# Frodsham Solar

# Frodsham Marshes, Frodsham, Cheshire West and Chester

# Environmental Impact Assessment Scoping Report

**May 2023**

**Planning Act 2008**

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# 1.0 INTRODUCTION

## 1.1 Background

1.1.1 Frodsham Solar Limited ('the Applicant') has commissioned this Environmental Impact Assessment (EIA) Scoping Report for the Frodsham Solar project ('the Proposed Development'). The Proposed Development comprises a new solar energy generating station and an associated on-site Battery Energy Storage System (BESS) on land at Frodsham Marsh, Frodsham, Cheshire West and Chester ('the Site'). The Proposed Development also includes the associated infrastructure for connection to the local electricity distribution network, as well as private wire electricity connections to nearby businesses that would utilise the renewable energy generated by the Proposed Development.

1.1.2 The current design for the Proposed Development would enable the generation of approximately 150 megawatts (MW) of electricity, as well as the storage of approximately 50 - 100 MW of electricity in a BESS. The precise generating capacity and storage capacity will be subject to detailed design, but it should be noted that at present the gird connection offer from the District Network Operator (DNO) is for 100 MW export and 50 MW import. As noted above the Proposed Development would also be capable of exporting electricity directly to local businesses.

1.1.3 As the Proposed Development would have an electrical generating capacity in excess of 50MW it would be defined as a Nationally Significant Infrastructure Project (NSIP) under S.14(1)(a) and S.15(2) of the Planning Act 2008 ('the Act'), necessitating the submission of a Development Consent Order (DCO) application to the Secretary of State for the Department for Energy Security and Net Zero ('the SoS').

1.1.4 The Site is located approximately 500 m to the north of the centre of Frodsham Town Centre. The Proposed Development location is shown on Figure 1.1.

1.1.5 The Site contains all of the principal elements of the Proposed Development which includes the:

i) Solar Array Development Area that would include solar photovoltaic (PV) panels, internal access tracks, cabling, solar array substation compound, BESS compound;

ii) the access route into the Site;
iii) the grid connection to the SP Energy Networks (SPEN) Substation; and,
iv) the private wire connections to local businesses.

1.1.6 The development areas are shown on Figure 1.2 and are described in detail within Chapter 3.0 of this Scoping Report.

1.1.7 It is important to note that at this stage, Figure 1.2 shows the currently anticipated extent of land to be included within the DCO application. This may be refined as the Proposed Development design progresses, taking into account the findings of the ongoing environmental and technical assessments, and consultation responses. The design of the Proposed Development will also include provision of mitigation areas and buffers to sensitive receptors such as watercourses, Public Rights of Way (PROW) and ecological receptors. Details of the mitigation will be determined from the findings of the ongoing environmental assessment work and engagement with project stakeholders.

1.1.8 This Scoping Report forms a formal request for a Scoping Opinion under Regulation 10(1) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 'EIA Regulations') as well as notification that an ES is to be produced pursuant to Regulation 8(1)(b) of the EIA Regulations.

## 1.2 Legislative Context and Need for Environmental Impact Assessment

1.2.1 As set out above, the Proposed Development is defined as a NSIP as an onshore generating station in England, exceeding 50 MW.

1.2.2 The EIA requirement for NSIP developments is transposed into law through the EIA Regulations. The EIA Regulations specify which developments are required to undergo EIA and schemes relevant to the NSIP planning process are listed under either of 'Schedule 1' or 'Schedule 2'. Those developments listed in Schedule 1 must be subject to EIA, while developments listed in 'Schedule 2' must only be subjected to EIA if they are considered *'likely to have significant effects on the environment by virtue of factors such as its nature, size or location'*. The criteria on which this judgement must be made are set out in Schedule 3.

1.2.3 The Proposed Development is a 'Schedule 2' development under Paragraph 3(a) of Schedule 2 of the EIA Regulations as it would comprise an *'Industrial installations for the production of electricity, steam and hot water'.*

1.2.4 It is considered that by virtue of the nature, size and location of the Proposed Development it would have the potential to meet the Criteria in Schedule 3 of the EIA regulations and, therefore, has the potential to give rise to likely significant environmental effects. As a consequence, further to Regulation 8(1)(b) of the EIA Regulations and pursuant to Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 ('APFP Regulations') the Applicant has elected to prepare an Environmental Statement (ES) in support of the DCO application. The ES will set out the methods and findings of a comprehensive EIA process undertaken in line with the EIA Regulations.

1.2.5 The Localism Act 2011 appointed the Planning Inspectorate as the agency responsible for operating the DCO process for NSIPs. The SoS will appoint an Examining Authority from the Planning Inspectorate, who will examine the DCO application for the Proposed Development and will make a recommendation to the SoS, who will ultimately make the decision on whether to grant or to refuse the DCO.

1.2.6 In accordance with Section 104(2) of the Act, the SoS is required to have regard to the relevant National Policy Statement (NPS), amongst other matters, when deciding whether or not to grant a DCO. Solar PV generation and battery storage are not currently covered by an adopted NPS.

1.2.7 A revised series of energy NPSs were published for consultation in September 2021. In March 2023 the government responded to the consultation and issued an updated series of draft energy NPSs for further consultation. Solar PV Generation is covered within the Draft NPS for Renewable Infrastructure (EN-3) (Draft NPS EN-3), with energy storage recognised as associated infrastructure. It is anticipated that by the time the Frodsham Solar DCO application is submitted, the revised NPSs will be adopted and current NPSs will be superseded (adoption of the NPSs is expected in Q3 of 2023) and therefore section 104 the Act will apply (noting that even if this is not the case, that the current and emerging NPSs would still be an 'important and relevant' consideration for the purposes of section 105 of the Act). The SoS will have regard to the updated NPSs when determining the DCO.

1.2.8 Until the new NPSs are formally adopted, account will be taken of both the extant and emerging NPSs of relevance to the Proposed Development. They comprise:

i) Overarching National Policy Statement for Energy (EN-1) (NPS EN-1)
ii) National Policy Statement for Renewable Energy Infrastructure (EN-3) (NPS EN-3)
iii) National Policy Statement for Electricity Networks Infrastructure (EN-5) (NPS EN-5)
iv) Draft Overarching National Policy Statement for Energy (EN-1) (Draft NPS EN-1)
v) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (Draft NPS EN-3)
vi) Draft National Policy Statement for Electricity Networks Infrastructure (EN-5) (Draft NPS EN-5)

1.2.9 The extent to which a NSIP project accords (or otherwise) with the relevant NPSs is central to the SoS's ability to ultimately approve a DCO application. Given the critical importance of these NPSs, they have been fully considered in adopting the approach to the EIA. A summary of the relevant considerations is provided for each environmental topic (contained within Chapters 7 to 17 of this Scoping Report).

1.2.10 The SoS will also consider other important and relevant matters, including national and local planning policy. For example, the National Planning Policy Framework (NPPF) published in July 2021 is considered a relevant national planning policy.

1.2.11 The Proposed Development lies predominantly within Cheshire West and Cheshire Council, with a very small section of one of the private wire electricity connections falling within Halton Borough Council. As such the Development Plan documents relevant to the Proposed Development are as follows:

i) Cheshire West and Chester Local Plan (Part One) Strategic Policies (January 2015)
ii) Cheshire West and Chester Local Plan (Part Two) Land Allocations and Detailed Policies (July 2019)
iii) Halton Delivery and Allocations Local Plan (March 2022)
iv) Joint Merseyside and Halton Local Plan (2013)

1.2.12 The purpose of considering the aforementioned planning policy at the scoping stage of the EIA is twofold:

i) To identify policy that could influence the sensitivity of receptors (and therefore the significance of effects) and any requirements for mitigation; and
ii) To identify planning policy that could influence the methodology of the EIA. For example, a planning policy may require the assessment of a particular impact or the use of a particular methodology.

1.2.13 A summary of national and local planning policy relevant to each technical assessment is provided for each environmental topic.

## 1.3 Purpose and Structure of the Scoping Report

1.3.1 The EIA Regulations set out the requirements for an applicant who proposes to request a scoping opinion from the SoS. Regulation 10(3) of the EIA Regulations requires a Scoping Report to include:

i) A plan sufficient to identify the land;
ii) A description of the proposed development, including its location and technical capacity;
iii) An explanation of the likely significant effects of the development on the environment; and
iv) Such other information or representations as the person making the request may wish to provide or make.

1.3.2 The purpose of this EIA Scoping Report is therefore to:

i) Provide a summary of the Proposed Development;
ii) Set out the proposed scope of work and methods to be applied in carrying out the EIA; and
iii) Set out the proposed structure and coverage of the ES to be submitted with the DCO application.

1.3.3 The Scoping Report is set out in accordance with guidance provided by the Planning Inspectorate's Advice Note 7: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements. Table 1.1 lists the suggested requirements identified in Advice Note 7 and details where they

are presented in this Scoping Report. The requirements of the EIA Regulations regarding the content of the ES are also covered within the contents tabulated below.

**Table 1.1 - Contents for the Scoping Report based on Advice Note 7**

| Suggested Scoping Report Contents | Location in this Scoping Report |
|---|---|
| Transboundary Effects | Section 1.4 |
| A plan showing:<br>The proposed draft DCO site boundary (identified by a red line) including any associated development;<br>Any permanent land take required for the proposed development;<br>Any temporary land take required for construction, including construction compounds;<br>Any existing infrastructure which would be retained or upgraded for use as part of the proposed development and any existing infrastructure that would be removed; and<br>Features including planning constraints and designated areas on and around the sites such as national parks or historic landscapes. | Figure 1.1 (Site Location)<br>Figure 1.2 (The Proposed Development Area)<br>Figure 1.3 (Planning and Environmental Designations) |
| A description of the proposed development including both the NSIP and any associated development. | Chapter 3.0 (The Proposed Development) |
| In dealing with the description of the proposed development and its possible effects on the environment, applicants should:<br>Set out the information using the headings in Schedule 4 of the EIA Regulations; and<br>Ensure that all aspects of the environment likely to be significantly affected by the development are addressed. | Chapter 3.0 (The Proposed Development) and Chapters 7.0 to 17.0 (Technical Topics) |
| An outline of the main alternatives considered and the reasons for selecting a preferred option. | Chapter 4.0 (Alternatives Considered) |
| Results of desktop and baseline studies where available. | Chapters 7.0 to 17.0 (Technical Topics) |
| Referenced plans presented at an appropriate scale to convey clearly the information and all known aspects associated with the proposal. | See figure list |
| Any mitigation proposed and predicted residual effects | Chapters 7.0 to 17.0 (Technical Topics) |
| Where cumulative development has been identified, how the developer intends to assess these impacts in the ES. | Chapter 6.0 (EIA Methodology) |
| An indication of any European designated nature conservation sites that are likely to be significantly affected by the proposed development and the nature of the likely significant impacts on these sites. | Chapter 8.0 (Ecology) |

| | |
|---|---|
| Where a developer seeks to scope out a matter, a full justification for scoping out such matters.. | Chapters 7 to 17 (Technical Topics) |
| Key topics covered as part of the developer's scoping exercise. | Chapters 7 to 17 (Technical Topics) |
| An outline of the structure of the proposed ES. | Chapter 18 (Structure of the ES) |

## 1.4 Transboundary Effects

1.4.1 Schedule 4 of the EIA Regulations requires the Applicant to consider transboundary effects i.e. an effect on an EEA State. Based on the findings set out in the subsequent sections of this Scoping Report the Applicant considers that the spatial extent of any likely significant effects which could potentially arise from the Proposed Development would not extend to any neighbouring EEA State. This conclusion is based on the Applicant's knowledge and experience of effects from similar projects and the findings from other EIAs of Solar PV developments of a similar scale.

1.4.2 On this basis it is proposed that further consideration of transboundary effects is scoped out of the ES and that Regulation 32 of the EIA Regulations will not need to be engaged by the SoS.

# 2.0 THE NEED FOR THE PROPOSED DEVELOPMENT

## 2.1 Introduction

2.1.1 This section of the EIA Scoping Report puts into context the strategic need for the Proposed Development based on a review of key Government policy and strategy.

## 2.2 National Energy Policy and Strategy

### *Climate Change Act 2008 (2050 Target Amendment) Order 2019*

2.2.1 The Climate Change Act 2008 set a legally binding target for the UK to achieve an 80% reduction in greenhouse gas emissions by 2050, from the 1990 baseline. However, the UK Government decided that this legally binding target was not ambitious enough to mitigate the nation's activities on climate change. In 2019 the UK Government became the first major economy in the world to pass laws to end its contribution to global warming by 2050, compared to the 1990 baseline.

2.2.2 On 12 June 2019, the Government laid the draft Climate Change Act 2008 (2050 Target Amendment) Order 2019 to amend the Climate Change Act 2008 by introducing a target for at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) in the UK by 2050. This is otherwise known as the 'net zero' target. The draft order amended the 2050 greenhouse gas emissions reduction target in the Climate Change Act from at least 80% to at least 100%, thereby constituting a legally binding commitment to end the UK's contribution to climate change.

2.2.3 At the time the legislation was enacted the UK had already reduced emissions by 42% while growing the economy by 72%. However, the new target requires a significant increase in renewable energy, development of carbon capture and storage technology, construction of new nuclear generation capacity, and a transition to hydrogen and electric for heating and transport.

2.2.4 On 20 April 2021 the UK government announced that it would set in law a more ambitious target of cutting carbon emissions by 78% by 2035 compared to 1990 levels. This was in response to the UK's Sixth Carbon Budget from the Climate Change Committee (see below) and signals the Government's acceptance of the recommendations and commitment to carbon emission reductions.

2.2.5 It is clear from the Government's legally binding commitment to net zero by 2050 and recent announcement that significant new investment will be required in renewable energy projects across the UK to deliver these ambitious objectives.

### *Sixth Carbon Budget (2021)*

2.2.6 Since the Clean Growth Strategy was updated in April 2018 the Sixth Carbon Budget, required under the Climate Change Act, has been published. On the 20th April 2021 the UK government announced that it would adopt the recommendations and enshrine them in law, and the legislation was set out to parliament on 21 April 2021. The Sixth Carbon Budget provides advice on the volume of greenhouse gases that the UK can emit during the period 2033-2037. This would involve setting the most ambitious climate change target in the world of a reduction of 78% by 2035. One of the four key steps to achieving this target is the expansion of low-carbon energy supplies (such as the Proposed Development), with UK electricity production achieving zero carbon emissions by 2035. This is a dramatic step-change and will logically require more emphasis on renewable energy as part of a suite of measures to achieve this target.

2.2.7 The Electricity Generation Sector Summary for the Sixth Carbon Budget sets out on page 14 that:

*'Large-scale solar currently has 13 GW installed capacity in the UK, which requires 290 km$^2$. Maximising the potential of solar generation might entail using an additional 1,500 km$^2$'*

2.2.8 To maximise the potential of solar generation in the context of the Sixth Carbon Budget and to achieve the Government's Net Zero Target by 2050 could require an additional 150,000 hectares of land. This highlights the scale of the challenge to deliver Net Zero by 2050.

### *Delivering a reliable decarbonised power system (March 2023)*

2.2.9 The Committee on Climate Change published a report in March 2023 which highlights the scale of the task in achieving the Government's 2035 goal. The report focusses on the need to deliver a resilient and reliable power system in the UK.

2.2.10 The report discusses the need for improvements to infrastructure to meet the expected increase in electricity demand and variability in supply associated with renewable generation.

2.2.11 The report reiterates that renewables continue to be the cheapest form of electricity generation and that they can be harnessed cost-effectively and that *"delivering a decarbonised electricity system by 2035 is a critical national delivery milestone for Net Zero. Delivery and deployment of infrastructure must be achieved at a much greater pace than the present regulatory, planning and consenting regimes can achieve."*.

### *National Policy Statements*

2.2.12 NPS EN-1, published in July 2011, calls for a reduction in the UK dependency on fossil fuels. This need will only be heightened further if the government's 2035 ambition is to be met. The Proposed Development would assist in the delivery of the essential clean energy generating infrastructure required to mitigate the UK's contribution to climate change in advance of 2035, due to the availability of suitable grid capacity.

2.2.13 NPS EN-1 makes the following statements (emphasis added):

*'As part of the UK's need to diversify and de-carbonise electricity generation, the Government is committed to increasing dramatically the amount of renewable generation capacity.' (Paragraph 3.3.10)*

*'An increase in renewable electricity is essential to enable the UK to meet its commitments under the EU Renewable Energy Directive. It will also help improve our energy security by reducing our dependence on imported fossil fuels, decrease greenhouse gas emissions and provide economic opportunities.' (Paragraph 3.3.11)*

*'The UK has committed to sourcing 15% of its total energy (across the sectors of transport, electricity and heat) from renewable sources by 2020 and new projects need to continue to come forward urgently to ensure that we meet this target. Projections suggest that by 2020 about 30% or more of our electricity generation – both centralised and small-scale – could come from renewable sources, compared to 6.7% in 2009.' (Paragraph 3.4.1)*

*'Paragraph 3.4.1 above sets out the UK commitments to sourcing 15% of energy from renewable sources by 2020. To hit this target, and to largely de-carbonise the power sector by 2030, it is necessary to bring forward new renewable electricity generating projects as soon as possible. The need for new renewable electricity generation projects is therefore urgent.' (Paragraph 3.4.5)*

2.2.14 The figures in paragraphs 3.4.1 and 3.4.5 of NPS EN-1 are now considered out of date in the context of the Climate Change Act 2008 (2050 Target Amendment) Order 2019. The revised target of net zero by 2050 introduces an even greater imperative to deliver increased renewable energy schemes, as matter of utmost urgency.

2.2.15 NPS EN-3, also published in July 2011, sets out the national policy for renewable energy projects. NPS EN-3 sets out the importance of renewable energy in achieving the Government's ambitious targets for renewable energy generation, highlighting in the introductory paragraph (1.1.1) that a '*significant increase in generation from large-scale renewable energy infrastructure is necessary to meet the 15% renewable energy target.'*

2.2.16 As set out above this target is now out of date and the Climate Change Act 2008 (2050 Target Amendment) Order 2019 introduces an even greater urgency to deliver renewable energy projects, such as the Proposed Development.

### *Draft National Policy Statements*

2.2.17 Since December 2020 the Government have been reviewing the energy NPSs to reflect changes in energy and climate change policy. This led to a consultation on updated draft energy NPSs in September 2021. Following the consultation on the draft NPSs the Government published further energy policy documents, including the British Energy Security Strategy (described below). As a result, it was decided to make changes to the draft NPSs including the need to strengthen the Renewables NPSs to reflect the importance of energy security and net zero commitments. The revised draft NPS have therefore been subject to a further round of consultation.

2.2.18 The Government's response to the September 2021 consultation provided clear support for the development of solar recognising *"the need to see increased deployment of all types and scales of solar, including rooftop projects, to meet our objectives",* it also made it clear that *"that accelerated deployment of large scale*

*solar, in common with other large infrastructure projects, will have impacts on land-use, landscape and the local environment.".*

2.2.19 Draft NPS EN-1 updates the policy statement to reflect the Net Zero target by 2050. Draft NPS EN-1 states at paragraph 3.3.20 that:

*'Wind and solar are the lowest cost ways of generating electricity, helping reduce costs and providing a clean and secure source of electricity supply (as they are not reliant on fuel for generation). Our analysis shows that a secure, reliable, affordable, net zero consistent system in 2050 is likely to be composed predominantly of wind and solar'.*

2.2.20 Draft NPS EN-3 covers renewable energy infrastructure. The Government has updated the document to reflect the important role that renewables will play in developing a low carbon economy and meeting government's net zero targets. Draft NPS EN-3 sets out at paragraphs 3.10.1 that:

*"The government has committed to sustained growth in solar capacity to ensure that we are on a pathway that allows us to meet net zero emissions. As such solar is a key part of the government's strategy for low-cost decarbonisation of the energy sector."*

### *British Energy Security Strategy*

2.2.21 On the 7th April 2022 the Government published their long awaited Energy Security Strategy to the backdrop of soaring global energy prices and increased energy security fears in the wake of Russia's invasion of the Ukraine. The objective of the Energy Security Strategy is to set out a clear way forward to providing the energy we need in a safe, secure and affordable way, and at the same time ensuring that we do all we can to meet our net-zero commitments. The Prime Ministers foreword states that; *"We're going to take advantage of Britain's inexhaustible resource of wind and – yes- sunshine."*

2.2.22 The Strategy states that: *"Accelerating the transition from fossil fuels depends critically on how quickly we can roll out renewables. Our 'Ten point plan for a green industrial revolution' has already put the UK at the forefront of may renewable technologies, delivering £40 billion of private investment in under 2 years. By the end of 2023 we are set to increase our capacity by a further 15%." Turning*

*specifically to solar, the Strategy recognises the opportunities open to us to harness the suns power. It states: "The cost of solar has fallen by around 85% over the past decade…We expect a five-fold increase in deployment by 2035. For ground-mounted solar, we will consult on amending planning rules to strengthen policy in favour of development on non-protected land, whilst ensuring communities continue to have a say and environmental protections remain in place."* (emphasis added)

2.2.23 The five-fold increase in solar deployment referenced in the British Energy Security Strategy means that solar will need to increase from the existing 14GW to 70GW by 2035, if the strategy targets are to be delivered. These targets match the rate of increase forecast in National Grid's Future Energy Scenarios Report 2022. It is clear that the Government solar policy is to support the broad role out of opportunities where they are not identified in high value protected landscapes and designations.

### *Powering Up Britain (March 2023)*

2.2.24 This report was published by the Government in March 2023 with the stated purpose of setting out how the Government will enhance the country's energy security, seize the economic opportunities of the transition, and deliver on net zero commitments. The Government makes it clear that the transition to net zero will require action across the whole economy fuelled by rapid deployment of low carbon electricity.

2.2.25 The reports reiterates the previously stated intention to increase solar power by five times by 2035 to 70GW of generating capacity. It is stated that Government seeks large scale solar deployment across the UK, looking for development mainly on brownfield, industrial and low/medium grade agricultural land.

## 2.3 Conclusion

2.3.1 The need for additional renewable energy development, including Solar PV, is very significant and new infrastructure must be delivered as a matter of urgency, if the UK Government is to meet its commitment to Net Zero by 2050.

# 3.0 THE PROPOSED DEVELOPMENT

## 3.1 Site Description

### *Introduction*

3.1.1 This chapter presents a description of the Proposed Development in sufficient detail to inform the approach to, and scope of, the EIA.

### *Site and Surrounding Area*

3.1.2 The Site is located within the administrative areas of Cheshire West and Chester Council (CWaCC) and Halton Borough Council (HBC). The vast majority of the Proposed Development, including the entirety of the Solar Array Development Area lies within CWaCC. The only element of the Proposed Development within HBC is a small section of the private wire electrical connection on the northern bank of the Weaver Navigation.

3.1.3 The currently anticipated extent of land that is expected to be included within the DCO application for the Proposed Development, including the areas of the cable route corridors and access to the Site is shown on Figure 1.2. It should be noted this represents the current extent of land being considered and will be refined as the design of the Proposed Development progresses.

3.1.4 Key environmental and planning designations on, and in close proximity to, the Site are shown on Figure 1.3, these are described below.

3.1.5 The Site is approximately centred on National Grid Reference (NGR) 351000E, 378500N and is located approximately 500 m to the north Frodsham Town Centre at its nearest point.

3.1.6 The Site comprises a single red line boundary that covers all land expected to be included within the Proposed Development, which in total is approximately 314 ha. This encompasses the areas required for solar development, all associated infrastructure, access tracks, cabling, the grid connection to the SPEN Substation and private wire connections to local businesses.

3.1.7 The Solar Array Development Area Context Plan is shown on Figure 1.4, which illustrates the key features described below.

3.1.8 The Solar Array Development Area would be located at the eastern extent of Frodsham Marsh, an area of land between the Mersey Estuary and the M56. The northern boundary of the Solar Array Development Area is formed by the River Weaver, the north-west boundary by the Manchester Ship Canal, with the Mersey Estuary lying beyond. The western boundary of the Solar Array Development Area is formed by two of the former Manchester Ship Canal Dredging Deposit Ground Cells; Cell 3 and Cell 6. The southern boundary of the Solar Array Development Area is formed by agricultural fields and the M56 motorway.

3.1.9 The Solar Development Area comprises four relatively distinct areas:

i) The Eastern Cluster of Frodsham Wind Farm (approximately 152 ha): This area forms the western half of the Solar Array Development Area. Six wind turbines, 125 m to blade tip, are located in this area. The land forms part of the former Manchester Ship Canal Dredging Deposit Ground, and includes Cells 1, 2 and 5. The cells have been restored to agricultural land and are now grazed by sheep / cattle (by the tenant of Frodsham Marsh Farm). The land in this area lies between approximately 9.5 m and 12.5 m above ordnance datum (AOD).
ii) Former agricultural land used by Frodsham Wildfowlers (approximately 36 ha): The central area of the Solar Array Development Area is former agricultural land which has been left fallow and managed to encourage use by wildfowl. This area is currently used for recreational shooting by Frodsham Wildfowlers. This area of the site is crossed by a series of ditches which have been used to drain and manage water levels on Frodsham Marsh. The land in this area lies at approximately 6 m AOD.
iii) Agricultural land (approximately 61 ha): The south-western portion of the Solar Array Development Area is agricultural land. It is understood that the land has been used for growing crops and silage (this is not linked to the activities of Frodsham Marsh Farm). Some areas of the fields appear to have been left fallow and have colonised with scrub and wet grassland. Hedgerows demarcate boundaries between field units. The land in this area lies at approximately 5 m AOD.
iv) Former Weaver Navigation Dredging Deposit Ground (approximately 22 ha): Located in the north-eastern part of the Solar Array Development Area is a former deposit ground that was historically used to deposit dredgings from the Weaver Navigation, referred to as the INEOS Inovyn Deposit Ground. A raised

embankment forms the boundary of the cell. The surface of the cell has been left to recolonise with scrub, with some areas of grassland. The land in this area lies at approximately 10 m AOD.

3.1.10 The Access Route to the Site is from the west, leading from Pool Lane roundabout. Vehicles accessing the Site would turn onto Grinsome Road (a private road) from Pool Lane roundabout and travel east towards Protos[1] for approximately 1.5 km, routing north at Grinsome Road Roundabout, along Road 1 of Protos. Vehicles would then turn east along Marsh Lane which provides access to Frodsham Wind Farm. The Frodsham Wind Farm access tracks provide access to the Solar Array Development Area.

3.1.11 A series of Public Rights of Way (PROW) cross the Site, these are illustrated on Figure 1.5. The PROW include footpaths and restricted byways, which allow access by foot, horseback and cyclists. National Cycle Route 5 runs along a section of the access route into the Site and along part of the southern edge of the Site.

3.1.12 The Site is crossed by a series of utilities including above and below ground high voltage electricity transmission lines, high pressure gas lines, water distribution mains, telecommunication lines and private pipelines associated with nearby petrochemical plants.

3.1.13 As set out previously the closest settlement is Frodsham on the south side of the M56. To the south-west of Frodsham lies Helsby, approximately 2 km from the Solar Array Development Area. Both Frodsham and Helsby lie at the foot of the northern extent of the Cheshire Sandstone Ridge, which rises to a height of approximately 150 m to the south of Frodsham and Helsby.

3.1.14 To the north and north-east of the Site, on the north bank of the River Weaver / Weaver Navigation, lies Runcorn and the settlements of Weston and Beechwood, located approximately 1 km from the Solar Array Development Area.

3.1.15 There are large areas of industrial development along this section of the River Mersey corridor. The northern bank of the River Weaver / Weaver Navigation is

[1] *A significant strategic development site with the benefit of planning permissions for a range of energy generation and resource management businesses*

occupied by the INEOS Inovyn Runcorn Site which produces a range of chemicals for industrial use. The INEOS Inovyn Runcorn Site also includes an 800MW gas-fired power station, and further north is the Runcorn Energy from Waste Plant operated by Viridor. To the west of the Solar Array Development Area are 13 further turbines associated with the Frodsham Wind Farm, beyond which lies the former CF Fertiliser plant which was decommissioned in 2022. Protos, a significant development site with the benefit of planning permissions for a range of energy generation and resource management businesses, is located to the west of the CF Fertiliser plant along with the Encirc glass manufacturing facility. Beyond this to the west is the Stanlow oil refinery site.

3.1.16 As set out above the Manchester Ship Canal forms the northern boundary of the Site and is separated from the Mersey Estuary by Frodsham Score, a 100-200 m wide strip of low-lying marshland. The Mersey Estuary and Frodsham Score are designated as a Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar site. The SSSI also covers a strip of land approximately 100m wide on the southern side of the Manchester Ship Canal, the eastern 500m of which lies within the Site.

3.1.17 The Solar Array Development Area is also designated as a Local Wildlife Site and as Green Belt.

3.1.18 Neither the Site nor the immediate surrounding area is covered by any statutory landscape designations, e.g. National Parks or Areas of Outstanding National Beauty (AONB). The nearest statutory landscape designation to the Site is the Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB), located over 26.5km to the south-west.

3.1.19 CWaCC maintain a non-statutory Area of Special County Value (ASCV) designation. The Weaver Valley ASCV is located approximately 850m south-east of the Site at the closest point. The Helsby and Frodsham Hills ASCV is located approximately 1km south of the Site at the closest point.

3.1.20 There are no designated heritage assets within the Site. There are nine Grade II Listed Buildings within 1km of the Site and four Conservation Areas, including Frodsham Town Centre. Five Scheduled Monuments lie between 1 km and 3 km from the Site.

3.1.21 With the exception of the INEOS Inovyn Deposit Ground the eastern half of the Site lies within Flood Zone 3, which benefits from flood defences. The Manchester Ship Canal Dredging Deposit Ground Cells in the western half of the Site, and the INEOS Inovyn Deposit Ground are raised and so lie within Flood Zone 1. There are a series of drains which dissect the agricultural and former agricultural land in the eastern half of the Site. Some drainage ditches are also present within the area of the Manchester Ship Canal Dredging Deposit Ground Cells. This includes three drainage ditches which are classified as Main Rivers. Flood defences maintained by the Environment Agency run along the southern bank of the River Weaver and along the Main Rivers within the Site. Frodsham Pumping Station, located close to the eastern boundary of the Site, pumps water from the drainage ditches into the River Weaver.

## 3.2 The DCO Site Boundary

3.2.1 The expected maximum area of land potentially required for the construction, operation and maintenance of the Proposed Development, which includes land required for permanent and temporary purposes, is shown on Figure 1.2. It is important to note that this may be subject to change as the design of the Proposed Development progresses, taking into account environmental and technical factors, and consultation responses.

3.2.2 At this stage of the process there is no known existing infrastructure on the Site that would need to be removed in order to facilitate the development.

### *The Rochdale Envelope*

3.2.3 The Planning Inspectorate's Advice Note 9: Using the 'Rochdale Envelope' ('Advice Note 9') provides guidance regarding the degree of flexibility that may be considered appropriate within an application for development consent under the Planning Act 2008. The advice note acknowledges that there may be aspects of the Proposed Development design that are not yet fixed, and therefore, it may be necessary for the EIA to assess likely worst-case variations to ensure that all foreseeable significant environmental effects of the Proposed Development will be assessed.

3.2.4 The amount of flexibility required will depend upon the progress of the design when the detailed EIA work is undertaken. However, it is expected that certain aspects of the Proposed Development will still require design flexibility whilst the EIA is being carried out. Building flexibility into the design of the Proposed Development will

ensure that the detailed design can be informed by environmental and technical considerations, post-consent work and take advantage of any innovations in technology (noting that Solar PV and BESS technology is rapidly evolving). Where such flexibility or optionality is required, this is explained below and will also be explained in the ES.

3.2.5 It is therefore necessary for the technical assessments to assess an 'envelope' within which the works will take place. As such, the DCO application and EIA will be based upon maximum and, if relevant, minimum parameters or limits of deviation. To remain in accordance with the EIA Regulations it will be essential that the parameters are as 'limited' as possible to ensure that the 'likely significant effects' are identified, rather than unrealistically amplified effects, which could be deemed to be unlikely. These parameters will be considered in detail by technical authors in the ES to ensure the realistic worst-case effects of the Proposed Development are assessed for each potential receptor.

3.2.6 Advice Note 9 sets out that within the defined parameters, the level of detail of the proposals must be sufficient to enable a proper assessment of the likely significant environmental effects and the identification of mitigation measures, if necessary, considering a range of possibilities, paragraph 4.9 states *"the ES should be undertaken on the basis of the relevant design parameters applicable to the characteristics of the Proposed Development included within the DCO. The assessment should establish those parameters likely to result in the maximum adverse effect (the worst case scenario) and be undertaken accordingly to determine significance."*.

3.2.7 It is for the decision maker in granting consent, to impose requirements to ensure that the process of evolution remains within the parameters applied for and assessed for the Proposed Development as set out in paragraph 2.4 of Advice Note 9, *"the DCO must not permit the Proposed Development to extend beyond the 'clearly defined parameters' which have been requested and assessed. The Secretary of State may choose to impose requirements to ensure that the Proposed Development is constrained in this way"*.

3.2.8 The amount of flexibility required will depend upon the progress of the design at the stage the detailed EIA work is undertaken. It is expected that the following aspects

of the Proposed Development may still require design flexibility when the EIA is being carried out:

i) The detailed layout and type of PV module mounting structure.
ii) The arrangement of supporting infrastructure such as inverters, transformers and switchgear (decentralised or centralised options).
iii) The arrangement of battery energy storage systems.
iv) The location of and the method used to connect to the SPEN Substation and the INEOS Inovyn Runcorn Site (below ground or above ground).

## 3.3 Description of the Proposed Development

### *Introduction*

3.3.1 Solar PV and energy storage technologies are rapidly evolving. As a result, the parameters of the DCO will maintain flexibility to allow the latest technology to be utilised at the time of construction. This section of the chapter provides information on the following:

i) Solar and battery infrastructure, grid connection, and other associated and ancillary development needed to operate and maintain the Proposed Development;
ii) Construction programme and activities;
iii) Operational and maintenance activities; and
iv) Decommissioning.

### *Overview of Solar and Battery Storage Infrastructure*

3.3.2 The principal infrastructure would be as follows:

i) Solar PV modules;
ii) PV module mounting structures;
iii) Inverters;
iv) Transformers;
v) High voltage (HV) Switchgear and control equipment;
vi) Onsite cabling;
vii) Battery Energy Storage System;

viii) An electrical substation compound comprising a new substation and control building (Frodsham Solar substation);
ix) A spare parts storage building(s);
x) Fencing and security measures;
xi) Access tracks; and
xii) Landscaping and biodiversity enhancement.

3.3.3 During the construction phase, one or more temporary construction compound(s) would be required as well as temporary roadways to facilitate access to all land within the Site. These will be fully considered within the ES. Further information on construction activities is described below. It should be noted that at present it is anticipated that all temporary land requirements would be able to be included within the boundary shown on Figure 1.2.

3.3.4 In areas around the arrays, and on other land within the Site (or outside it if proven necessary), opportunities for landscaping, biodiversity enhancements, public access and habitat management will be explored.

### *Solar PV Infrastructure*

3.3.5 The Proposed Development comprises the installation of static solar PV panels which convert sunlight into direct electrical current (DC) electricity. It is possible to install the panels as either 'fixed' arrays, where the angle of the panels is fixed, or 'tracker' arrays, where the angle of the panels can change to follow the sun at different times of the year. The Proposed Development will use 'fixed' arrays.

3.3.6 The solar PV panels are installed on support frame mounting structures which would be arranged into rows, typically set approximately 3.5 m apart with the maximum height of the panels along the back edge of the array typically up to approximately 3.5 m in height. The clearance beneath the base of the panel to the ground would be a minimum of 0.7m.

3.3.7 The solar PV support frame structures would consist of steel uprights and aluminium or steel cross bars. The steel uprights would comprise hollow steel posts with a u-shaped cross section. The rest of the support frame would then be fitted to the posts to create angled support tables ready for the solar panel installation.

3.3.8 The solar PV panels would be mounted on the pre-constructed support frame table. The individual solar PV panels typically comprise dark blue, dark grey or black PV cells. The PV cells can be mounted to one side of the panel (mono-facial) or both side (bi-facial). PV technologies are developing rapidly and it is not possible to specify the precise panel type, as this will depend on the competitive procurement process and the best technology available at the time of construction. Where flexibility is sought each relevant topic of the ES will assess the worst case scenario.

3.3.9 The solar PV panels would be connected in strings and cabling would be secured to the rear of the solar panel and would be protected by suitable trunking.

**Image 3.1 – Example Solar PV Panel Arrangement**

### *Supporting Infrastructure (Inverters, Transformers and Switchgear)*

*Inverters*

3.3.10 Inverters convert the DC electricity produced by the solar PV panels into alternating current (AC) that can be exported to an electricity user or the local distribution network. The inverters can be located at regular intervals throughout the Proposed Development and are typically containerised with associated control and switchgear equipment, referred to as centralised inverters. The structures are up to 3.5 m in height. Alternatively, inverters can be mounted underneath the rear of the panels, referred to as string inverters. The option selected will be determined by a number

of factors and will be dependent on the final technology supplier. Where flexibility is sought each relevant topic of the ES will assess the worst case scenario.

**Image 3.2 – Example Centralised Inverter / Transformer Station**

**Image 3.3 – Example String Inverter**

*Transformers*

3.3.11 Transformers increase and control the voltage of the electricity produced before it reaches the Frodsham Solar substation. The transformers are typically co-located with centralised inverters at regular intervals throughout the Proposed Development. They are normally housed in containers up to 3.5 m in height that also include control equipment. Image 3.2 above provides an image of a combine inverter / transformer station. Independent transformer stations are similar in appearance.

*Switchgear*

3.3.12 Switchgear includes a range of electrical switches, fuses and breakers to control, protect and isolate the electrical circuits and equipment. The switchgear is also typically co-located with the Inverters (if centralised inverters are used) and Transformers.

*Cabling*

3.3.13 Underground electrical cabling within the Solar Array Development Area would connect the PV arrays to the inverter / transformers and then onto the Frodsham Solar substation or in the case of direct wire connections to a separate onsite distribution substation(s) via the private wire connection corridors. Cables would be laid within trenches that typically follow the internal access tracks, these trenches would typically be up to 1.2 m in width and 1.2 m in depth.

***Substation***

3.3.14 The electricity generated on site is relayed from the on-site transformers to the Frodsham Solar substation, or in the case of direct wire connections to a separate onsite distribution substation(s). The substations would contain a number of high-voltage transformers and switchgear equipment, with the Frodsham Solar substation also containing control facilities for the whole Scheme.

***Electrical Export/Import Connections***

3.3.15 From the Frodsham Solar substation, a 132kV cable grid connection will be provided to the SPEN Substation on the northern bank of the River Weaver. The grid connection is included as part of the Proposed Development, and all land anticipated to be required to provide the grid connection is included in the Site boundary.

3.3.16 The 132kV cable grid connection could be an overground connection with cables supported on new pylons, or underground, constructed by a combination of trench cut and backfilling, and horizontal directional drilling to navigate beneath the River Weaver. The height of the pylons required to support cables crossing the River Weaver will be dictated by any navigation limitations which will be determined as part of the ongoing design process.

3.3.17 The current proposals provide for the potential for two private wire connections as well as the connection to the SPEN Substation. One to the INEOS Inovyn Runcorn Site on the northern bank of the River Weaver / Weaver Navigation and one to Protos to the west of the Site. A distribution substation would be required for each connection. The distribution substations would be located within the Solar Array Development Area and would comprise transformer(s) and switchgear, either within a container or a fenced compound. A cable connection (voltage dependent on supplier requirement) would then be constructed from the distribution sub-station to the user, terminating at another substation within the user's site to be constructed and consented by that user.

3.3.18 Two potential cable routes are currently illustrated to the boundary of the INEOS Inovyn Runcorn Site. As with the SPEN Substation the connection could be either above ground or below ground.

3.3.19 The connection to Protos would be underground and would follow the route of the access road to the Site. For the majority of the route the cable trench would be located within the existing access road, with all construction disturbance limited to the existing surfaced roads. The cable route to Protos would terminate at Hoolpool Gutter as the final destination within Protos has yet to be decided. The remainder of the link into Protos would be developed by the end user.

### *Energy Storage Facility*

3.3.20 The Proposed Development will include a BESS that will either:

i) store excess power generated by the Proposed Development that could not be exported, or
ii) manage the export to make power available to the grid during times of peak demand, or
iii) provide grid balancing services for SPEN.

3.3.21 BESS facilities are an essential part of a net zero carbon electricity transmission network and are particularly important to solar generating facilities where the peak times of generation lie outside periods of traditional peak demand, which is typically in the evenings.

3.3.22 The BESS would comprise battery containers along with associated inverters and transformers and is expected to be co-located with the Frodsham Solar substation. The battery containers contain battery modules, air conditioning units, a fire suppression system, and battery monitoring, management and protection system and would be linked via cables to the other electrical infrastructure equipment within the Frodsham Solar substation.

**Image 3.4 – Example Battery Storage System Facility**

### *Security and Lighting*

3.3.23 Pole-mounted, infra-red security detection cameras would be mounted on poles of up to approximately 5m in height located along the perimeter fence and around electrical infrastructure / compounds. It is anticipated that these cameras would have motion detection technology for recording and would be pointed directly within the Site and away from any land outside of the Site.

3.3.24 The Proposed Development would not be routinely lit. Security lighting would be required around key electrical infrastructure. This lighting would only be operated during periods of maintenance or in the event of an emergency or a security breach.

### *Fencing*

3.3.25 A perimeter security fence would be installed to enclose the operational areas of the Proposed Development. The fence is likely to be either a wire-mesh or deer fence and measure between 2m and 3m in height. The fence will be designed in such a way to allow small animals to pass through the fenced areas.

3.3.26 High security fencing, weld mesh or palisade fencing, would be required around the main compound and Frodsham Solar substation / BESS compound.

**Image 3.5 – Example wire-mesh deer stock fencing and security camera**

## 3.4 Construction Programme and Activities

3.4.1 The following section provides a summary of the key elements of the construction of the Proposed Development. This description is not intended to be prescriptive and the exact construction methods, phasing and programme would be determined by the appointed designers and contractors. However, the following description should be sufficient to enable the principal construction phases and methods to be understood.

### *Construction Programme*

3.4.2 The construction of the Proposed Development is anticipated to commence in 2027 at the earliest. The date would be dependent on the procurement process, detialed

design, discharge of requirements and grid connection limitations. It is anticipated it would take approximately 15 months to complete construction. It is therefore expected the earliest the Proposed Development will be fully operational is 2028-29.

### *Construction Activities*

3.4.3 The types of construction activities are expected to include (not necessarily in order):

i) Site preparation and ground clearance;
ii) The establishment of construction compound(s) and laydown areas;
iii) Import of construction materials, plant and equipment to site;
iv) Upgrading of existing site tracks / access roads and construction of new tracks, many of which would be retained for the operation of the development;
v) The upgrade or construction of crossing points (bridges / culverts) over drainage ditches;
vi) Setting out of fencelines, panel arrays, substations, landscaping, drainage and associated infrastructure;
vii) Fencing installations;
viii) Site landscaping and habitat creation;
ix) Erection of PV module mounting structures;
x) Mounting of PV modules;
xi) Installation of inverter, transformer and substation cabins;
xii) Installation of electric cabling;
xiii) Installation of battery storage units;
xiv) Construction of substation compound;
xv) Grid connection groundworks;
xvi) Electrical cabling and connection to the SPEN Substation and private wire connections; and
xvii) Testing and commissioning.

### *Construction Site Access*

3.4.4 Construction access to the Site is described in Section 3.1 above. The access from the adopted highway network would be from Pool Lane roundabout via a series of private access roads which lead to the Site. Pool Lane provides access via the dualled A5117 to Junction 14 of the M56 and Junction 10 of the M53. The roads leading to the Site are all designed to a standard to accommodate HGV and currently

provide access to the east side of Stanlow Refinery, Protos and Encirc. There would be no construction access to the Site from Frodsham or Helsby.

3.4.5 It is not anticipated that any construction work would be required to the access route into the Site. Some minor repair works, such as repair of potholes, may be required along the unsurfaced section of the route leading from Marsh Lane to the Site.

### *Construction Environmental Management*

3.4.6 An Outline Construction Environmental Management Plan (OCEMP) would be prepared and submitted with the DCO application which would outline the principles, controls and measures to be implemented during construction to reduce potential significant environmental effects from occurring.

3.4.7 Where the Applicant intends to rely on mitigation measures to scope out likely significant construction phase environmental effects from the EIA these measures will be detailed within the OCEMP. A detailed Construction Environmental Management Plan will be produced following grant of the DCO and prior to the start of construction based on the principles of the OCEMP (this is likely to form a requirement attached to the DCO).

3.4.8 A series of other management plans would also be prepared, either as standalone plans, or in accordance with a required content list that will be set out in the outline CEMP.

### *Site Reinstatement and Habitat Creation*

3.4.9 Following construction, a programme of site reinstatement and habitat creation will commence (noting that ecological protection measures will be included in the CEMP for the construction state). An Outline Landscape and Ecological Management Plan (OLEMP) will be submitted as part of the DCO application. This document will set out the principles of how the land will be managed throughout the operational phase, following the completion of construction. A detailed Landscape and Ecological Management Plan will be produced following grant of the DCO and prior to the start of construction based on the principles of the OLEMP (this is likely to form a requirement attached to the DCO).

## 3.5 Operational Activities

3.5.1 The Proposed Development comprises a temporary development with an operational lifespan of up to 40 years, which is the expected operational life of the solar PV panels.

3.5.2 Once the Proposed Development is constructed, operational management access to the Site would be limited to routine maintenance operations, vegetation management, and farming activities. Maintenance access to the Site would be by a small van or similar, and storage containers would contain spare equipment and tools for routine repairs and maintenance. Operational access would be via the existing public highway with limited traffic movements expected.

3.5.3 Should more major repairs be required, such as the replacement of transformers, more staff and specialist equipment (cranes and low loaders) would be required. However, this is not anticipated to be a regular occurrence. The ES will set out what assumptions have been made in respect of maintenance activities and traffic movements.

## 3.6 Decommissioning

3.6.1 When the operational phase ends, the Proposed Development will require decommissioning. All solar PV modules, mounting poles, cabling, inverters and transformers would be removed from the Site and recycled or disposed of in accordance with good practice and market conditions at that time. It is likely that many of the below ground elements, such as the below ground sections of the panel supporting frames, would be left in situ limiting the potential for impacts on ecology, landscaping, mobilisation of sediments or contaminants etc. The Site will be returned to its original use after decommissioning. A Decommissioning Environmental Management Plan, to include timescales and transportation methods, would be agreed in advance with the relevant Local Planning Authority. Its preparation is likely to be secured through a DCO requirement.

3.6.2 Decommissioning is expected to take between 12 and 24 months and could be undertaken in phases.

3.6.3 The effects of decommissioning are often similar to, or of a lesser magnitude than, construction phase effects. As such it is not proposed to provide a separate

decommissioning assessment within each technical chapter, unless there are specific issues related to decommissioning which could give rise to materially greater impacts than construction. Where this occurs an assessment of these impacts will be provided within the ES.

## 4.0 ALTERNATIVES CONSIDERED

4.1.1 Schedule 4 of the EIA Regulations identifies the information for inclusion in an ES, of which paragraph 2 requires: *"A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".*

4.1.2 It should be noted that the EIA Regulations place no specific obligation on a developer to study alternatives, but simply to describe them in the manner specified, where they have been considered.

4.1.3 At this stage in the process the design team are still examining a variety of options associated with the Proposed Development. The selected options will be influenced by engineering, efficiency and environmental factors. The alternatives considered will be set out within the ES but are likely to include alternative design solutions for the PV array layout, substation locations and BESS locations, alternative cable route corridors and alternative options for landscape and biodiversity management / mitigation. The ES will also describe the approach to the selection of this Site for the development.

4.1.4 A 'no development' alternative would not deliver the additional electricity generation capacity which is the objective of the Proposed Development and, therefore, will not be considered.

4.1.5 The ES will include a detailed description of the alternatives considered, including their specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects. A full detailed appraisal of the options considered will be presented as part of the ES, discussing the rationale for the final site layout and design selection, as well as explaining the flexibility sought within the consent in this regard.

# 5.0 CONSULTATION

## 5.1 Context

5.1.1 Effective stakeholder engagement and consultation is intrinsic to the Planning Act 2008 and is fundamental to the success of the Proposed Development.

5.1.2 The process of consultation is critical to the development of a comprehensive and balanced ES. The views of statutory and non-statutory consultees help focus the environmental studies and to identify specific issues that require further investigation. Consultation is an ongoing process, which enables mitigation measures to be incorporated into the project design, thereby limiting adverse effects, and enhancing environmental benefits.

5.1.3 The Proposed Development has a wide range of stakeholders (including landowners, statutory consultees, local communities and specialist interest groups) with differing interests that will require varied levels of consultation. Specific communication activities therefore need to be focussed to meet the needs of particular individuals and groups. This requires an understanding of the stakeholders and their interests in the Proposed Development.

5.1.4 Stakeholder engagement for the Proposed Development is based on the following core principles:

i) Early and ongoing engagement to inform and influence the design development process;
ii) Seeking an appropriate level of feedback in the iterative design process and ensuring that comments received are taken into consideration;
iii) Building long term relationships with key stakeholders throughout the different stages of the Proposed Development to help better understand their views;
iv) Where possible and practicable ensuring concerns are addressed; and
v) Ensuring appropriate statutory consultation is undertaken in compliance with requirements of the Planning Act 2008, EIA Regulations and associated guidance.

## 5.2 DCO Consultation Requirements

5.2.1 The DCO process has a number of statutory requirements regarding consultation. These requirements stipulate that certain stakeholder groups and the community must be consulted as part of the pre-application process, as set out in Sections 42, 47 and 48 of the Act and Regulation 13 of the EIA Regulations. The legislation sets out how the Proposed Development must be publicised, and specific documents produced, including a Statement of Community Consultation (SoCC), Preliminary Environmental Information Report (PEIR) and a Consultation Report.

## 5.3 Consultation to Date

5.3.1 A number of meetings / correspondence with statutory consultees and local stakeholders have already taken place to provide an introduction to the proposals, including:

i) The Planning Inspectorate;
ii) Cheshire West and Chester Council;
iii) Halton Borough Council;
iv) Liverpool City Region;
v) Natural England; and
vi) The Environment Agency.

## 5.4 Scoping Consultation

5.4.1 The Planning Inspectorate (on behalf of the SoS) will consult on this Scoping Report under the EIA Regulations. Views from consultees will be considered and used to inform the Scoping Opinion to be issued by the Planning Inspectorate (on behalf of the SoS).

5.4.2 Under Regulation 10(6) of the EIA Regulations, the SoS must undertake consultation with statutory consultation bodies, including environmental bodies (such as Natural England, the Environment Agency and Historic England) and relevant planning authorities (Cheshire West and Chester Council and Halton Borough Council), before adopting a Scoping Opinion.

## 5.5 Statutory Public Consultation

5.5.1 The Applicant has prepared a SoCC in accordance with Section 47(1) of the Planning Act 2008. This outlines how the Applicant intends to consult with the local community about the Proposed Development, and in accordance with Regulation 12 of the EIA Regulations, how it intends to publicise and consult on the Preliminary Environmental Information (PEI). The Applicant has consulted the host local authorities (i.e. those local authorities whose administrative area the Proposed Development is located within) on a draft SoCC and they have provided comments on a draft SoCC, which have been taken on board prior to its publication.

5.5.2 The proposed consultation will consist of at least two phases:

i) A Phase One community consultation, lasting six weeks, which will be held from Thursday 1 June 2023 to Thursday 13 July 2023. Although undertaken in accordance with the SoCC, this will not be a fully 'statutory' consultation in respect of the full extent of section 42 requirements. The consultation will be used to inform the local community about the proposal and gather preliminary views on the Proposed Development; and
ii) A Phase Two community consultation, which will also last longer than the statutory minimum of 28 days, planned for Winter 2023. This will be a full statutory consultation, complying with all statutory requirements.

5.5.3 The consultations will involve a range of activities to ensure information about the Proposed Development can be access by all members of the community, this will include:

i) In-person information events
ii) Webinars
iii) Meetings and briefing sessions
iv) Consultation leaflets and feedback forms
v) Project website

5.5.4 Throughout the consultation phase there will be ongoing technical and political engagement to assist the local community in their understanding of the Proposed Development and ensure that the assessments undertaken consider all relevant matters.

5.5.5 During Phase Two, consultation will also be undertaken with prescribed consultation bodies as well as affected landowners, in accordance with Sections 42 and 48 of the Planning Act 2008 and Regulation 13 of the EIA Regulations.

5.5.6 All responses received during consultation will be carefully considered and taken into account in accordance with Section 49 of the Planning Act 2008. Details of any responses received during consultation and how those responses have been taken into account will be included in a Consultation Report. This Consultation Report will be submitted with the application and will be available for public review.

5.5.7 The Consultation Report will demonstrate how the Applicant has complied with the consultation requirements of the Planning Act 2008 and EIA Regulations and will be considered by the SoS when determining whether to accept the application, and then in examining the application.

# 6.0 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

## 6.1 Introduction

6.1.1 The approach to EIA is not standardised, but there are established and recognised approaches set out by professional institutions as to methods to be used for the assessment of environmental effects. Where appropriate, the environmental effects of the Proposed Development will be assessed using definitive standards, legislation and guidance applicable to each of the technical areas covered.

6.1.2 In order to provide a clear and robust assessment, each of the technical chapters presented within the ES will follow the structure set out below and described in the subsequent paragraphs.

i) Introduction
ii) Legislation, Planning Policy and Guidance
iii) Methodology
iv) Baseline Conditions
v) Assessment of Effects (including consideration of embedded mitigation measures)
vi) Additional Mitigation, Monitoring and Enhancement
vii) Residual Effects and Conclusions

6.1.3 The introduction to each chapter will provide a statement outlining the relative expertise and qualifications of the specialist that has undertaken the assessment.

## 6.2 Legislation, Planning Policy and Guidance

6.2.1 This section will describe the legislation, planning policy and guidance which are relevant to the assessment of the topic area. This section is not intended to provide an analysis of whether the project would comply with legislative requirements and would not provide an appraisal of the Proposed Development against the planning policies identified. However, this section helps to inform the reader of the relevant documents which have informed the approach to the assessment (including signposting to which section of the chapter has taken account of the requirements) and also the factors the decision maker will need to take into account when considering the acceptability of the Proposed Development.

## 6.3 Methodology

6.3.1 This section will provide details of the assessment method followed and will include the following information:

i) The findings from any consultations undertaken to date and how the assessment chapter is based on the Scoping Opinion provided by PINS;
ii) A description of the study area used for the assessment;
iii) The approach taken to gathering of any desk-based or field data. Where specific surveys have been undertaken an outline of the survey methodology will be provided;
iv) The approach to the impact assessment. This includes how the particular topic has defined impact magnitude, receptor sensitivity and how these relate to the overall level effect / significance; and
v) Any limitations or assumptions made in the assessment.

## 6.4 Baseline Conditions

6.4.1 This section of the chapter will provide a description of the baseline conditions at the Site relevant to the topic being assessed. The baseline conditions will have been established through consultation, collation and analysis of existing data sets and reports, and in some cases site specific field data. The baseline identifies any sensitive receptors that will need to be evaluated in the assessment.

6.4.2 Each chapter will provide an outline of the likely evolution of the baseline conditions without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge (‘the future baseline’). This will include consideration of the impacts of climate change.

## 6.5 Assessment of Effects

6.5.1 This section of the chapter will describe the likely significant environmental effects of the Proposed Development on the baseline conditions at the Site and the surrounding area relevant to the assessment topic. The assessment would include a description of the nature, extent and significance of these effects.

6.5.2 This section of each chapter will describe the mitigation measures that have been specifically incorporated into the Proposed Development to reduce environmental effects of the project i.e. embedded mitigation. This will include measures described within the OCEMP and OLEMP, or other outline management plans submitted with the application, and which are intended to be relied upon when establishing the residual environmental effects of the Proposed Development.

6.5.3 The assessment of effects will consider the construction and operational phases of the Proposed Development. As set out previously it is anticipated the effects from decommissioning would be similar to, or of a lesser magnitude than, construction effects. As such it is not proposed to provide a separate decommissioning assessment for each technical chapter unless there are specific activities or processes which fall outside the assessment parameters assumed for the construction phase, and could thereby give rise to a greater level of effect.

6.5.4 The EIA Regulations do not provide definitive methods for the assessment of significance and a variety of methods are employed within ESs. The method used to assess the effects will be specific to each discipline. Where available and appropriate, the assessments follow impact assessment criteria and methodology set out by relevant professional institutions. Where such guidance is not available, or prescriptive methods are not set out by the relevant professional body, then an assessment criteria will be developed by the technical specialists to enable a clear and structured assessment to be undertaken.

6.5.5 The level of the effect is, in general, derived by considering the magnitude of the impact and the sensitivity of the receptor to a change resulting from the Proposed Development.

6.5.6 Depending on the discipline there are several factors that need to be taken into account when establishing the type and magnitude of an effect, including:

i) whether the effect is adverse or beneficial;
ii) whether it is temporary or permanent;
iii) extent or spatial scale of the effect;
iv) duration of the effect;
v) whether the effect is reversible; and
vi) probability / likelihood of the effect.

6.5.7 Similarly, the sensitivity of a receptor is the function of several elements dependent on the discipline and effect being assessed, these could include:

i) designation and legal status;
ii) quality;
iii) rarity; and
iv) ability to adapt to change.

6.5.8 Having established the magnitude of the effect and the sensitivity of the receptor, the level of the effect is then defined. For some disciplines, a matrix is used to classify the level of effect by correlating magnitude and sensitivity. Where a matrix is to be used it will be set out within the relevant chapter and the levels of effect described.

6.5.9 Where a matrix is not used, the magnitude of change and the sensitivity of the receptor is used to make a reasoned professional judgement to establish the level of the effect and whether it is considered to be significant or not significant. For some topics, e.g. ground conditions and hydrogeology, an environmental risk assessment approach may be used to establish the potential environmental effects of the Proposed Development.

6.5.10 Where the findings of an assessment are set out as different levels of effect (e.g. major, moderate, minor, etc.) the assessment will clearly sets out where an effect is considered to be significant. This may vary between disciplines and the threshold will be defined within each chapter of the ES.

6.5.11 In all instances, the assessment will set out the basis of the judgements made so that the readers of the ES can understand the rationale of the assessment. In this sense the ES will clearly explain how significant effects are identified.

## 6.6 Additional Mitigation, Monitoring and Enhancement

6.6.1 It is a requirement of the EIA Regulations to describe the measures envisaged to prevent, reduce and where possible offset any significant effects on the environment. Whilst not a requirement of the EIA Regulations, mitigation measures which can include monitoring and enhancement can be used to reduce, avoid or offset any adverse effect, whether or not that effect is deemed to be ‘significant’. Mitigation can be achieved in a number of ways as listed below. This approach is often referred to

as the mitigation hierarchy with mitigation being selected as high up the hierarchy as possible.

i) Avoid
ii) Reduce
iii) Remediate
iv) Offset / Compensate

6.6.2 As set out above many of the mitigation measures associated with the Proposed Development will be incorporated into the design of the Proposed Development. Accordingly, they will feature within the detailed scheme description of the ES and, where appropriate, set out in the accompanying outline management plans and taken into account in the assessment undertaken.

6.6.3 Where additional mitigation, monitoring or enhancement measures are proposed to prevent, reduce or offset adverse effects identified through the initial assessment and are unavoidable through design, or to provide benefits to the Proposed Development / local environment; these are described separately within this section of each chapter. Where such measures have been defined, an explanation is provided of how these measures will mitigate / reduce the identified effects of the Proposed Development. An objective of the Proposed Development will be to deliver benefits to biodiversity, and as such the design of the Proposed Development will include ecological mitigation and enhancement measures. These measures will be assessed as part of the Ecological Impact Assessment (EcIA) and presented within a Biodiversity Net Gain (BNG) assessment.

## 6.7 Residual Effects and Conclusions

6.7.1 This section of each technical chapter will provide a textual description of the likely residual effects of the Proposed Development following the implementation of any additional mitigation or enhancement measures.

6.7.2 The conclusions will summarise the key elements of the assessment and include a statement on whether the Proposed Development is likely to result in significant environmental effects for that topic.

## 6.8 Cumulative Effects

6.8.1 The EIA Regulations require that a description of the likely significant effects of the development on the environment should be included in the ES, including cumulative effects. On this basis, each technical chapter provides an assessment of likely significant cumulative environmental effects with other projects in the area.

6.8.2 The Planning Inspectorate's Advice Note 17 on the assessment of cumulative effects identifies a four stage approach as follows:

*Stage 1 – Establish the NSIP's ZOI and Identify Long List Of 'Other Development'*

6.8.3 A review of other developments will be undertaken, initially encompassing a 'zone of influence' (ZOI) defined by the environmental topic specialists to prepare a long list of 'other development'.

6.8.4 The long list of 'other development' to be included in the assessment of cumulative effects will be reviewed and developed in consultation with the local planning authorities, statutory consultees and other relevant organisations.

6.8.5 Development will be included in the initial long-list based on the following criteria:

i) development currently under construction;
ii) approved applications which have not yet been implemented (covering the past five years and taking account of those that received planning consent over three years ago and are still valid but have not yet been completed);
iii) submitted applications not yet determined;
iv) refused applications, subject to appeal procedures not yet determined;
v) projects on the Planning Inspectorate's Programme of Projects where a scoping report has been submitted;
vi) on the National Infrastructure Planning Programme of Projects;
vii) development identified in the relevant Development Plan(s) captured within the ZoI; and
viii) development identified in other plans and programmes which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

6.8.6 Criteria will be developed and applied to filter development which may be excluded from the initial long list, having regard to the size and spatial influence of each development. These criteria will be documented and set out within the ES.

*Stage 2 – Identify Shortlist of 'Other Development' for Cumulative Effects Assessment*

6.8.7 At Stage 2, any developments of a nature or scale without the potential to result in cumulative impacts will be excluded, following discussion with the local planning authorities and consideration of the likely zone of influence for each environmental topic. The justification for including or excluding developments from the long list will be provided in a matrix, modelled on the example given within Appendix E of the Planning Inspectorate's Advice Note 17.

*Stage 3 – Information Gathering*

6.8.8 Information relating to other developments will be collected from the appropriate source (which may include the local planning authorities, the Planning Inspectorate or directly from the applicant / developer) and will include, but not be limited to:

i) proposed design and location information;
ii) proposed programme of demolition, construction, operation and/or decommissioning; and
iii) environmental assessments that set out baseline data and effects arising from the 'other development'.

*Stage 4 – Assessment*

6.8.9 The assessment will include a list of those developments considered to have the potential to generate a cumulative effect together with the Proposed Development, and this will be documented in a matrix which includes the following:

i) a brief description of the development;
ii) an assessment of the cumulative effect with the Proposed Development;
iii) proposed mitigation applicable to the Proposed Development including any apportionment; and
iv) the likely residual cumulative effect.

6.8.10 The criteria for determining the significance of any cumulative effect will be based upon:

i) the duration of effect, i.e. will it be temporary or permanent;
ii) the extent of effect, e.g. the geographical area of an effect;
iii) the type of effect, e.g. whether additive or synergistic;
iv) the frequency of the effect;
v) the 'value' and resilience of the receptor affected; and
vi) the likely success of mitigation.

6.8.11 It should be noted that the cumulative effects assessment is an iterative process and may need to be revisited numerous times throughout the EIA process prior to DCO submission.

### *Effect Interactions*

6.8.12 There is no established EIA methodology for assessing and quantifying effect interactions that lead to combined effects on sensitive receptors. However, the European Commission (EC) has produced guidelines for assessing effect interactions *"which are not intended to be formal or prescriptive, but are designed to assist EIA practitioners in developing an approach which is appropriate to a project…"* .

6.8.13 The EIA will predict beneficial and adverse effects during construction, operation and decommissioning of the Proposed Development. Several effects on one receptor or receptor group could theoretically interact or combine to produce a combined significant overall effect.

6.8.14 An exercise which tabulates the effects on receptors or receptor groups will be undertaken to determine the potential for effect interactions and therefore any combined effects. Only adverse or beneficial residual effects classified as minor, moderate, or major will be considered in relation to potential effect interactions. Residual effects, which are classified as negligible will be excluded from the assessment of the effect interactions as they are considered to be imperceptible effects to an environmental resource or receptor.

## 6.9 Proposed Topics to be Included in the ES

6.9.1 The following chapters present a discussion of the potential likely significant environmental effects associated with the Proposed Development, taking into account information known about the baseline conditions relevant to the Site.

6.9.2 Where it is deemed that a likely significant effect may result from the construction, operation or decommissioning of the Proposed Development, the topic or matter in question has been scoped into the ES.

6.9.3 If having taken into account currently envisaged embedded mitigation measures, including standard best practice management measures which can be fully described within an outline management plan submitted with the DCO application, then topics or matters have been proposed to be scoped out of the ES.

6.9.4 Paragraph 5.10 of PINS Advice Note 7 sets out that:

*Ensuring that ESs are appropriately focused on aspects and matters where a likely significant effect may occur is essential. The Planning Inspectorate is keen to ensure that the scoping process is used effectively, ensuring that the EIA process is proportionate. The Planning Inspectorate will agree to 'scope out', from the need for further assessment, aspects and matters where it is appropriate to do so. In order to support the Planning Inspectorate with this aim, Applicants should ensure that their requests include sufficient justification for scoping aspects/matters out. The justification should be evidence based and have reference to the assessment process.*

6.9.5 As such where a topic or matter is proposed to be scoped out a reasoned justification is provided.

6.9.6 The following topics are proposed to be scoped into the ES and are described in Chapters 7 to 12:

i) Landscape and Visual;
ii) Ecology and Nature Conservation;
iii) Flood Risk, Drainage and Surface Water;
iv) Ground Conditions;
v) Cultural Heritage and Archaeology;
vi) Climate Change.

6.9.7 The following topics are proposed to be scoped out of the ES and are described in Chapters 13 to 17:

i) Noise and Vibration;
ii) Socio-Economics, Land Use and Tourism;
iii) Traffic and Transport;
iv) Air Quality;
v) Other Environmental Topics:

a) Glint and Glare;
b) Agricultural Land;
c) Human Health;
d) Major Accidents or Disasters; and
e) Waste.

# 7.0 LANDSCAPE AND VISUAL EFFECTS

## 7.1 Introduction

7.1.1 Landscape and visual effects are separate, although closely related and interlinked issues. As such, the assessments of the effects of the Proposed Development upon the landscape and upon visual amenity will be carried out under separate headings within the Landscape and Visual Impact Assessment (LVIA).

7.1.2 The assessment of landscape effects considers the potential effects of the Proposed Development on the landscape as an environmental resource. Landscape effects are caused by physical changes to the landscape, which may result in changes to the distinctive character of that landscape and how it is perceived.

7.1.3 The visual assessment is concerned with the potential effects that may occur resulting from the Proposed Development upon the population likely to be affected. It assesses the change in visual amenity experienced by people arising from the presence of a development in the view.

7.1.4 The LVIA will be undertaken in accordance with the good practice guidance set out in *Guidelines for Landscape and Visual Impact Assessment*[2] (hereafter referred to as the GLVIA). Where appropriate, reference will be made to other environmental topics and other Chapters of the ES.

## 7.2 Study Area

7.2.1 The curvature of the earth and the refraction of light through the atmosphere influence what can be seen from any given location. Guidance produced by NatureScot (formerly Scottish Natural Heritage)[3] in relation to wind farm visualisations, includes a formula that can be used to determine visibility in a flat landscape, as follows:

$$h = \underline{c^2\ (1\text{-}2k)}$$ where:

$h$ is the height correction in metres

[2] Landscape Institute and Institute of Environmental Management and Assessment, 3rd edition 2013. *Guidelines for Landscape and Visual Impact Assessment*. Routledge: Abingdon.
[3] Scottish Natural Heritage, 2017. *Visual Representation of Wind Farms version 2.2*. Annex D (page 49).

*2r c* is the distance to the object in metres

*k* is the refraction coefficient (NatureScot state 0.075 as a reasonable average)

*r* is the radius of the Earth in m (NatureScot state 6,367,000m)

7.2.2 Using the formula above, it can be determined that in a flat landscape, the vertical correction for a 3.5 m high solar panel is approximately 7.24 km i.e. the panels would not be theoretically visible beyond this distance when viewed from a similar elevation, although they may potentially be visible when viewed from different elevations.

7.2.3 The nature of the landform surrounding the Solar Array Development Area is such that elevated views are available from locations to the south, including from Frodsham Hill and Helsby Hill. However, the nature of the landform is such that this prevents longer views from points further to the south.

7.2.4 Further analysis was undertaken of the context into which the Proposed Development would be introduced, informed by desktop review, by a field visit undertaken in July 2022, by the assessor's experience of other solar farm development proposals in other parts of the UK, and the assessor's experience of other development proposals located on Frodsham and Helsby Marshes.

7.2.5 Given the pattern of surrounding landform, which encloses Frodsham and Helsby Marshes to the south, and the presence of extensive built development, including a series of major infrastructure developments (refer to Chapter 3.0 for a description of the surrounding context into the which the Proposed Development would be introduced), it is clear that more distant views of the Proposed Development would not give rise to significant landscape and visual effects. As such, the Study Area for the LVIA is proposed to extend for approximately 5km from the Solar Array Development Area and is illustrated on Figures 7.2 and 7.3 (which also show the Zone of Theoretically Visibility (ZTV) of the Proposed Development at different scales). It is considered that this distance is sufficient to capture all potentially significant landscape and visual effects.

## 7.3 Legislation, Planning Policy Context and Guidance

### *Legislation*

7.3.1 The UK Government is a signatory of the European Landscape Convention (ELC), which became binding in March 2007. The Convention is aimed at the protection, management and planning of all landscapes and raising awareness of the value of a living landscape. It relates chiefly to public bodies and to the policies, plans and programmes produced by these.

7.3.2 The LVIA will be a development specific process which accords with Article 6C of the ELC. The LVIA will be informed by extant Landscape Character Assessment studies (described in Section 7.4 below), which more directly relate to the provisions of Article 6C.

### *National Planning Policy*

7.3.3 National-level planning policy for NSIPs is set out in a series of NPSs. Those of relevance to the Proposed Development are:

i) Overarching National Policy Statement for Energy (EN-1) (NPS EN-1);
ii) NPS for Electricity Networks (EN-5) (NPS EN-5).

7.3.4 NPS EN-3 comprises technology-specific guidance, which does not include solar. As such, the published NPS EN-3 is not relevant.

7.3.5 Draft revised versions of NPS EN-1, NPS EN-3 and NPS EN-5 were published for public consultation in March 2023. The replacement version of NPS EN-3 does include solar-specific guidance.

7.3.6 The National Planning Policy Framework (NPPF), and the accompanying online Planning practice guidance (PPG) are also relevant but are not the key policy documents against which the application will be determined.

7.3.7 Relevant policies from the above documents are summarised in Table 7.1.

**Table 7.1 - Summary of National Planning Policy**

| Document | Policy/ Paragraph Reference | Summary of Policy/ Paragraph |
|---|---|---|
| NPS EN-1 | Section 4.5 | Gives an overview of 'good design' for energy infrastructure |
| | Section 5.9 | Addresses issues to be covered in LVIA.<br>Confirms that references to landscape include townscape and seascape.<br>Requires that LVIA should take account of local planning policy.<br>Confirms that local landscape designations should not be used in themselves to refuse consent. |
| NPS EN-5 | Section 2.8 | Addresses issues to be covered in LVIA.<br>Notes that most impacts of overhead lines can be mitigated.<br>Notes cumulative impacts may occur, where new overhead lines are required along with other related developments such as substations and new sources of power generation.<br>Sets out the Holford Rules as design guidelines for overhead lines.<br>Identifies potential mitigation options. |
| Draft NPS EN-1 | §3.3.23 | The scope of the emergent NPS includes solar development. |
| | Section 4.6 | Gives an overview of 'good design' for energy infrastructure. |
| | Section 5.10 | Addresses issues to be covered in LVIA.<br>Confirms that references to landscape include townscape and seascape.<br>Requires that LVIA should take account of local planning policy.<br>Confirms that local landscape designations should not be used in themselves to refuse consent. |
| Draft NPS EN-3 | Section 3.10 | Addresses issues to be covered in LVIA.<br>Applicants are expected to direct considerable effort towards minimising landscape and visual impacts.<br>Existing trees and hedges should be retained wherever possible and protected during construction.<br>The potential to mitigate impacts through, for example, screening with native hedges should be considered.<br>Lighting should use passive infra-red technology. |
| Draft NPS EN-5 | Section 2.9 | Addresses issues to be covered in LVIA.<br>Notes that the impacts of overhead lines can usually be mitigated.<br>Notes cumulative impacts may occur, where new overhead lines are required along with other related developments such as substations and new sources of power generation.<br>Sets out the Holford Rules as design guidelines for overhead lines.<br>Sets out the Horlock Rules as design guidance for substations.<br>Identifies potential mitigation options. |
| NPPF | §174 | Confirms that planning decisions should protect valued landscapes, and that the intrinsic character and beauty of the countryside should be recognised |
| | §185 | The impacts of light pollution should be minimised |
| NPPG | Light Pollution | Identifies factors to be considered in relation to the potential effects of new lighting |

| | | |
|---|---|---|
| | Natural Environment: Landscape | Describes how planning policy can conserve and enhance landscapes; Sets out how the character of landscapes can be assessed |

### *Local Planning Policy*

7.3.8 Local planning policy relevant to the LVIA is set out in the following documents:

i) The Local Plan (Part One) Strategic Policies[4];

ii) The Local Plan (Part Two) Land Allocations and Detailed Policies[5].

7.3.9 Relevant policies from the above documents are summarised in Table 7.2

**Table 7.2 - Summary of Local Planning Policy**

| Document | Policy/ Paragraph Reference | Summary of Policy/ Paragraph |
|---|---|---|
| Local Plan (Part One) | §SO12 | Strategic objective including to ensure that development respects the character and appearance of the landscape and townscape. |
| | §SO13 | Strategic objective to manage, expand and improve green infrastructure and waterways networks. |
| | §STRAT 1 | Sets out principles of sustainable development, including to: Protect, enhance and improve the natural and historic environment. |
| | §STRAT 9 | The intrinsic character and beauty of the countryside will be protected. Development must be of an appropriate scale and design to not harm the character of the countryside. |
| | §STRAT 11 | The Council will support the provision of appropriate new infrastructure where this will have no significant adverse impact on environmental assets. |
| | §ENV2 | Protect and enhance landscape character and local distinctiveness. Development should: take full account of the characteristics of the development site, its relationship with its surroundings and where appropriate views into over and out of the site; recognise, retain and incorporate features of landscape quality into the design. |
| | §ENV3 | Support for the creation, enhancement, protection and management of a network of high-quality, multi-functional Green Infrastructure, via: development incorporating new or enhanced provision, or contributing to such provision elsewhere; increased planting of trees and woodland, particularly in urban areas and at the urban fringe. |

[4] Cheshire West and Chester Council, adopted 2015. *Local Plan (Part One) Strategic Policies*
[5] Cheshire West and Chester Council, adopted 2019. *Local Plan (Part Two) Land Allocations and Detailed Policies*

| Document | Policy/ Paragraph Reference | Summary of Policy/ Paragraph |
|---|---|---|
| | §ENV6 | Development should respect local character, and be sympathetic to landscape assets. |
| | §ENV7 | Support for renewable and low carbon energy development where there are no unacceptable landscape and visual effects, or effects on residential amenity. |
| Local Plan (Part Two) | §GBC2 | Development in the countryside must protect and where possible enhance landscape character and distinctiveness; integrate into the landscape character of the area;<br>Take account of guidance in the *Landscape Strategy*[6]<br>Development affecting the setting of an Area of Special County Value (ASCV) must preserve the special landscape character and scenic value of the designated area, enhance landscape quality, character and appearance where possible, make provision for improving public access where appropriate. |
| | §DM2 | Development proposals should not have a significant impact upon residential amenity. |
| | §DM3 | Development in the countryside should respect the key features of the landscape and should not be detrimental to its character. |
| | §DM44 | Planting schemes should use native species where appropriate. |
| | §DM45 | Development should conserve, manage and enhance trees, woodland and hedgerows. Where such assets would be lost, replacement planting should be provided within the site (or off-site if on-site planting is not practical). Replacement planting should be at a ratio of at least two trees for each tree lost. Native local species should be used where appropriate. |
| | §DM52 | Sets out criteria for solar energy development, including that: proposals should be of a scale and type where sensitivity has been identified as low/ moderate, or moderate, and impacts on key characteristics are considered to be acceptable, having regard to the *Landscape Sensitivity Study*[7].<br>Applications must be supported by LVIA (or landscape appraisal for non-EIA development).<br>Applications should demonstrate have adverse landscape affected would be mitigated.<br>Associated development should be designed to minimise visual impact. |
| | §DM53 | The cumulative impact of energy related development on the landscape must be acceptable.<br>The impact of new power lines on the landscape must be minimised. |

[6] Bayou Bluenvironment and The Planning & Environment Studio, 2016. *A Landscape Strategy for Cheshire West and Chester Borough*. Cheshire West and Chester Council
[7] Bayou Bluenvironment and The Planning & Environment Studio, 2016. *Landscape Sensitivity Study and Guidance on Wind and Solar Photovoltaic Developments*. Cheshire West and Chester Council

### *Guidance*

7.3.10 Good practice guidance for the undertaking of LVIA is set out in the GLVIA[8].

7.3.11 Further good practice guidance relating the production of visualisations is set out in the Landscape Institute's *Technical Guidance Note 06/19* (TGN 06/19)[9].

## 7.4 Preliminary Baseline Conditions

### *The Site and its Surroundings*

7.4.1 The location of the Site of the Proposed Development is illustrated on Figure 1.1. The majority of the Site comprises the Solar Array Development Area, the location of which is also illustrated on Figure 1.2. The surrounding area is described in more detail in Chapter 3.0.

7.4.2 A field visit to the Site and the surrounding area was made in July 2022, in order to inform initial conclusions regarding the likely landscape and visual effects of the Proposed Development.

7.4.3 The Site comprises a series of fields located on the former estuarine marshes north of Frodsham. In the eastern half of the Solar Array Development Area, fields tend to be enclosed by dense hedgerows and tree belts. In the western half of the Solar Array Development Area, the Site is more open. The proposed Access Road follows existing private roads and tracks that run across the marshes. Turbines forming the eastern cluster of Frodsham Wind Farm are located within the Solar Array Development Area. Two overhead electricity lines (the SPEN 132kV OHL and the NG 400kV OHL) run through the Solar Array Development Area, and several pylons are located within the Site boundary.

7.4.4 The landform is largely flat and low-lying. Engineered embankments are present at the north boundary of the Solar Array Development Area, along the boundary with the River Weaver and the Manchester Ship Canal. Within the Solar Array Development Area, areas of raised ground are present, these being the INEOS Inovyn Deposit Ground (where dredgings from the River Weaver have been

[8] Landscape Institute and Institute of Environmental Management and Assessment, 3rd edition 2013. *Guidelines for Landscape and Visual Impact Assessment*. Routledge: Abingdon.
[9] Landscape Institute, 2019. *Visual Representation of Development Proposals. Technical Guidance Note 06/19*

deposited), and the Manchester Ship Canal Deposit Ground (where dredgings from the Ship Canal have been deposited).

7.4.5 Several public rights of way run through the Site, connecting with the town of Frodsham to the south, and with other parts of the marshes to the west. These routes are accessible from Frodsham via overbridges that cross the M56 motorway.

7.4.6 The nearest properties to the Solar Development Array Area are at the edge of Frodsham, approximately 140m to the south. The M56 runs between Frodsham and the Site, and vegetation cover at the edge of town and along the motorway corridor breaks up views northwards.

7.4.7 Frodsham is located on a hillside overlooking the Mersey Estuary, and views towards the Site are also available from more elevated locations within the town. The town of Helsby to the south-west of the Site is similarly situated on a north-facing hillside, and views towards the Site from elevated location are also available. Frodsham Hill and Helsby Hill in particular are well know beauty spots where expansive views over the Mersey Estuary are available.

7.4.8 The marshes between the M56 and the Mersey Estuary, where the Site is located, are influenced by a variety of different types of infrastructure development, both within the marshes themselves, and on the adjacent higher ground. The M56 runs close by to the south of the Solar Array Development Area, and the Frodsham Wind Farm extends into the Solar Array Development Area, as stated above. There is an extensive area of industrial development to the north of the River Weaver at the edge of Runcorn (north-east of the Solar Array Development Array), notably the INEOS Inovyn Runcorn Site. Further development in the marshes is located to the west of the Wind Farm and this includes Stanlow Oil Refinery, the Former CF Fertilisers Plant (currently being decommissioned), Encirc Glass, and a series of different facilities at Protos (some existing, some under construction, with further development proposed).

### *Landscape Designations*

#### *Statutory Landscape Designations*

7.4.9 The nearest statutory landscape designation to the Site is the Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB), located over 26.5km to the

south-west. This is well outside the extents of the proposed Study Area for the LVIA, and the Proposed Development would not be visible from the AONB.

7.4.10 As such, it is proposed that the LVIA does not consider effects on statutory landscape designations.

*Non-statutory Landscape Designations*

7.4.11 Cheshire West and Chester Council (CWaCC) maintain a non-statutory Area of Special County Value (ASCV) designation, which is supported by local planning policy (see Section 7.3 above).

7.4.12 The Weaver Valley ASCV is located approximately 850m south-east of the Site at the closest point. The Helsby and Frodsham Hills ASCV is located approximately 1km south of the Site at the closest point. The locations of both ASCVs are illustrated on Figure 7.1. A supporting document[10] underpins the designation and provides a Statement of Importance and details of landscape qualities for each ASCV.

7.4.13 The LVIA will consider the effects of the Proposed Development upon the two ASCVs.

*Green Belt*

7.4.14 Much of the Study Area, including the Solar Array Development Area and much of the Access Road itself, lies within the Green Belt (refer to Figure 7.1 for location). Green Belt is not a landscape designation, but effects on the openness of the Green Belt (an important planning consideration) can be influenced by visual effects. As such, the visual effects upon the openness of the Green Belt will be considered in the LVIA, in order to inform wider planning judgements.

[10] Bayou Bluenvironment and The Planning & Environment Studio, 2017. *Local Landscape Designations: Areas of Special County Value in Cheshire West and Chester*. Cheshire West and Chester Council.

### *Landscape Character Assessment and Other Studies*

#### *National*

7.4.15 At a national level, 159 National Character Areas (NCA) have been identified by the former Countryside Commission (now Natural England).

7.4.16 Most of the Site is located within NCA60: Mersey Valley. The western edge of the Access Road is located within NCA61: Shropshire, Cheshire and Staffordshire Plain. That part of the Study Area to the south and south-west of Frodsham and Helsby is located within NCA62: Cheshire Sandstone Ridge.

7.4.17 These NCAs provide background and context to more detailed landscape character assessments produced at county and district levels. Their broad geographic reach means that the key characteristics identified as typical of a particular NCA may not necessarily apply to a specific location within that NCA.

7.4.18 Descriptions of each NCA are available via the Natural England website[11]. Any contents relevant to the Study Area or to the likely effects of the Proposed Development would be referred to in the LVIA in the ES order to provide context. An assessment of effects against the NCAs will not be carried out, as more detailed information is available at a local level (see below), which is a more appropriate baseline against which to assess the type of change proposed.

#### *Local*

7.4.19 *A Landscape Strategy for Cheshire West and Chester Borough*[12] describes and classifies the landscape of the CWaCC area. Urban areas are excluded. The Site is located almost entirely within LCA 4a: Frodsham, Helsby and Lordship Marshes. The western end of the Access Road extends into LCA 9a: Dunham to Tarvin Plain.

7.4.20 A full list of CWaCC LCAs within the Study Area is set out below, with locations illustrated on Figure 7.1:

i) 2a: Frodsham;

[11] Natural England, 2014. *National Character Area profiles*. Available at http://publications.naturalengland.org.uk/category/587130 (accessed 17 February 2023)
[12] Bayou Bluenvironment and The Planning & Environment Studio, 2016. *A Landscape Strategy for Cheshire West and Chester Borough*. Cheshire West and Chester Council.

ii) 2b: Helsby Hill;
iii) 3a: Helsby to Tarporley Sandstone Fringe;
iv) 4a: Frodsham, Helsby and Lordship Marshes;
v) 5b: Frodsham to Northwich;
vi) 5f: Helsby to Frodsham;
vii) 8a: Aston;
viii) 9a: Dunham to Tarvin Plain;
ix) 15c: Lower Weaver Valley: and
x) 16a: Stanlow and Ince Banks

7.4.21 The *Halton Landscape Character Assessment*[13] identifies LCA within Halton. Those within the Study Area are set out below, with locations illustrated on Figure 7.1:

i) 3: Moore Village and Keckwick Brook Valley;
ii) 4: Upper Mersey Estuary;
iii) 5: Norton Wooded Parkland;
iv) 6: Runcorn Heath and Hill Parkland;
v) 7: Hale Shore and Farmland.

*Landscape Sensitivity Study*

7.4.22 The *Landscape Sensitivity Study*[14] identifies which landscapes within the CWaCC area are least sensitive to wind energy and solar energy development. The document is clear that:

*"It is important to note that this sensitivity study does not define the precise limit of wind energy or ground mounted solar PV development that can be accommodated within CWaC, but gives an indication of the relative sensitivity of the different landscape types to these types of development, as defined in the study. It should not be interpreted as a definitive statement that a particular landscape is suitable or not suitable for a particular type of development – this report is not a substitute for*

[13] TEP, 2009. *Halton Landscape Character Assessment*. Halton Borough Council.
[14] Bayou Bluenvironment and The Planning & Environment Studio, 2016. *Landscape Sensitivity Study and Guidance on Wind and Solar Photovoltaic Developments*. Cheshire West and Chester Council

*detailed landscape and visual impact assessment of local development proposals or as part of wider environmental impact assessment".*[15]

7.4.23 The document identifies landscape sensitivity based on a series of different development typologies. The Proposed Development would fall within the 'very large solar farm category', which is defined as covering an area greater than 25 hectares. A series of criteria are also set out against which the sensitivity of different LCAs can be assessed. Design guidance is also provided, regard will be had to this where applicable when designing the Proposed Development.

7.4.24 LCA4a, where the Proposed Development would be located is assessed as having an overall high sensitivity to a 'very large solar farm'. Key conclusions made include that a medium, large or very large solar farm could potentially fit into LCA 4a, but being south-facing it would impact on important viewpoints from the Frodsham Sandstone Ridge and Helsby Hill looking northwards over the Mersey Estuary.

### *Visual Baseline*

#### *ZTV*

7.4.25 The ZTV of the Proposed Development is presented on Figures 7.2 and 7.3, showing the theoretical visibility of the Proposed Development at different scales (within 5km and 2.5km of the Solar Array Development Area respectively). In order to inform the Scoping process, it has been assumed on a precautionary basis that solar panels could be located across the majority of the Solar Array Development Area (subject only to known utility constraints), and therefore modelling for the ZTV has been undertaken on this basis. Colour banding is used to differentiate between locations where more, or fewer solar panels are predicted be visible.

7.4.26 The ZTV was produced using a free 2m LIDAR Digital Surface Model (DSM) available from the Environment Agency under the terms of the OpenGovernment Licence. The data was captured in 2020. The ZTVs reflect the theoretical visibility of 3.5m high solar panels.

[15] Ibid, paragraph 1.16

7.4.27 The ZTV produced using the DSM reflects the presence of screening features in the landscape. However, it does not distinguish between the ground surface and the surface of structures and vegetation. As a consequence, the ZTV output may indicate visibility from areas known to be occupied by woodland and buildings (i.e., views from treetops and roofs). Ordnance Survey open mapping data (OS Zoomstack Woodland) datasets have been added to the ZTV Figures, as a solid white hatch on top of the ZTV information (but beneath base mapping), to mask out mapped areas of tree cover and buildings, noting this is unlikely to be exhaustive but helps refine the ZTV.

7.4.28 Observations made in the field in July 2022, and by review of aerial imagery suggest that the DSM does not necessarily reflect the presence of vegetation such as hedgerows and belt of trees along boundaries and along public rights of way. As such, visibility (particularly in summer when deciduous foliage is present) may be less than indicated on Figures 7.2 and 7.3.

*Viewpoints*

7.4.29 The LVIA will include a detailed assessment of visual effects from a series of pre-determined viewpoint locations. Viewpoints fall into three categories, as set out in the GLVIA:

i) Representative viewpoints (which represent the experience of different types of receptors in the vicinity);
ii) Specific viewpoints (a particular view, for example a well-known beauty spot); and
iii) Illustrative viewpoints (which illustrate a particular effect/ issue, which may include limited/ lack of visibility)

7.4.30 It should be noted that the viewpoint itself is not the receptor. Rather it is the people that would be experiencing the view from it. People within the Study Area that are likely to experience views of the Proposed Development include:

i) Local residents;
ii) Users of public rights of way, and other routes/ land with public access;
iii) Road users

7.4.31 A provisional list of viewpoints is set out below, with the intention that a final list is agreed with consultees following receipt of comments (and any further post-scoping consultation that is required). Viewpoint locations are illustrated indicatively on Figures 7.2 and 7.3. The precise location of each viewpoint will be determined in the field, and will be selected to show the clearest views towards the Solar Array Development Area (or in the case of Viewpoints 19, 20 and 22, clear views along the Access Road/Protos Grid Connection).

**Table 7.3 - Viewpoint Locations**

| Viewpoint | Location | Receptor Type |
|---|---|---|
| 1: Mersey Way, near Hale | Footpath along the water's edge, approx. 2.7km north-west of the Solar Array Development Area | *Representative* of views across the Mersey Estuary |
| 2: A56, Sutton Weaver | Edge of small village east of the Weaver Valley, approx. 1.86km east of the Solar Array Development Area | *Representative* of views available to local residents and road users |
| 3: Ship Street, Frodsham | Side road at the northern edge of Frodsham, approx. 215m south of the Solar Array Development Area | *Representative* of views available to residents in the adjacent properties |
| 4: Hawthorne Road, Frodsham | Side road at the northern edge of Frodsham, approx. 205m south of the Solar Array Development Area | *Representative* of views available to residents in the adjacent properties |
| 5: Langdale Way, Frodsham | Side road at the eastern edge of Frodsham, approx. 1.02km south of the Solar Array Development Area | *Representative* of elevated views available from eastern Frodsham |
| 6: Public footpath, near St Laurence's Church, Frodsham | Footpath through an area of public open space in central Frodsham, approx. 1.14km south of the Solar Array Development Area | *Representative* of views available from elevated parts of central Frodsham |
| 7: Castle Park, Frodsham | Public open space in Frodsham, approx. 890m south of the Solar Array Development Area | *Representative* of the views available to users of the public open space, and to residents in nearby properties |
| 8: A56, Chester Road, Frodsham | Public footpath immediately north of the A56, approx. 1.08km south of the Solar Array Development Area | *Representative* of the views available from the western edge of Frodsham |

| Viewpoint | Location | Receptor Type |
|---|---|---|
| 9: Frodsham Hill War Memorial | Hill top, approx. 1.27km south of the Solar Array Development Area | *Specific* view from Frodsham Hill, which is a well-known and well frequented location |
| 10: Public footpath, north of Foxhill House | Footpath running up the side of Woodhouse Hill, approx. 2.4km south of the Solar Array Development Area | *Representative* of views available to walkers on the hillside between Helsby and Frodsham |
| 11: Plovers Lane, Helsby | Minor road at the north-eastern edge of Helsby, approx. 2.28km south of the Solar Array Development Area | *Representative* of views available to residents in the north-eastern part of Helsby |
| 12: Bates Lane | Minor road south of Helsby, approx. 3.06km south of the Solar Array Development Area | *Representative* of views available from the ridge south-east of Helsby |
| 13: Helsby Hill | Hill top, approx. 2.9km south of the Solar Array Development Area | *Specific* view from Helsby Hill, which is a well-known and well frequented location |
| 14: M56, Weaver Lane overbridge | Bridge over the M56, adjacent to the Solar Array Development Area | *Representative* of views available to users of the M56, and of the public footpath that runs over the overbridge |
| 15: M56, Brook Furlong overbridge | Bridge over the M56, approx. 160m south of the Solar Array Development Area | *Representative* of views available to users of the M56, and of the restricted byway that runs over the overbridge |
| 16: M56, Straight Length overbridge | Bridge over the M56, approx. 860m south of the Solar Array Development Area | *Representative* of views available to users of the M56, and of the restricted byway that runs over the overbridge |
| 17: Public footpath within Site | Within the Site, close to the northern boundary | *Representative* of views available to walkers. The viewpoint is located on a engineered riverbank and allows panoramic views across the eastern part of the Site |
| 18: Restricted byway leading to Frodsham Marsh Farm | Within the Site, in the western part of the Solar Development Array Area | *Representative* of views available to users of the restricted byway. |
| 19: Restricted byway, Lordship Lane | Adjacent to the route of the proposed Access Road, north-east of the Former CF Fertilisers Plant | *Representative* of views available to users of National Cycle Route 5 and other users of the restricted byway |
| 20: Restricted byway, Cross Lane | Along the route of proposed Access Road, between the Eastern and Western Clusters of Frodsham Wind Farm | *Representative* of views available to users of National Cycle Route 5 and other users of the restricted byway |

| Viewpoint | Location | Receptor Type |
|---|---|---|
| 21: Restricted byway, Straight Length | Intersection of several public rights of way to the south of the Site, within the marshes north of Frodsham | *Representative* of views available to users of the public rights of way, and of National cycle Route 5 |
| 22: Public footpath, Ince | North of the route of the proposed Access Road, close to the village of Ince | *Representative* of views available to walkers |
| 23: Public footpath adj. to Manchester Ship Canal (northern Site boundary) | Within the Site, close to the northern boundary, on a footpath that runs along the embankment of the Ship Canal | *Representative* of views available to walkers |
| 24: The Willows, Frodsham | From road running through central Frodsham, approx. 850m south of the Solar Array Development Area | *Representative* of views available to residents in the nearby properties and to road users |
| 25: Public footpath adj. to River Weaver (eastern Site boundary) | Within the Site, close to the northern boundary, on a footpath that runs adjacent to the River Weaver | *Representative* of views available to walkers |

7.4.32 The LVIA will include a series of photographs from viewpoints representative of this range of receptors. Photomontages and/ or other visualisations will be prepared from specific key locations to be agreed with consultees (but not necessarily from every viewpoint included in the LVIA). All photography and any visualisations will be prepared and presented in accordance with the requirements of *Technical Guidance Note 06/19* (TGN 06/19)[16]. Initial viewpoint photography from each of the proposed viewpoints was shot in April 2023, with deciduous foliage beginning to appear, but providing a good indication of unscreened winter visibility (i.e. a worst-case scenario of visibility). Where new planting, or changes to the management of existing vegetation is proposed as mitigation, visualisations will reflect this. For example, photomontages prepared from specific viewpoints may include a Year 0 image showing how the Proposed Development would appear at the start of operations, and an image showing the point at which planting would provide effective mitigation (this would typically be Year 5 in relation to hedgerow planting)

[16] Landscape Institute, 2019. *Visual Representation of Development Proposals. Technical Guidance Note 06/19*

*Glint and Glare*

7.4.33 As discussed in Chapter 17.0 a preliminary Glint and Glare Assessment has been conducted. This identified the potential for limited effects on a small number of residential properties to the south of the M56. Visits to the areas indicate that existing vegetation would provide screening such that the Proposed Development is unlikely to present an amenity issue to residential properties. Furthermore, additional screening planning will be proposed along the southern boundary of the Site.

7.4.34 An updated Glint and Glare Assessment will be prepared reflecting the final design and will be provided as a Technical Appendix to the ES. The findings of this will be reported in the LVIA, and a conclusion made regarding any implications for the visual effects of the Proposed Development.

## 7.5 Potential Effects and Mitigation

### *Potential Effects*

7.5.1 Potentially significant effects could arise from:

i) the introduction of new solar panels and associated infrastructure, which would result in direct change to the physical landscape fabric of the Site;
ii) views of these from the surrounding area, affecting the visual amenity of local residents in their properties, users of the public rights of way network (especially where routes run through the Site), and road users;
iii) the influence of these upon the character of the surrounding landscape, with potential changes in the characteristics of those LCAs where visibility is predicted;
iv) temporary activities associated with the construction of the Proposed Development, including temporary land take, any improvements required along the route of the Access Road, construction of the grid connection and the private wire connections, and the temporary presence of construction plant;
v) temporary activities associated with the decommissioning of the Proposed Development; and
vi) cumulative effects that would occur as a result of interactions between the Proposed Development and other consented of proposed schemes.

### *Night-time Landscape and Visual Effects*

7.5.2 The Proposed Development would not be routinely lit. Security lighting would be required around key electrical infrastructure. This lighting would only be operated during periods of maintenance or in the event of an emergency or a security breach.

7.5.3 Additional lighting is likely to be required during construction and decommissioning, which would be use in periods of poor visibility during normal working hours (e.g. the start and end of the working day during the winter months).

7.5.4 The surrounding area is relatively well lit. Existing light sources include street lighting in nearby settlements, lighting generated by traffic (especially from the M56), lighting in nearby industrial/ commercial developments, and lighting of tall structures such as the Frodsham Wind Farm and various stacks at Protos. The lighting proposed as part of the Proposed Development would result in very limited additional change in light levels in the Study Area, and the effects of this would not be significant.

7.5.5 As such, an assessment is night-time landscape and visual effects is proposed to be scoped out of the ES.

### *Residential Visual Amenity Assessment*

7.5.6 The purpose of a Residential Visual Amenity Assessment (RVAA) is to consider how the change in view resulting from the presence of the Proposed Development would impact upon the visual component of residential amenity (as distinct from other aspects such as noise) of nearby properties and whether the predicted effects would affect living conditions.

7.5.7 *Residential Visual Amenity Assessment (RVAA) Technical Guidance Note 02/19*[17] sets out good practice guidance in RVAA. The guidance reflects the findings made at a number of public inquiries, and reflects the factors need to be weighed in the planning balance when considering the difference between significant visual effects and unacceptable effects on residential amenity.

7.5.8 The issue to be considered in RVAA is not whether there would be any change in view from a property as a result of a development, but rather:

[17] Landscape Institute, 2019. *Residential Visual Amenity Assessment (RVAA) Technical Guidance Note 02/19*

*"Is the effect of the development on Residential Visual Amenity of such nature and/ or magnitude that it potentially affects living conditions' or Residential Amenity?"*[18]

7.5.9 This is referred to as the Residential Visual Amenity Threshold (RVAT).

7.5.10 In relation to the Proposed Development, the new structures proposed, would be relatively low in height, would be separated from the nearest residential properties (which are approximately 140m from the Solar Array Development Area) by the M56, by a line of electricity pylons and by vegetation cover which runs (with gaps) through the land between the motorway and the edge of Frodsham.

7.5.11 Any view of the Proposed Development from any nearby property would occur in the context where these existing structures and motorway traffic are already visible, and where some degree of screening by vegetation is typically present. In this context, whilst there may be views of the Proposed Development from some properties, it is clear that visual change would not occur to such a degree that the living conditions of residents would be affected. The RVAT would not therefore be breached.

7.5.12 As such, it is proposed that Residential Visual Amenity Assessment is scoped out of the ES.

### *Construction Mitigation*

7.5.13 Construction activities would be controlled via a CEMP. The DCO application would be accompanied by an OCEMP setting out the key measures that should be undertaken to reduce adverse landscape and visual effects, these will include:

i) Measures to protect retained existing vegetation.
ii) Measures to limit the effects of temporary construction lighting upon the amenity of local residents.
iii) Protocols governing the establishment of any temporary contractor's compound, again to limit any effects upon the amenity of local residents.
iv) Measures to retain the amenity of users of the public rights of way network running through the Site, including where practical measures to screen views from retained sections of routes, and from any diverted sections of routes.

[18] Ibid, paragrapg 2.1

### *Operational Mitigation*

7.5.1 It is likely that a series of measures would be embedded into the design of the Proposed Development in order to reduce or eliminate potential adverse landscape and visual effects. These are likely to include:

i) Changes to the layout of the proposed solar panels and ancillary structures in order to reduce visual prominence.
ii) Providing a 6m buffer to existing hedgerows and trees (extended where necessary to project mature trees).
iii) Provision of new planting, and/ or changes to the management of existing vegetation in order to reduce visibility, to improve landscape character, and to enhance Green Infrastructure.

7.5.2 In some cases, proposed landscape and visual mitigation may dovetail with mitigation proposed in relation to other disciplines. For example, proposed planting may also provide ecological mitigation.

7.5.3 To ensure the long-term effectiveness of mitigation, a Landscape and Ecology Management Plan (LEMP) would be developed in agreement with key stakeholders. The DCO application would be accompanied by an Outline LEMP (OLEMP). This will set out the aims and objectives of landscape mitigation and ecological mitigation, details of how this mitigation would be implemented, and would also set out how this would be managed by the Applicant over the lifespan of the Proposed Development.

### *Decommissioning Mitigation*

7.5.4 It is anticipated that decommissioning stage effects would be similar in size and scale to construction stage effects, and that these would be mitigated in a similar way, i.e. via a CEMP or similar document which would include measures similar to those proposed above for construction.

## 7.6 Assessment Methodology

7.6.1 The LVIA will be carried out in accordance with a project specific methodology prepared in accordance with good practice guidance provided within the GLVIA[19], which will be appended to the LVIA. A typical methodology for a solar farm LVIA is included as Appendix 7.1.

7.6.2 A separate methodology setting out how visualisation materials have been produced will also be included in the LVIA. This will include details of the processes followed in producing ZTVs, taking viewpoint photography and producing photomontages and other visualisation material. Any limitations inherent to these processes will also be set out.

7.6.3 The LVIA will aim to provide:

i) a clear understanding of the Site and its setting in respect of landscape character and visual amenity;
ii) an understanding of the Proposed Development in terms of its relationship with the landscape character and visual amenity;
iii) an identification of potential effects of the Proposed Development upon the landscape;
iv) an identification of potential effects on visual receptors, including an identification of potential effects upon the experiences of users of public rights of way (i.e. sequential visual effects);
v) a conclusion as to potential visual effects upon the openness of the Green Belt;
vi) a description of any proposed mitigation measures; and
vii) a conclusion as to the potential residual effects of the Proposed Development (reflecting any temporal changes in effects once mitigation provided by new planting and changes to the management of existing vegetation is effective).

7.6.4 The LVIA process will follow a standard approach, namely:

i) the establishment of the baseline conditions i.e. the existing character and sensitivity of the landscape, and the type and sensitivity of visual receptors;

[19] Landscape Institute and Institute of Environmental Management and Assessment, 3rd edition 2013. *Guidelines for Landscape and Visual Impact Assessment*. Routledge: Abingdon.

ii) the prediction of the magnitude of change that the Proposed Development will bring, allowing for mitigation measures, upon the landscape and upon visual receptors; and

iii) an assessment of the significance of effect that would occur, by considering the predicted magnitude of change, together with the sensitivity of the landscape or visual receptor.

**Table 7.4 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Effects on statutory landscape designations | Scoped Out | Scoped Out | Scoped Out | There are no statutory landscape designations within the proposed Study Area |
| Effects on non-statutory landscape designations | Scoped In | Scoped In | Scoped In | There are two non-statutory ASCV designations located within the proposed Study Area |
| Visual effects on the openness of the Green Belt | Scoped In | Scoped In | Scoped In | Visual effects on openness will be assessed in order to inform wider planning arguments in relation to the Green Belt |
| Effects on National Character Areas | Scoped Out | Scoped Out | Scoped Out | These are very broad-based character areas, which add context to the more detailed LCAs identified at a district level. An assessment of effects upon them is not necessary – the District LCAs provide a baseline that is more appropriate to the extent of change that is likely to occur |
| Effects on Landscape Fabric | Scoped In | Scoped In | Scoped In | The Proposed Development will result in physical change, which has potential to result in significant effects |
| Effects on Landscape Character | Scoped In | Scoped In | Scoped In | The Proposed Development will influence the surrounding landscape, and there is potential for significant effects on character. Effects will be assessed against district level LCAs |
| Visual Effects | Scoped In | Scoped In | Scoped In | The Proposed Development will be visible in views from within the Study |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | Area, and there is potential for significant effects to occur |
| Night-time Landscape and Visual Effects | Scoped Out | Scoped Out | Scoped Out | The Site would not be routinely lit during operation with lighting restricted to periods of maintenance or emergencies, where used it would be limited to low-level security lighting. There would be some lighting required during construction/ decommissioning normal working hours but this would be managed in accordance with best practice via measures to be set out in the OCEMP. The surrounding area is relatively well lit, and the lighting proposed would not result in any significant change |
| Residential Visual Amenity | Scoped Out | Scoped Out | Scoped Out | The Proposed Development would comprise structures that are relatively low height, and which are not located in close proximity to residential properties. The nearest properties are separated from the Site by the M56. Views of solar panels and associated infrastructure would not result in visual change that would materially affect residential amenity |

## 7.7 Assumptions, Limitation and Uncertainties

7.7.1 The conclusions of the LVIA will be informed by a series of field visits. The dates of these visits will be dictated by project timescales. As such, initial 'in the field' conclusions regarding visibility will reflect the level of deciduous foliage present at the time of the visits. Viewpoint photography will also reflect the level of foliage present at the time photography is taken. Where relevant to its conclusions, the LVIA will set out assumptions made as to the likely seasonal change in the visibility of the Proposed Development.

7.7.2 The preparation of visualisation materials including ZTVs and photomontages will be subject to limitations which are inherent in the processes followed in their production. These limitations will be clearly stated in the methodology that will be appended to the LVIA.

# 8.0 ECOLOGY AND NATURE CONSERVATION

## 8.1 Introduction

8.1.1 This chapter provides an initial assessment of the likely significant effects of the Proposed Development on the environment with respect to biodiversity. It provides a summary of baseline ecological information collected to date, and the further baseline data that will be collected to inform the assessment of the likely significant effects of the Proposed Development. An overview of likely significant effects proposed to be assessed within the ES chapter is also provided. In addition, the chapter provides a description of the proposed assessment methodology for the environmental assessment.

### *General Site Description*

8.1.2 The Site comprises 314 ha of primarily arable and pastoral farmland located adjacent to the M56 motorway, the River Weaver and the Manchester Ship Canal, with the latter being separated from the Mersey Estuary by a parcel of land referred as Frodsham Score.

8.1.3 Approximately half of this land, the western half of the Solar Array Development Area, comprises a series of raised cells, historically used to deposit dredgings from the nearby Manchester Ship Canal. This land has been subsequently restored to farmland and used for livestock grazing.

8.1.4 The north-eastern area of the Site was also used as a dredging deposit ground, for the deposit of dredgings from the Weaver Navigation, this area is referred to as the former INEOS Inovyn Deposit Ground and is located adjacent to the River Weaver. This has been left to ‘scrub-over’.

8.1.5 The remainder of the Site is dominated by arable farmland, and an area managed by local wildfowlers. Field boundaries in this area are marked by a series of drains and hedgerows.

8.1.6 Accordingly, across most of the Site, habitats with potential ecological value are restricted to field margins, hedgerows between arable fields and the scrubbed-over banks of the former Dredging Deposit Ground Cells. Mature Trees are generally absent and the Site overall is open in nature.

8.1.7 Part of the Site is within the operational Frodsham Wind Farm and corresponding Wind Farm Mitigation Areas (Cells 2 and 5).

## 8.2 Study Areas

8.2.1 The study areas for the project have been based on 'zones of influence' for different ecological features which may be affected by biophysical changes as a result of the Proposed Development. The zones of influence that extend beyond the direct land-take required for the Proposed Development have been identified based upon the nature of the project and the construction, operation and decommissioning activities to be undertaken and Chartered Institute of Ecology and Environmental Management ('CIEEM') and Natural England guidance, where available[20,21].

8.2.2 The zone of influence will therefore vary for different ecological features depending on their sensitivity to an environmental change. The identified zones of influence were used to establish the scope of baseline ecological surveys and the extent of survey area and desk study.

8.2.3 Zones of influence for the Site have been based on the Solar Array Development Area and comprise:

i) **Statutory designated sites** – searches made for information on statutory designated sites (internationally and nationally important sites for ecology) and functionally linked land within 2 km and non-statutory designated sites within 1 km of the Solar Array Development Area boundary, extended to 10 km for Ramsar sites, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

ii) **Protected and priority habitats and species** - (e.g., Natural Environment and Rural Communities Act 2006 Section 41 Species of Principal Importance and Priority Habitats)[22]. Searches for biological records within 1km of the Solar Array Development Area;

*[20] CIEEM (2018) 'Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine'. Chartered Institute of Ecology and Environmental Management, Winchester*
*[21] Where specific guidance documents do not stipulate specific required zones of influence from a proposed Site, professional judgement has been applied based on the understanding of the site and developments similar in nature, size, and scale to the Proposed Development.*
*[22] This is a standard requirement to inform planning applications, as detailed within CIEEM (2020) Guidelines for Accessing, Using and Sharing Biodiversity Data in the UK. 2nd Edition. Chartered Institute of Ecology and Environmental Management. Winchester, UK. 27*

iii) **Habitats** - land within the Site and immediately surrounding habitats where these have been able to surveyed to date from within the Site;
iv) **Breeding birds** - the Solar Array Development Area and adjacent boundary habitats viewable from within the Site. Targeted checks for evidence of nesting species that are afforded protection under Schedule 1 of the Wildlife and Countryside Act (1981, as amended) along the Access Road and adjacent land;
v) **Wintering birds** - the Solar Array Development Area and surrounding fields up to 600m from the Solar Array Development Area where access was possible, or where land could be viewed from publicly accessible locations;
vi) **Protected Mammals** – within the Solar Array Development Area;
vii) **Great crested newts** – within Solar Array Development Area ponds/water bodies and accessible ponds/waterbodies within 500m of the Site; and,
viii) **Reptiles** – within the Solar Array Development Area.

8.2.4 Should the results of surveys or desk based information indicate that different zones of influence would be more appropriate these would be adjusted as the assessment progresses.

8.2.5 Additional detailed surveys covering the Connections and the Access Road are not proposed given the very limited nature of works and extensive existing data sets; further information is presented in the corresponding species sections below.

## 8.3 Legislation, Planning Policy Context and Guidance

8.3.1 Relevant legislation, planning policy and guidance will be referenced in the ES chapter. The documents set out below have informed the assessment methodology proposed and will be considered when identifying potential constraints to the Proposed Development, design options and mitigation.

### *Legislation*

8.3.2 There are aspects of the Proposed Development that will be affected by international and national legislation. The key legislation that is of relevance is as follows:

i) Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (‘the Ramsar Convention’);
ii) Convention on the Conservation of European Wildlife and Natural Habitats 1979 (‘the Bern Convention’);

iii) UNESCO convention on the protection of World Cultural and Natural Heritage (1972);
iv) The Conservation of Habitats and Species Regulations 2017 (as amended)';
v) The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
vi) The Environment Act 2021;
vii) The Wildlife and Countryside Act 1981 (as amended);
viii) Natural Environment and Rural Communities (NERC) Act (2006);
ix) Countryside and Rights of Way Act 2000;
x) The Invasive Alien Species (Enforcement and Permitting) Order 2019;
xi) Protection of Badgers Act 1992;
xii) Hedgerow Regulations 1997; and,
xiii) The Eels (England and Wales) Regulations 2009.

8.3.3 The Conservation of Habitats and Species Regulations 2017 (as amended) remains in place following the United Kingdom's (UK's) withdrawal from the European Union (EU) with only relatively minor changes made by the Conservation of Habitats and Species Amendment (EU Exit) Regulations 2019 which came into force on 31st December 2020. These are collectively hereafter referred to as the 'Habitats Regulations'.

8.3.4 It is noted that following the changes made to the Conservation of Habitats and Species Regulations 2017 (as amended) by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) in the UK no longer form part of the EU's Natura 2000 ecological network and now form part of the UK's national site network.

### *National Planning Policy*

8.3.5 The Ecology and Nature Conservation chapter will take account of relevant National Policy Statements (NPS). The following NPSs are considered important and relevant to the Proposed Development.

8.3.6 NPS EN-1, with particular reference to paragraphs 4.2.2 and 4.2.3, which provides national policy on what an ES for a NSIP project should contain; paragraph 4.3.1 which states what the SoS must consider when granting a DCO; and Part 5 section 5.3 which sets out guidance on generic impacts relating to biodiversity for the

applicant's assessment and decision-making on the application. The Draft NPS EN-1 includes guidance for Biodiversity Net Gain (BNG).

8.3.7 Draft NPS EN-3 describes the potential impacts from solar development on biodiversity in paragraphs 3.10.66 to 3.10.74. Paragraph 3.10.80 identifies that solar farms can have the potential to increase biodiversity value, with 3.10.81 noting that that projects should consider enhancement, management and monitoring in line with the ambition set out in the Environment Improvement Plan.

8.3.8 NPS EN-5 sets out generic impacts concerning biodiversity, although these are more relevant to considerations for birds, their feeding and hunting grounds, migration corridors and breeding grounds, and potential implications on the above in light of a development proposal. However, paragraph 2.8.9 of NPS EN-5 details biodiversity considerations when choosing an underground electricity line.

8.3.9 The NPPF, sets out that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity, and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution. The NPPF also specifies the obligations that the Local Authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation and how this is to be delivered in the planning system.

### *Local Planning Policy*

8.3.10 Local planning policy documents that are particularly relevant to the Proposed Development in relation to ecology and biodiversity are:

i) Cheshire West and Chester Local Planning Policy Local Plan (Part One) Strategic Policies - adopted on 29 January 2015[23]:
   a. ENV4 Biodiversity and Geodiversity
ii) Cheshire West and Chester Local Planning Policy Local Plan (Part Two) Land Allocations and Detailed Policies - adopted on 18 July 2019[24]:

[23] https://consult.cheshirewestandchester.gov.uk/kse/event/24907
[24] https://consult.cheshirewestandchester.gov.uk/portal/cwc_ldf/adopted_cwac_lp/parttwo_adopted

a. DM 44 Natural Environment

8.3.11 The Ecology and Nature Conservation chapter of the ES will take account of the above documents and corresponding local policies.

### *Other Guidance*

8.3.12 Other guidance documents relevant to the assessment of the impacts of the Proposed Development on ecology and biodiversity include:

i) The 25-year Environment Plan[25];
ii) Natural England and Department for Environment, Food and Rural Affairs (DEFRA) Standing Advice (protected species)[26];
iii) Cheshire Region Biodiversity Action Plan (2011)[27];
iv) 'Birds of Conservation Concern 5' (Stanbury *et al*., 2021[28]);
v) Biodiversity Net Gain. Good practice principles for development[29];
vi) BS 42020:2013 'Biodiversity – Code of Practice for Planning and Development (British Standard)';
vii) BS 8683:2021 'Process for designing and implementing Biodiversity Net Gain. Specification (British Standard)';
viii) CIEEM (2018) 'Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine'. Chartered Institute of Ecology and Environmental Management, Winchester;
ix) Collins, J. (2016) 'Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd edition'. Bat Conservation Trust, London;
x) Natural England (2021) 'Identification of Functionally Linked Land supporting Special Protection Areas (SPAs) waterbirds in the North West of England'. Natural England Commissioned Report NECR361; and,

[25] *Department for Environment, Food & Rural Affairs and The Rt Hon Michael Gove MP (2021) The 25-year Environment Plan. Available at: https://www.gov.uk/government/publications/25-year-environment-plan.*
[26] *Natural England and Department for Environment, Food and Rural Affairs (Defra) Standing Advice (protected species). Available at: https://www.gov.uk/guidance/protected-species-how-to-review-planning-applications.*
[27] *Cheshire region Biodiversity Action Plan. Available online at: https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/BAP%20list%20-%20updated%20April%202011.pdf*
[28] *Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747. Available online at https://britishbirds.co.uk/content/status-our-bird-populations.*
[29] *Available online at: https://cieem.net/wp-content/uploads/2019/02/Biodiversity-Net-Gain-Principles.pdf*

xi) The United Kingdom Biodiversity Action Plan (UK BAP).

8.3.13 Other guidance documents, such as species-specific survey methodologies, will be considered and referenced throughout the ES chapter, as appropriate.

### *Consultation*

8.3.14 To date the Applicant has engaged with Natural England through the Discretionary Advice Service (DAS) in relation to the scope of ornithological surveys and preliminary discissions on the approach to HRA. A DAS response was received on 24th March 2023 (included as Appendix 8.1) and a subsequent follow-up meeting was held with Natural England on 28th March 2023. The DAS response and outcome of the meeting discussions has informed the scope presented within the chapter.

8.3.15 Further consultation will be carried out as necessary with Natural England, local council biodiversity officers (CWaCC and HBC), the Environment Agency and other interested parties such as Cheshire Wildlife Trust.

## 8.4 Preliminary Baseline Conditions

8.4.1 Baseline information in relation to ecological features which may be affected by the Proposed Development has been and will continue to be collected through desk study and ecological field surveys.

8.4.2 Full details of baseline studies, field surveys and any consultation will be provided within the ES. Survey data available to date is summarised in this chapter. Appropriate survey areas have been adopted or will be adopted or updated as necessary during the preparation of the EIA to account for any changes to the design of the Proposed Development as it evolves.

### *Preliminary Ecological Appraisal*

8.4.3 A preliminary ecological appraisal (PEA) was initially undertaken, in line with guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM, 2017[30]), and included:

[30] *CIEEM (2017) Guidelines for Preliminary Ecological Appraisal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester*

i) a desk study (including records of designated sites, protected and notable species; a review of aerial photographs; obtaining information from the DEFRA and JNCC websites, and the local authority website; and requesting data from the local records centre) here called a background data search; and
ii) a field survey that informed phase 1 habitat mapping, an assessment of the possible presence of protected or priority species, and the likely importance of habitat features.

8.4.4 The PEA report[31] is included as Appendix 8.2. The report includes an ecological description of the Solar Array Development Area and surrounding land and information about species that may occur there. This formed the basis for further surveys and data gathering exercises, where required.

### *Other Desk-Based Study Resources*

8.4.5 In addition to the desk study information already gathered to inform the PEA report, the following additional data sources will be contacted for relevant records.

#### *Wetland Bird Survey*

8.4.6 The Site is located entirely within a regularly counted British Trust for Ornithology (BTO) Wetland Bird Survey ('WeBS') area. Recent and historical wetland bird data covering the entirety of the Site will be obtained and used to inform the ES chapter.

#### *Local Recording Groups*

8.4.7 The Site is within an area which is regularly visited by local birdwatchers[32,33]. Casual records data from the Site will be obtained from the Cheshire and Wirral Ornithological Society (CAWOS) and used to inform the ES chapter.

#### *Wind Farm Monitoring Data*

8.4.8 Consent for Frodsham Wind Farm was granted under Section 36 of the Electricity Act 1989 on 19th October 2019 (reference DPI/A0655/11/13). The consent included

[31] *Report titled 'Frodsham Renewable Energy Development -Preliminary Ecological Appraisal Report' dated January 2023 (RSK Biocensus)*
[32] https://www.birdguides.com/sites/europe/britain-ireland/britain/england/cheshire/frodsham-marsh/
[33] https://www.cawos.org/frodsham.html

a series of relevant planning conditions, pertaining to management of habitats for wetland birds and subsequent monitoring.

8.4.9 Monitoring reports, where available, will be reviewed and any relevant information included in the ES chapter baseline for the application.

*Ecological Data from other Planning Applications*

8.4.10 The Site lies in an area that has been, and is currently subject to, a range of planning applications for other developments. Where this data is readily accessible, and is deemed to be relevant, this will be used to help inform the baseline ecological conditions of the Site and surrounding area.

### *Baseline Ecology Surveys*

8.4.11 The following field surveys have been undertaken to date, to establish the baseline ecological features within the Site:

i) Preliminary Ecological Appraisal (Appendix 8.2)[31];
ii) Breeding Bird Survey (April to June 2021);
iii) Wintering Bird Survey (November 2021 to March 2022);
iv) Bat Activity Survey (May to October 2021);
v) Water Vole Habitat Assessment (April 2022);
vi) Great crested Newt eDNA survey (April and May 2022); and
vii) Reptile survey (March to June 2022).

8.4.12 All surveys have been undertaken by suitably competent and qualified ecologists in accordance with industry standard guidance. Full details of survey methodologies and corresponding results will be presented in full within the ES, and are summarised in this chapter.

8.4.13 Additional targeted / update ecological surveys of the Site are on-going, or will be undertaken in the appropriate survey season in 2023. These comprise:

i) Extended habitat survey (during the optimal habitat survey season);
ii) Breeding bird surveys;
iii) Non-breeding bird surveys (to include spring passage periods); and,
iv) Targeted invertebrate surveys (the INEOS Inovyn Deposit Ground only).

8.4.14 Full details of ecological survey methodologies, results and analysis will be provided within the ES chapter. Information gathered to date is summarised in the following sections.

*Designated Sites*

8.4.15 Locations of statutory designated sites for nature conservation were reviewed in MAGIC[34]. All such designated site within the zone of influence are listed in Table 8.1 with their reasons for designation and distance from the Site. Designated sites with geological interest only are omitted. See Figure 8.1 for designated site locations.

**Table 8.1 - Statutory Designated Sites (SPA: Special Protection Area; SSSI: Site of Special Scientific Interest; LNR: Local Nature Reserve).**

| Site Name | Approximate Distance and Direction from Site | Description |
|---|---|---|
| Mersey Estuary SSSI | Main area 80m north-west – a section on south side of Manchester Ship Canal, approximately 500m, extends into the Site, albeit this area would not be physically impacted by the development. | Internationally important site for its wintering waterbird assemblage with significant populations of dunlin *Calidris alpina,* pintail *Anas acuta*, teal *Anas crecca*, shelduck *Tadorna tadorna* and wigeon *Anas penelope*. Additionally designated for its saltmarsh habitats and boulder clay cliffs. |
| Mersey Estuary SPA | 80m north-west | Internationally designated site for non-breeding waterbirds, namely:<br>Shelduck;<br>Teal;<br>Pintail;<br>Golden plover Pluvialis apricaria;<br>Dunlin;<br>Black-tailed godwit Limosa limosa islandica;<br>Redshank *Tringa totanus*; and,<br>Waterbird assemblage. |
| Mersey Estuary Ramsar | 100m north-west | International and nationally important site for wintering birds. Nationally important populations of birds on passage include: ringed plover *Charadrius hiaticula*, redshank, dunlin. Internationally important numbers of the following |

[34] https://magic.defra.gov.uk/MagicMap.aspx *[accessed February 2023]*

| Site Name | Approximate Distance and Direction from Site | Description |
|---|---|---|
| | | species shelduck, teal, pintail, dunlin and redshank, as well as nationally important wintering populations of wigeon, grey plover *Pluvialis squatarola,* black-tailed godwit and *curlew Numenius arquata.* |
| Flood Brook Clough SSSI | 1km north-east | A deep wooded valley cutting through Keuper Marl with an Ash (*Fraximus excelsior*) and Wych Elm (*Ulmus glabra*) woodland. Many of the plants present are characteristic of ancient woodland on base-rich soils, and are comparatively rare in Cheshire. |
| Dunsdale Hollow SSSI | 1.5km south | Dunsdale Hollow occurs on a steep north-west facing escarpment of Upper Mottled and Keuper Sandstone. It is an acidic lowland Birch (*Betula spp*). and Sessile Oak (*Quercus petraea*) woodland. |
| Runcorn Hill LNR | 1.7km north | The largest area of lowland heath in North Cheshire. The woodlands, ponds and scrub along with its geological structure complete a unique mosaic of habitats. |
| Midland Meres & Mosses Phase 1 Ramsar | 6.7km south-east | A geographically diverse series of lowland open water and peatland sites in the north-west Midlands of England and north-east Wales. These have developed in natural depressions in the glacial drift left by receding ice sheets which formerly covered Cheshire/Shropshire Plain. The 18 component sites include open water bodies, the majority of which are nutrient rich with associated fringing habitats, reed swamp, fen, carr and damp pasture. The wide range of habitats support national important flora and fauna. |
| Midland Meres & Moses Phase 2 Ramsar | 7km south-east | As above |

8.4.16 Data regarding non-statutory designated sites is provided in Table 8.2.

**Table 8.2 - Non-Statutory Designated Sites (LWS: Local Wildlife Site).**

| Site Name | Approximate Distance and Direction from Site | Description |
|---|---|---|
| Frodsham, Helsby and Ince Marshes LWS | On Site | Neutral grassland, floodplain, wetlands, wildlife corridors, other qualifiers, saltmarsh, birds, invertebrates, vascular plants. |
| Frodsham Field Studies Centre LWS | 30m north-east | Undetermined species-rich grassland, wetlands, ponds, wildlife corridors, invertebrates, vascular plants |
| Easton Clifton Tip LWS | 80m south-east | No information available |

| Site Name | Approximate Distance and Direction from Site | Description |
|---|---|---|
| Weston Marsh Lagoon LWS | 115m east | Grassland of industrial origin |
| Upper Mersey Estuary LWS | 300m north | Intertidal sand and mudflats, saltmarsh, estuarine and wetland birds. |
| Clifton Lagoon LWS | 485m east | Grassland of industrial origin, invertebrates, breeding and wetland birds. |
| Clifton Cloughs B | 530 m north | Ancient woodland |
| Clifton Cloughs A | 700m north | Ancient woodland |
| Sutton Bridge Unused Lagoon | 875m south-east | Restorable grassland, wetlands, other qualifiers |
| Frodsham and Overton Woods | 980m south | Deciduous woodland, heathland, wildlife corridors, other qualifiers. |

*Habitats*

8.4.17 The Magic website identifies two areas mapped as good quality semi-improved grassland on the Site, located within the central section to the east of the former MSC Dredging Deposit Ground. One area which is mapped as reedbed in the northern section of the Site and one area is mapped as deciduous woodland, in the south-eastern corner of the Site. There are several areas of habitats listed under Section 41 of the NERC Act 2006, within 1 km of the Site, including 'coastal saltmarsh', mudflats, lowland calcareous grassland, lowland fens, reedbeds and deciduous woodland.

8.4.18 The PEA habitats field survey of the Solar Array Development Area was undertaken in March 2022 and adopted on the Phase 1 Habitat Survey approach (Joint Nature Conservation Committee 2010[35]), as extended for use in environmental impact assessment. It is acknowledged that the Access Road and Connections were not fully included; however, proposed works within these areas will be subject to further survey to enable Biodiversity Net Gain (BNG) calculations and the EIA assessment to be undertaken.

[35] *JNCC, (2010), Handbook for Phase 1 habitat survey – a technique for environmental audit, JNCC, Peterborough, ISBN 0 86139 636 7*

8.4.19 A Phase 1 Habitat map of the Solar Array Development Area is provided as Figure 1 of Appendix 8.2 (the PEA report) and shows the location of the target notes referred to in the text below. Due to the size and scale of the Solar Array Development Area, it has been split into 10 x 1km monad 'plots'. The following habitat types (with Phase 1 habitat codes in brackets) are present on and around the Solar Array Development Area:

i) Broadleaved woodland, plantation (A1.1.2)
ii) Scrub, dense / continuous (A2.1)
iii) Scrub, scattered (A2.2)
iv) Broadleaved scattered trees (A3.1)
v) Semi-improved neutral grassland (B2.2)
vi) Improved grassland (B4)
vii) Marsh / marshy grassland (B5)
viii) Poor semi-improved grassland (B6)
ix) Tall ruderal (C3.1)
x) Swamp (F1)
xi) Marginal vegetation (F2.1)
xii) Standing water (G1)
xiii) Arable (J1.1)
xiv) Introduced shrub (J1.4)
xv) Intact hedge, species poor (J1.1.2)
xvi) Fence (J2.4)
xvii) Dry ditch (J2.6)
xviii) Buildings (J3.6)
xix) Bare ground (J4)
xx) Hardstanding (J5)

8.4.20 Further habitat survey is proposed for the spring or summer of 2023 (within the optimum growing season). This survey will adopt the '*UK Habitat Classification Use Manual (V1.1)*' (UKHab, 2020[36]), thereby enabling use in Biodiversity Net Gain calculations in accordance with the most up to date version of the DEFRA

[36] https://ukhab.org/

Biodiversity Metric Calculator applicable at the time. This survey will also cover areas of the Site which were not picked up in the PEA.

8.4.21 The following Non-Native Invasive Species (NNIS) have been identified on the Site: Variegated Yellow Archangel, New Zealand Pigmyweed and Cotoneaster species.

*Protected and Priority Species Desk Study Records*

8.4.22 At least 241 protected and noteworthy species are recorded from within 1 km of the Solar Array Development Area boundary, as presented in the PEA. Noteworthy species include species of principal importance that are listed under Section 41 of the NERC Act 2006. Of these, 15 are plants, 4 are lichens, 5 are amphibians, 4 are reptiles, 46 are invertebrates, 146 are birds and 21 are mammals. These records will be considered in the ES.

*Breeding Bird Surveys 2021 and 2023*

8.4.23 The 2021 breeding bird survey involved walking a transect across the Solar Array Development Area and recording all birds seen or heard using a simplified version of activity notation used by the BTO[37]. Bird species protected under Schedule 1 of the Wildlife and Countryside Act and red and amber listed 'Birds of Conservation Concern' (BoCC)[38] and those listed on Schedule 41 of the Natural Environment and Rural Communities Act were plotted on field maps. These species were recorded as 'priority species'. A simple tally of species and number observed or heard was made for other bird species (those of no conservation concern, referred to as green list species).

8.4.24 Four visits were made between 22nd April 2021 and 15th June 2021 by experienced field ornithologists for the Proposed Development.

8.4.25 A total of 37 priority species of birds were recorded during the breeding bird surveys within the Frodsham survey area. This included four species protected under Schedule 1 of the Wildlife and Countryside act, namely hobby *Falco subbuteo*,

[37] https://www.bto.org/sites/default/files/u31/downloads/details/CBC-instructions-g100.pdf
[38] *Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746. Available online at: https://britishbirds.co.uk/wp-content/uploads/2014/07/BoCC4.pdf.*

peregrine falcon *Falco peregrinus*, marsh harrier *Circus aeruginosus*, and Cetti's warbler *Cettia cetti*. Only the latter was considered to be breeding on Site, as well as an additional 33 species listed as either red or amber-listed birds of conservation concern.

8.4.26 In addition, 38 green listed species were recorded. Of these, 34 were considered likely to be breeding on or near to the Solar Array Development Area.

8.4.27 Further breeding bird surveys are proposed in spring and summer 2023, using the same methodology undertaken in 2021 and extended to include for checks for evidence of nesting Schedule 1 listed species within 100m of the Access Road and the Connections.

8.4.28 Data on breeding birds from nearby planning applications will also be reviewed and referenced, where appropriate. It is relevant that the proposed 'HyNet North West hydrogen pipeline[39] NSIP (currently in pre-application stage) utilises much of the same Access Road as the Proposed Development and subsequently provides a highly relevant data set. It is therefore considered that existing data is extensive and adequate to inform impact assessment proportionate to the nature of effects on breeding birds along the Access Route.

*Non-breeding Birds (2021-2022 and 2022-2023)*

8.4.29 Wintering bird surveys of the Solar Array Development Area were undertaken between November 2021 and February 2022. Further surveys are on-going; these commenced September 2022 and are scheduled to continue until May 2023 in order to capture the spring passage period (in addition to the autumn passage and winter seasons). Natural England has confirmed satisfaction with the survey effort and methodologies in their DAS response of 23rd March 2023 (Appendix 8.1), and during the subsequent meeting on 28th March 2023.

8.4.30 Surveys of the Solar Array Development Area comprised a combination of walk transect visits and scaled Vantage Point (VP) surveys.

[39] https://infrastructure.planninginspectorate.gov.uk/projects/north-west/hynet-north-west-hydrogen-pipeline/?ipcsection=docs

8.4.31 The transect surveys for wintering birds involved walking a pre-determined transect route across the Solar Array Development Area, covering all areas of suitable habitat for wintering birds. All birds encountered (either visually or through their vocalisations) were recorded to maps using standard BTO notation. The following species were classified as priority target species:

i) Species listed on the citations for Mersey Estuary SPA/Ramsar site; particularly those listed as qualifying species;
ii) European Commission (EC) Birds Directive (2009/147/EC) Annex I listed species;
iii) Natural Environment and Rural Communities (NERC) Act 2006 S41 Species of Principal Importance; and
iv) Species included on the BoCC Red and Amber lists[28].

8.4.32 A total of seven transect surveys were undertaken between November 2021 and February 2022 inclusive. Transect surveys covered a period of approximately six hours from mid-morning until mid-afternoon, including various stages of the tidal cycle. Peak Counts of Mersey Estuary SPA / Ramsar qualifying feature species are summarised in Table 8.3. Data from the 2022 – 2023 surveys is not available at the time of preparation of this report.

**Table 8.3 - Transect Survey Summary – Mersey Estuary SPA / Ramsar qualifying feature species.**

| Common Name | Scientific Name | Peak Count 2021/ 2022 | Notes | SPA population[40] |
|---|---|---|---|---|
| **Qualifying Features** | | | | |
| Common Shelduck | Tadorna tadorna | 62 | All records on adjacent Weaver Estuary, outside the Site. | 10,697 |
| Eurasian Teal | Anas crecca | 375 | Highest count on Site = 2 birds. All records on adjacent Weaver Estuary, outside the Site. | 2,792 |

[40] *SPA populations taken from moving 5-year average as presented in Frost, T.M., Calbrade, N.A., Birtles, G.A., Hall, C., Robinson, A.E., Wotton, S.R., Balmer, D.E. and Austin, G.E. 2021. Waterbirds in the UK 2019/20: The Wetland Bird Survey. BTO/RSPB/JNCC. Thetford. .Wetland Bird Survey (WeBS) data from Waterbirds in the UK 2019/20 © copyright and database right 2021. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, in association with WWT, with fieldwork conducted by volunteers."*

| Common Name | Scientific Name | Peak Count 2021/ 2022 | Notes | SPA population[40] |
|---|---|---|---|---|
| Northern Pintail | Anas acuta | 22 | All records on adjacent Weaver Estuary, outside the Site. | 147 |
| Golden Plover | Pluvialis apricaria | 550 | Highest count on Site = 550 birds. | 1,712 |
| Dunlin | Ca;idris alpina alpina | 2 | All records on adjacent Weaver Estuary, outside the Site. | 51,456 |
| Black-tailed Godwit | Limosa limosa islandica | 60 | Highest count on Site = 1 bird. All other records in flight, or on adjacent Weaver Estuary, outside the Site. | 2,912 |
| Common Redshank | Tringa totanus | 270 | All records on adjacent Weaver Estuary, outside the Site. | 4,189 |
| **Other Species (waterbird assemblage)** | | | | |
| Pink-footed Goose | Anser brachyrhynchus | 85 | | 3,149 |
| Wigeon | Anas penelope | 180 | | 1,701 |
| Gadwall | Anas strepera | 3 | | 103 |
| Mallard | Anas platyrhynchos | 13 | | 845 |
| Pochard | Aythya ferina | 29 | All records on adjacent Weaver Estuary, outside the Site. | 54 |
| Goldeneye | Bucephala clangula | 22 | All records on adjacent Weaver Estuary, outside the Site. | 32 |
| Little Egret | Egretta garzetta | 1 | On Site | 48 |
| Great Egret | Ardea alba | 1 | Location not recorded. | 5 |
| Moorhen | Gallinula chloropus | 8 | All records on adjacent Weaver Estuary, outside the Site. | 54 |
| Oystercatcher | Haematopus ostralegus | 1 | All records on adjacent Weaver Estuary, outside the Site. | 888 |
| Lapwing | Vanellus vanellus | 2,500 | On Site | 8,507 |
| Curlew | Numenius arquata | 400 | Highest count on Site = 85 birds. All other records in flight, or on adjacent land. | 1,502 |

| Common Name | Scientific Name | Peak Count 2021/ 2022 | Notes | SPA population[40] |
|---|---|---|---|---|
| Ruff | Calidris pugnax | 2 | All records on adjacent Weaver Estuary, outside the Site. | 51 |
| Common Sandpiper | Actitis hypoleucos | 2 | All records on adjacent Weaver Estuary, outside the Site. | 18 |
| Jack snipe | Lymnocryptes minimus | 2 | Location not recorded. | 6 |
| Snipe | Gallinago gallinago | 34 | Location not recorded. | 64 |

8.4.33 In addition to walk-over surveys, VP surveys were completed. VP surveys are designed to record flight activity and assess collision risk of wind farms. VP surveys were undertaken at the Site to add additional context to transect surveys, by noting which species regularly over-fly. The surveys involved conducting a stationary survey from an elevated position overlooking suitable habitat for wintering birds within the majority of the Solar Array Development Area [41]. The VP was surveyed on four occasions (i.e., monthly) between November 2021 and February 2022 inclusive. VP surveys covered a period of approximately six hours from mid-morning until mid-afternoon, including various stages of the tidal cycle.

8.4.34 Forty species were recorded during VP surveys of the Solar Array Development Area. Notable species in the context of the Proposed Development included; Whooper Swan *Cygnus olor*, Pink-footed Goose, Shelduck, Teal, Mallard, Shoveler *Anas clypeata*, Little Egret, Marsh Harrier *Circus aeruginosus*, Lapwing, Curlew, Black-tailed Godwit and Snipe.

8.4.35 Additional transect surveys of the Solar Array Development Area commenced in September 2022 and will continue until May 2023, following the same methodology. Weekly surveys were undertaken in the autumn passage period (September and October 2022), with fortnightly surveys over the winter period (November 2022 to March 2023). Weekly surveys are again proposed in the spring passage period (April

*[41] Complete coverage of the Site is considered unnecessary as there is no pathway for effects from the Proposed Development on over-flying birds. VP survey data was collected to add additional context to records of birds using the Site (as observed during transect surveys), and which will form the basis of impact assessment purposes in combination with desk study records. This approach has been agreed with Natural England (DAS response dated 23rd March 2023).*

and May 2023). The increased survey effort in the passage period is designed to reflect the higher turnover of bird movements during migration.

8.4.36 Further contextual VP surveys of the Solar Array Development Area, using the same methodology as followed in winter 2021 – 2022, are also being undertaken currently and will continue until May 2023. At least 9 hours of survey effort per month has been / will be completed.

8.4.37 Surveys of the Access Road and adjacent land are not proposed. The ES will be informed by habitat appraisal, consultation with local recording groups and biological records centres, with reference to ornithology monitoring of the Frodsham Wind Farm (as available). Data on non-breeding birds from nearby planning applications will also be reviewed and referenced, where appropriate, in particular the proposed HyNet North West hydrogen pipeline NSIP where this relates to the Access Road (at Natural England's request). It is therefore considered that existing data is extensive and adequate to inform impact assessment proportionate to the likely effects on non-breeding birds along the Access Route.

*Bats*

8.4.38 No trees with features suitable to support roosting bats were identified during the PEA. Two buildings with bat roost potential were identified.

8.4.39 Bat activity surveys were carried out in accordance with the Bat Conservation Trust (BCT) good practice guidelines (Collins, 2016[42]). The Site was assessed for its suitability for foraging and commuting bats during the PEA, and it was determined that to have 'low' suitability for both foraging and commuting bats. The western section of the Solar Array Development Area, partially below the Frodsham Wind Farm, was considered to have very low potential to support foraging and commuting bats as it is predominantly large, improved fields which are intensively grazed by cattle and sheep. As such, the transects were designed to cover the eastern section of the Site and the most suitable foraging and commuting habitat. The Solar Array Development Area was split into two transects which were surveyed at the same

*[42] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London*

time and covered all suitable habitats for foraging and/or commuting bats, with a focus on boundary features (but also included open areas).

8.4.40 As the Solar Array Development Area was predominantly assessed as 'low' habitat quality, as per Collins (2016) guidance, one survey visit was undertaken per season in suitable weather conditions. Surveys were completed between May and September 2022. Each survey commenced at sunset and lasted two hours.

8.4.41 Two Wildlife Acoustics Song Meter 4 Bat+ (SM4) and one Wildlife Acoustics Song Meter 2 Bat (SM2) bat detector were installed at three locations within the boundary of the Solar Array Development Area in May, July and September 2022. The detectors were placed alongside features typically used by foraging or commuting bats. One static was deployed per transect, as recommended within Collins (2016).

8.4.42 At least five different species of bat were recorded during the transect surveys; common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius' pipistrelle *Pipistrellus nathusii*, noctule *Nyctalus noctule* and serotine *Eptesicus serotinus*.

8.4.43 This same five species were confirmed via automated monitoring. Nyctalus species were identified to species level for some calls within the automated monitoring data, with Leisler's bat *Nyctalus leisleri* also identified. Brown long-eared bat *Plecotus auritus* calls were also recorded. As such, a total of at least eight species were recorded.

8.4.44 No further bat activity surveys are proposed as linear bat habitat features and standalone trees with bat potential will be buffered (watercourses and ditches by a minimum 10m and hedgerows by a minimum 5m either side of the feature) and permanent lighting is not proposed. Temporary lighting, where required, will be directed away from potential bat habitat features. Bat roost surveys of the two identified buildings are not proposed as no works are proposed on these buildings.

*Water Voles and Otters*

8.4.45 The PEA identified that multiple ditches within the Solar Array Development Area were potentially suitable for both water voles and otters. Thirteen records of water voles, located within or immediately adjacent the Solar Array Development Area

boundary were returned from the desk study and water vole has been observed on the Solar Array Development Area during ornithology surveys in early 2023.

8.4.46 A detailed habitat suitability assessment was therefore undertaken in March 2022. This identified 22 ditches and 5 waterbodies with suitability to support water voles. One ditch was assessed as 'optimal suitability', while 16 (12 ditches and 4 waterbodies) were assessed as 'good suitability'. A further 10 (nine ditches and one waterbody) were assessed as 'suitable but poor'. The remaining three waterbodies and 13 ditches were assessed as having negligible suitability to support water vole.

8.4.47 The majority of ditches and waterbodies on the Solar Array Development Area were generally considered unsuitable for otter as they do not support fish, are shallow and densely shaded. No otter holts or evidence of otter was recorded during the PEA survey, but the larger ditches and waterbodies were considered to have the potential to support otter.

8.4.48 No further water vole or otter surveys are proposed; however these will be considered if the evolution of the Proposed Development requires any works within 10m of any ditch or waterbody.

*Badgers*

8.4.49 The Site contains areas of scrub and a variety of grassland habitats, which provide suitable habitats for badger. Two main active badger setts and an additional five outlier badger setts were identified within the Solar Array Development Area.

8.4.50 No further badger surveys are proposed; however this will be reviewed if the evolution of the Proposed Development requires any works within 30m of an active badger sett.

*Other Protected and Notable Mammals*

8.4.51 In addition, based on desk study records received and habitats present, it is considered that the Solar Array Development Area may potentially support Brown hare *Lepus europaeus*, European hedgehog *Erinaceus europaeus* and Western polecat *Mustela putorius*. Specific surveys for these species are not proposed; however their potential presence will be considered in the ES chapter.

*Amphibians*

8.4.52 The PEA desk study returned 71 amphibian records within 1km of the Solar Array Development Area boundary including records for common frog *Rana temporaria*, common toad *Bufo bufo*, great crested newt (GCN) *Triturus cristatus* and smooth newt *Lissotriton vulgaris.*

8.4.53 The closet record of a GCN is from 2003 and is 450m north of the Solar Array Development Area, but the River Weaver will act as a barrier to movement between this record and the Solar Array Development Area.

8.4.54 The PEA study identified 36 ditches and 9 waterbodies within the Solar Array Development Area that provide potential suitable breeding habitat for GCNs and other amphibians. Furthermore, there are an additional 14 waterbodies identified within 500m of the Solar Array Development Area boundary. The Site is bordered by the Manchester Ship Canal and River Weaver to the north and east, and the M56 motorway and Frodsham to the south and as such is relatively isolated.

8.4.55 All ditches and waterbodies on the site and within 500m, where accessible, were subject to a habitat suitability index (HSI) survey and water samples were collected from 21 of the most suitable and safely accessible waterbodies and analysed for the presence of GCN environmental DNA (eDNA), in 2022.

8.4.56 No positive eDNA results were recorded. Furthermore, reptile surveys were undertaken on the site between March and June 2022 and no GCNs were recorded using the refugia traps. Therefore, it is considered that GCNs are reasonably unlikely to be present on the Solar Array Development Area. These results are consistent with surveys undertaken in 2010 to inform the Frodsham Wind Farm planning application, when 27 water bodies were surveyed[43] (including those closest to the Proposed Development Access Road); all results were negative. Subsequently no further GCN surveys are proposed.

8.4.57 Common toads were identified on the Solar Array Development Area during the initial walkover survey and two toadlets were recorded during the reptile surveys.

[43] *Report titled 'Frodsham Windfarm; Great Crested Newt Survey Report' dated July 2010 (RSK Carter Ecological).*

*Reptiles*

8.4.58 The ecological value of the Solar Array Development Area and its suitability for reptiles was assessed in a preliminary ecological appraisal undertaken in March 2022. The Site was considered to provide suitable terrestrial habitat for reptiles as it contains areas of marshy grassland (grazed by sheep and cattle), rough grassland and arable land with a grid of interconnected ditches forming the field boundaries.

8.4.59 Surveys were subsequently undertaken in the period March to June 2022. Due to the size of the Solar Array Development Area, it was split into 13 different areas and a total of 600 artificial refuges were deployed on 31st March 2022. Seven reptile visits were then carried out between April and June 2022 and the refuges were checked for reptiles during suitable weather when reptiles are active.

8.4.60 No reptiles were recorded during any of the survey visits. Therefore, reptiles are considered reasonably likely to be absent from the Solar Array Development Area, or present only in very low numbers. No further surveys are proposed.

*Invertebrates*

8.4.61 A large proportion of the Solar Array Development Area is bramble, species poor marshy grassland, improved grassland and arable fields, which are considered likely to support a common assemblage of invertebrate species.

8.4.62 Arable fields and hedgerows within arable settings are often subject to maintenance, together with overspray and run-off of pesticides and other treatments. Accordingly, the network of boundary hedgerows, margins and drainage ditches are only likely to support common invertebrate assemblages typical of the local arable farming landscape. However, the ponds, ditches and areas of semi-improved neutral grassland and swamp may support a more diverse assemblage of invertebrates.

8.4.63 Boundary features, ponds and ditch habitats will be retained almost in their entirety, with development primarily taking place within the fields. Embedded mitigation and design buffers included within the Proposed Development for other species (such was bats and water voles) overlaps with these habitats. It is therefore not considered necessary to conduct detailed field survey for terrestrial or aquatic invertebrates across the majority of the Solar Array Development Area.

8.4.64 Targeted invertebrate surveys of potentially higher value habitats, namely the INEOS Inovyn Deposit Ground, will be undertaken in 2023.

### *Existing Impacts of Frodsham Wind Farm*

8.4.65 Consent for Frodsham Wind Farm was granted under Section 36 of the Electricity Act 1989 on 19th October 2019 (reference DPI/A0655/11/13).

8.4.66 In accordance with planning conditions attached to the wind farm consent (reference DPI/A0655/11/13), Cells 2, 3 and 5 are managed for SPA bird species in order to mitigate impacts predicted as a result of the operation of the wind farm. The prescribed management measures are detailed in the approved 'Outline Habitat Creation Management Plan: Frodsham Marshes Windfarm' (August 2014 report). Two areas are managed for SPA bird species:

i) Cell 3, which is located outside, but adjacent to, the Site boundary provides mitigation for the displacement of waterbirds through habitat creation (wet grassland and scrapes); and,
ii) Cells 2 and Cell 5 (both located within the Site) are grazed favourably for three SPA species; golden plover, lapwing and curlew.

8.4.67 It is widely acknowledged that wind farms displace birds from using the immediately surrounding land, up to a typical maximum distance of 600m[44]. This is understood to have been a design constraint for Frodsham Marsh Wind Farm, with the now operational wind turbines designed to be set-back from functional parts of the Mersey Estuary SPA and Ramsar.

8.4.68 Of the approximately 314 ha of the Proposed Development Site, a total of 174 ha (55%) is located within 600m of operational wind turbines, as shown on Figure 8.2. It can therefore be reasonably assumed that the attractiveness of this area to non-breeding waterbirds is significantly reduced due to proximity to the wind turbines.

8.4.69 In response to a request for clarification on this matter in the DAS request, Natural England responded to state *'Natural England advise that any assessment with regards to displacement of birds from wind turbines is undertaken on a case by case*

[44] *Langston and Pullen (2006) – see https://onlinelibrary.wiley.com/doi/10.1111/j.1474-919X.2006.00516.x*

*basis. It would need to be clear within any assessment that the proposed development doesn't add to any displacement effects and that the alternative habitat provided under the wind farm commitments is adequate for all the displaced birds, thereby maintaining the nearby SPA population. Data on the success of the wind farm mitigation would therefore need to be considered in order to agree with this statement'*. It should be noted that winter bird survey data from September 2022 to March 2023 was not available at the time of submission of the DAS request (November 2022) and so Natural England comments were provided without consideration of this data. Information on the success of the wind farm mitigation, where available, will be reviewed and considered in the chapter. However, from the data collected to date it is clear that displacement effects of the wind turbines are now in effect regardless of the efficacy of wind farm mitigation.

## 8.5 Potential Effects and Mitigation

8.5.1 The assessment will consider the potentially significant effects associated with the construction, operational and decommissioning phases of the Proposed Development.

### *Construction*

8.5.2 Potential construction phase ecological effects associated with the Proposed Development are considered to relate to:

i) Direct land take (habitat loss) to accommodate the Proposed Development;
ii) Temporary disturbance and land take for laydown areas and construction compounds;
iii) Disturbance to, fragmentation or severance of connecting habitat or potential commuting routes within and adjacent to the site;
iv) Potential to cause the spread of Invasive Non Native Species; and
v) Disturbance and pollution (indirect effects such as noise and vibration, dust, pollution from surface water run-off) resulting from site clearance and construction, plant and vehicles movements and site workers' activities.

### *Operation*

8.5.3 Operational phase effects are defined as effects following the construction of the Proposed Development. Operational phase effects generally relate to disturbance of

habitats or species, on either a temporary or permanent basis. Some effects may reduce with habituation or remain for the lifetime of the Proposed Development.

8.5.4 As there would be limited maintenance activities, much of which would be associated with management of the landscape treatments, human disturbance from operation of the Proposed Development is not anticipated to be any greater than current levels of agricultural and recreational activity. As such it is proposed to scope this matter out of the ES.

8.5.5 There are no additional operational effects relating to land take or habitat loss other than those already addressed in the construction phase.

### *Decommissioning*

8.5.6 Decommissioning effects are defined as effects following the end of the operational period of the Proposed Development. Decommissioning effects relate to disturbance of habitats or species, on a temporary basis and disturbance and pollution (indirect effects such as noise and vibration, dust, pollution from surface water run-off) resulting from site decommissioning activities, plant and vehicles movements.

### *Mitigation*

#### *Principles and Biodiversity Net Gain*

8.5.7 Compliance with planning policy in the NPSs and NPPF requires that the Proposed Development considers and engages a mitigation hierarchy, requiring the highest level to be applied, where possible. The mitigation hierarchy is also fundamental to BNG policy. There are four sequential steps that must be taken throughout the lifecycle of a project where there is potential for impacts on relevant ecological receptors:

i) Avoidance – actions taken to avoid causing impacts to the environment prior to beginning development (for example, moving the development to a different location);
ii) Minimisation – measures taken to reduce the duration, intensity, extent and/or likelihood of the unavoidable environmental impacts caused by development (for example, adapting the development design to minimise impacts);
iii) Restoration or rehabilitation – actions taken to repair environmental degradation or damage following unavoidable impacts caused by development; and

iv) Offsets – measures taken to compensate for any adverse environmental impacts caused by development which cannot be avoided, minimised and/or restored (e.g., including habitat creation to offset losses).

8.5.8 The Proposed Development's design evolution will seek to avoid areas of significant biodiversity value, such as field boundary hedgerows and ditch networks. Habitat enhancement measures and ongoing management practices will be proposed in line with guidance published by the Building Research Establishment (*Biodiversity Guidance for Solar Developments*[45]) ('the BRE Guidance') that will enhance and safeguard key habitats for the benefit of wildlife, and enhance the ecological value of land currently under agricultural use.

8.5.9 The BRE guidance states that:

*'with appropriate land management, solar farms have the potential to support wildlife and contribute to national biodiversity targets. Indeed, solar farms may have several additional advantages in that they are secure sites with little disturbance from humans and machinery once construction is complete. Recent research suggests biodiversity gains on solar farms can be significant'*

8.5.10 The ES chapter will provide commitments for long-term management of the land for the duration of the project to conserve and improve landscape habitat connectivity with the wider landscape for wildlife through protecting and enhancing potentially important wildlife corridors and habitats. This will contribute to the establishment of coherent ecological networks, supporting the BNG targets of the Environment Act 2021 and the NPS EN-1. The DCO application will be supported by a BNG calculation and landscaping and ecological improvements would be set out in an Outline Landscape and Ecological Management Plan (OLEMP) to demonstrate how mitigation/enhancement proposed in the EIA could be achieved. Implementation of a final LEMP is likely to form a requirement attached to the DCO.

[45] *BRE (2014). Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene.*

### *Embedded Mitigation*

8.5.11 The following measures will be considered as embedded mitigation and incorporated into the design of the Proposed Development to avoid and protect important ecological features, so far as is achievable:

i) Species-specific buffer zones will be adopted where possible (e.g. around badger setts), further detailed information will be provided within the ES chapter;
ii) A minimum buffer of 10m around watercourses and ditches will be applied, which all elements of the Proposed Development will avoid, where possible;
iii) A minimum buffer of 5m around hedgerow / field boundaries will be applied, which all elements of the Proposed Development will avoid, where possible;
iv) Design will be sensitive to ecologically valuable habitats and these will be avoided so far as practicable;
v) There will be no permanent new lighting of boundary features (hedgerows and ditches); and
vi) New watercourse / ditch crossings will be minimised and sensitively designed to allow the continued movement of wildlife along the watercourse.

### *Mitigation Proposals*

8.5.12 Where impacts cannot be avoided, appropriate mitigation measures will be implemented. The ES will include as a minimum;

i) An Outline Construction Environmental Management Plan (OCEMP); and
ii) A Outline Landscape and Ecological Management Plan (OLEMP);

8.5.13 The OCEMP will describe measures to be implemented during the construction process and may, for example, include commitments to Species Protection Plans, Reasonable Avoidance Measures (RAMs), pre-construction surveys and appropriate derogation licenses as well as pollution (including dust) control, managed construction lighting and noise / traffic management measures.

8.5.14 The OLEMP will be designed to ensure delivery of the Proposed Development's mitigation requirements.

8.5.15 The existing mitigation for the Frodsham Wind Farm is recognised, and the potential requirement for additional mitigation measures and / or compensatory measures is

acknowledged. The extent of the mitigation will depend on the results of on going baseline data collection and project design.

### *Enhancements*

8.5.16 Through provision of BNG and the measures to be set out in the OLEMP, the Proposed Development will deliver habitat enhancements, which will provide a clear benefit for a broad range of dependent species. Further, the removal of land from arable production will lead to a reduction (or complete removal) of agricultural chemical overspray and drift where this currently occurs on the Site. This would lead to improved conditions for terrestrial and aquatic invertebrates, which in turn will benefit dependent species, such as foraging bats or some farmland birds. Water quality and soil health will also likely improve as a result of less intensive farming practices.

8.5.17 The ES chapter will therefore include consideration of the potential benefits of the Proposed Development.

## 8.6 Assessment Methodology

### *Overarching Principle of Assessment*

8.6.1 CIEEM Guidelines (2018[46]) for Ecological Impact Assessment (EcIA) define a 'significant effect' as an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general (i.e., the feature could be positively or negatively significantly affected).

8.6.2 With regard to ecological impact assessment, the CIEEM Guidelines note that:

*'A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the decision-making process.'*

[46] *CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.1). Chartered Institute of Ecology and Environmental Management, Winchester.*

8.6.3 Any potentially significant effects identified will be expressed with reference to an appropriate geographic scale. For example, a significant effect on a nationally designated site is likely to be of national significance; however, the scale of significance does not necessarily always relate to the importance of an ecological feature. For example, an effect on a species which is considered of national importance may not have a significant effect upon its national population.

8.6.4 In line with the principles of proportionate EIA, embedded mitigation, including avoidance through the design process and application of industry standard good practice, will be considered at the outset of the assessment.

8.6.5 Where it is not possible to robustly justify a conclusion of no significant effect, a significant effect will be assumed as a precautionary approach to ensure that a realistic 'worst case' scenario has been assessed. Where uncertainty exists, this will be acknowledged.

8.6.6 Where the ES chapter proposes additional mitigation measures to mitigate potentially significant adverse effects on ecological features, an assessment of residual ecological effects, taking into account any ecological mitigation recommended, will be undertaken.

### *EcIA Methodology*

8.6.7 The assessment of the likely significant effects of the Proposed Development on ecological features to be presented within the ES chapter will be based on the CIEEM Guidelines.

8.6.8 The assessment process will include the following stages:

i) determination and evaluation of important ecological features;
ii) identification and characterisation of impacts;
iii) outline of mitigation measures to avoid and reduce significant impacts;
iv) assessment of the significance of residual effects after the implementation of such measures;
v) identification of appropriate compensation measures to offset significant residual effects if necessary; and
vi) identification of opportunities for ecological enhancement

8.6.9 Whilst not yet a mandatory requirement, the EIA will seek to demonstrate biodiversity net-gain in accordance with the Environment Act 2021. Therefore, the DEFRA Biodiversity Metric Calculator will be utilised in order to provide evidence of achievable biodiversity net-gains associated with the Proposed Development.

8.6.10 The ES chapter will be supported by Technical Appendices detailing the desk study results, consultation, survey methods and results, and will be further supported by relevant figures, tables and photographs, where necessary. Where sensitive data is recorded, the ES chapter will be supported by confidential appendices which will not be released into the public domain.

8.6.11 The assessment within the ES chapter will assess in detail impacts upon important ecological features i.e., those that are considered important and potentially significantly affected by the Proposed Development.

8.6.12 Relevant European, national and local legislation policy and guidance will be referred to in order to determine the importance (or 'sensitivity') of ecological features. In addition, importance will also be determined using professional judgement, the results of baseline surveys and the importance of features within the context of the geographical area.

8.6.13 Importance will not necessarily relate solely to the level of legal protection that a feature receives: ecological features may be important for a variety of reasons, such as their connectivity to a designated site and the rarity of species, or the geographical location of species relative to their known range.

8.6.14 The importance of ecological features will be defined in a geographical context from "Local" to "International".

8.6.15 The identification and characterisation of impacts on important ecological features will be undertaken in accordance with the CIEEM Guidelines, with reference made to magnitude (e.g. area or number of individuals of a species to be impacted), extent, duration and reversibility, as appropriate. The tables utilised for the assessment methodology are provided in Appendix 8.3).

8.6.16 Impacts will be considered during the construction, operational and decommissioning phases of the Proposed Development and will be assessed on the

basis that a clearly defined range of avoidance and standard best practice measures are implemented.

### *Habitats Regulations Assessment*

8.6.17 As part of the assessment, it is necessary to consider whether the Proposed Development is likely to have a significant effect, or an adverse effect on integrity on areas that have been internationally designated for nature conservation purposes (i.e., European sites). European sites are protected under the Conservation of Habitats and Species Regulations 2017 (as amended; relevant to England and Wales). The UK left the EU on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 ("the Withdrawal Act"). However, the most recent amendments to the Habitats Regulations – the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 – make it clear that the need for Habitats Regulations Assessment (HRA) continues to apply.

8.6.18 Whilst HRA decisions must be taken by the competent authority (the SoS, informed by the recommendations of the appointed Examining Authority), the information needed to undertake the necessary assessments must be provided by the Applicant. The information needed for the competent authority to establish whether there are any Likely Significant Effects (LSEs) from the Proposed Development and to assist in carrying out its Appropriate Assessment, will be provided in a shadow HRA Report. The shadow HRA will be prepared in line with Planning Inspectorate Advice Note 10 (Habitats Regulations Assessment) including completion of the necessary matrices. The HRA and EIA assessments will be developed together to allow mutual consideration of issues where relevant.

## 8.7 Impacts Scoped Out of the Assessment

8.7.1 It is proposed that the potential for indirect effects upon statutorily designated sites for nature conservation (without mobile qualifying criteria) located greater than 2km from the Site, or for which embedded mitigation and good practice will be sufficient to prevent any impacts, is scoped out of the assessment. It is considered that potentially significant effects on such designations can be precluded on the basis of spatial separation and due to the static nature of the qualifying habitat and species interests.

8.7.2 Impacts to existing common and widespread habitats of low sensitivity and/ or conservation interest, such as arable fields and improved grazing pasture are proposed to be scoped out of the assessment; the application will include a commitment to BNG and it can therefore be reasonably assumed that the effects of the Proposed Development will outweigh any potential for negative effects on such habitats.

8.7.3 Due to the lack of records, impacts on amphibians (including GCN) and reptiles are scoped-out of the assessment. Impacts on water voles and aquatic species are scoped-out on the basis of embedded mitigation (buffers).

8.7.4 Although these ecological features are proposed to be scoped out of the assessment due to their limited value, consideration will, however, be afforded to the provision of standard mitigation on these features, and this would be integrated into the OCEMP or OLEMP, as relevant.

8.7.5 Any lighting required during construction, operation and decommissioning of the Proposed Development will be temporary and / or low impact (e.g. Passive Infrared (PIR) lighting). Lighting will be directed away from trees, hedgerows and other surrounding habitats. On the basis that lighting is designed in a sensitive manner, no discernible effects are anticipated on biodiversity during the construction, operational and decommissioning phases of the Proposed Development and therefore an assessment of lighting effects is proposed to be scoped out of the ES chapter.

**Table 8.4 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Statutory Designated Sites (within 2 km of the Site) | Scoped In | Scoped In | Scoped In | Scoped-in based on the potential for indirect impacts, e.g., through increased pollutants, or impacts on species' population or habitats or to functionally linked land. |
| Statutory Designated Sites (with mobile qualifying criteria) located up to 10 km from the Site | Scoped In | Scoped In | Scoped In | Scoped-in on the basis that qualifying mobile species populations may utilise the Site or surrounding environs. |
| Statutory Designated Sites (without mobile qualifying criteria) located greater than 2 km from the Site | Scoped Out | Scoped Out | Scoped Out | Scoped-out due to lack of clear pathway for effects due to separation distance between Site and designation boundary. |
| Non Statutory Designated Sites (within 1 km of the Site) | Scoped In | Scoped In | Scoped In | Scoped-in based on the potential for indirect impacts, e.g., through increased pollutants, or impacts on species' populations or habitats. |
| Impacts to Priority Habitats or otherwise of biodiversity importance/value | Scoped In | Scoped Out | Scoped In | Scoped-in as construction may lead to detrimental impacts on habitats through loss or damage during construction process.<br><br>Operational impacts on habitats not considered likely to occur as activity will be limited to maintenance visits only. |
| Impacts to common and widespread habitats of low sensitivity and/or conservation interest | Scoped Out | Scoped Out | Scoped Out | Scoped-out due to low sensitivity of these predominantly farmland habitats (arable and improved pasture), which are abundant in the wider area and across the County, and support limited biodiversity. Embedded design to further protect habitats through implementation of buffers. Wildlife corridors will be maintained through embedded design and the application includes a commitment to BNG, which will evidently lead to habitat improvements. |
| Breeding Birds | Scoped In | Scoped Out | Scoped In | Scoped-in for construction and decommissioning, as these may lead to adverse impacts on species' populations through habitat |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | loss, or destruction of individual nesting sites. Embedded design (retention of hedgerows and ditches, which will also be buffered) will avoid and minimise impacts. Some species of breeding birds likely to benefit from habitat improvements under BNG and removal of farming chemicals from Site environment (i.e., increased invertebrate prey abundance).<br><br>Any potential for operational impacts is limited to disturbance through maintenance visits, which is considered likely to be no more than existing farming and wind farm management activities. Operational impacts are therefore scoped-out. |
| Wintering Birds | Scoped In | Scoped Out | Scoped In | Construction and operational effects scoped-in due to the Site's proximity to statutory designated sites for ornithology (the Mersey SPA and Ramsar) and the potential for the Site to be functionally linked to such a designation.<br><br>The potential for operational impacts is limited to disturbance through maintenance visits, which is considered likely to be no more than existing farming and wind farm management. Operational impacts are therefore scoped-out. |
| Bats (roosting) | Scoped In | Scoped Out | Scoped Out | Scoped-in on a precautionary basis as Proposed Development design evolves. To be reviewed on design completion and will be scoped-out if no potential bat roost features will be directly impacted during construction. |
| Bats (foraging & commuting) | Scoped In | Scoped Out | Scoped In | Scoped-in on a precautionary basis as Proposed Development design evolves. To be reviewed on design completion. Embedded design (retention of hedgerows and ditches, which will also be buffered) implemented to minimise impacts across most of the Site. |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | Bats are likely to benefit from habitat improvements under BNG and removal of agricultural chemicals from Site environment (i.e., increased invertebrate prey abundance).<br>Operational impacts avoided through embedded design (lighting plan) and are therefore scoped-out. |
| Water vole and otter | Scoped Out | Scoped Out | Scoped Out | Scoped-out as impacts will be avoided through embedded design (water course and ditch buffers). To be reviewed on design completion and will be scoped-in if infrastructure and construction areas are located at least 10m from ditches and waterbodies.<br><br>Both species are likely to benefit from habitat improvements under BNG and removal of agricultural chemicals from Site environment (improved water quality). Operational impacts are therefore scoped-out. |
| Reptiles | Scoped Out | Scoped Out | Scoped Out | No evidence of presence during 2022 surveys and therefore scoped-out.<br><br>Precautionary avoidance measures will be included in the OCEMP. |
| Badger | Scoped In | Scoped Out | Scoped In | Scoped-in as construction or decommissioning may lead to damage or harm of a badger sett. To be reviewed as project design evolves; species to be considered on a precautionary mitigation basis (to be determined through pre-construction surveys).<br><br>The potential for operational impacts is limited to disturbance through maintenance visits, which is considered likely to be no more than existing farming and wind farm management. Operational impacts are therefore scoped-out. |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Great crested newts | Scoped Out | Scoped Out | Scoped Out | No evidence of presence during 2022 surveys and therefore scoped-out.<br>Precautionary avoidance measures will be included in the OCEMP. |
| Other amphibians | Scoped Out | Scoped Out | Scoped Out | Scoped-out with the provision of precautionary avoidance measures included in the OCEMP. |
| Other mammals | Scoped Out | Scoped Out | Scoped Out | Scoped-out with the provision of precautionary avoidance measures included in the OCEMP. |
| Invertebrates | Scoped In | Scoped Out | Scoped Out | Scoped-in for targeted areas only, subject to completion of surveys of the INEOS Inovyn Deposit Ground. Across the remainder of the Site areas of higher habitat suitability for terrestrial invertebrates are avoided through embedded mitigation (project design). Also the provision of BNG and cessation of the use of agricultural chemicals will lead to a clear benefit to invertebrate populations across the majority of the Site. |

### *Assumptions, Limitation and Uncertainties*

8.7.6 Field surveys commenced in April 2022 and will continue through 2023 to determine the baseline ecological conditions. The surveys may highlight new important ecological features with potential to be significantly affected which have not been identified (or considered not to be significant) at this stage of the assessment. These would be discussed on a case-by-case basis with the local authorities and Natural England as appropriate.

8.7.7 It is assumed that should there be a requirement for the potential mitigation of impacts on ecological features, or enhancement measures are proposed as part of the project, suitable on-site areas will be made available to deliver the required outcomes.

# 9.0 FLOOD RISK, DRAINAGE AND SURFACE WATER

## 9.1 Introduction

9.1.1 This chapter relates to the potential effects of the Proposed Development on the water environment, which includes surface water bodies (rivers, ditches, canals, lakes and ponds etc.) and groundwater bodies. Impacts considered include water quality, hydromorphology, flood risk and drainage.

9.1.2 This scoping chapter also considers the scope for mitigation, and how it is proposed to assess the significance of any identified potential effects.

## 9.2 Study Area

9.2.1 A study area of 1km from the Site is proposed to identify water bodies and downstream receptors that could be affected by the Proposed Development. This study area is considered appropriate in light of the fact that the Site, and the onsite waterbodies which the Proposed Development could directly affect, flow into the Manchester Ship Canal and then the Mersey Estuary which are located adjacent to the Site.

## 9.3 Legislation, Planning Policy Context and Guidance

### *Legislation*

9.3.1 A summary of the legislation relevant to the Proposed Development includes:

i) Water Framework Directive (WFD) 2000/60/EC
ii) Directive on Environmental Quality Standards (EQSD) 2008/105/EC
iii) Water Act 2014
iv) Water Resources Act 1991
v) Flood and Water Management Act 2010
vi) Environmental Protection Act 1990
vii) The Land Drainage Act 1991
viii) The Groundwater (England and Wales) Regulations 2009
ix) Environmental Permitting (England and Wales) Regulations 2016
x) Environmental Protection (Duty of Care) Regulations 1991
xi) Environmental Damage (Prevention and Remediation) (England) Regulations 2015

xii) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

### *National Planning Policy*

9.3.2 The following planning policies have been taken into account as part of the assessment:

i) NPS EN-1 with particular reference to section 4.10 (pollution control and other environmental regulatory regimes), section 5.7 (Flood Risk) and section 5.15 (Water quality and resources). These highlight the requirement for site specific flood risk assessments, the need for the decision maker to assess whether the development proposes an acceptable use of the land, the need for early engagement with regulators and the requirement for development to have pollution control in place.

ii) NPS EN-3 – whilst not providing any specific advice on solar development, this document highlights the importance of considering potential impacts on water quality, water resources and flood risk, taking into account climate change when discussing other renewable technologies.

9.3.3 The Draft NPS EN-1 sets out additional information on the requirements for flood risk assessments and encourages applications to manage surface water during construction. It also makes it clear that it is necessary to have regard to current River Basin Management Plans and that development much meet the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

9.3.4 The Draft EN-3 sets out requirements for use of permeable surfacing and Sustainable Drainage Systems (SuDS) to control runoff and states that water management is a critical component of site design for ground mount solar panels.

9.3.5 The National Planning Policy Framework (NPPF) is a relevant consideration within the decision-making process. Paragraph 161 of the NPPF states that all plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change. Paragraph 174 of the NPPF states that development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

### *Local Planning Policy*

9.3.6 The Cheshire West and Chester Local Plan (Part One) Strategic Policies - adopted on 29 January 2015, contains the following policies relating to flood risk and drainage:

*ENV 1 – Flood Risk and Water Management. This policy details that all development must take a sequential approach to determining the suitability of land for development and that an appropriate Flood Risk Assessment should be undertaken to demonstrate that development proposals will not increase flood risk on site or elsewhere.*

9.3.7 The Cheshire West and Chester Local Plan (Part Two) Land Allocations and Detailed Policies - adopted on 18 July 2019 contains the following policies relating to flood risk and drainage:

*Policy DM40 – Development and flood risk. This policy sets out the requirements of a site-specific Flood Risk Assessment and replicates key points of Local Plan policy ENV 1.*

*Policy DM41 – Sustainable Drainage Systems. This policy sets out the requirement for SuDS for major developments and the requirement to mimic or improve upon greenfield runoff rates.*

*Policy DM43 – Water quality, supply and treatment. This policy sets out that development must not cause unacceptable deterioration to water quality or have an unacceptable impact on water quantity or wastewater infrastructure.*

### *Guidance*

9.3.8 The Cheshire West and Chester Strategic Flood Risk Assessment (SFRA) – March 2016 forms part of the evidence base for the Local Plan Part 2 and provides guidance on flood risk and drainage together with an investigation of the extent and severity of flooding throughout the borough.

9.3.9 The CIRIA C753 ‘The SuDS Manual’ 2015 provides guidance on the implementation of SuDS features, the advantages they offer and how benefits can be maximised.

9.3.10 National Planning Practice Guidance (NPPG): Flood Risk and Costal Change provides guidance on the how Applicants should take account of and address the risks associated with flooding and coastal change in the planning process.

9.3.11 The Government and the Environment Agency has also provided advice on the preparation of flood risk assessments:

i) Flood risk assessment in flood zones 1 and critical drainage and areas – How to carry out a flood risk assessment so that you can complete your planning application' (February 2017); and
ii) 'Flood risk assessment in flood zones 2 and 3 – How to carry out a flood risk assessment so that you can complete your planning application' (February 2017).

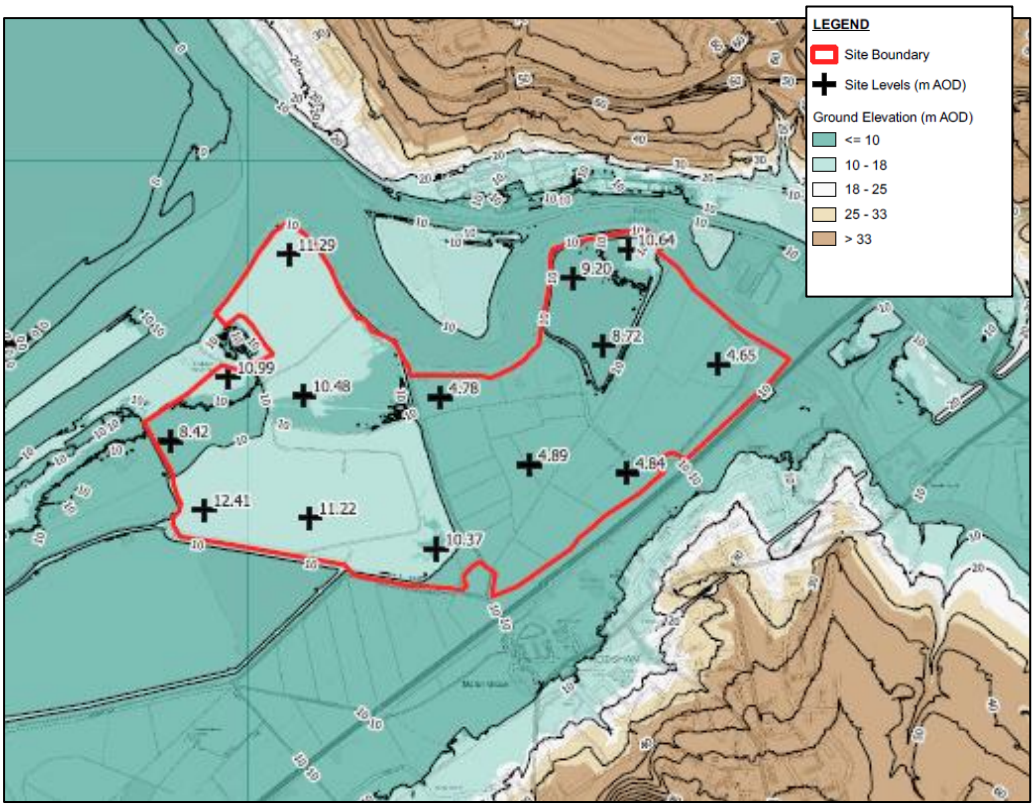
9.3.12 The Planning Inspectorate (PINS) Advice Note 18: The Water Framework Directive provides advice on how applicants should assess the impacts of a proposed development on the objectives of the Water Framework Directive.

## 9.4 Preliminary Baseline Conditions

### *Topographical Setting*

9.4.1 Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). A review of LiDAR data shows that the western extent of the Site forms an elevated plateaux with levels between 10m AOD and 12.41m AOD. The eastern extent of the Site forms a lower lying area with levels varying from 4.65m AOD to 4.89m AOD. The north-eastern extent of the Site forms a localised high point with levels varying from 8.7m AOD to 10.64m AOD. A LiDAR extract is included below.

**Image 9.1 - LiDAR Extract**




### *Geological Setting*

9.4.2 The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is underlain by Tidal Flat deposits comprising clay, silt and sand. The superficial deposits are identified as being underlain by the Helsby Sandstone Formation, Wilmslow Sandstone Formation and the Chester Formation, all comprising sandstone.

9.4.3 According to the EA's Aquifer Designation data, obtained from MAGIC's online mapping [accessed April 2023], the tidal flat deposits are classified as Secondary Undifferentiated Aquifers. Secondary Undifferentiated Aquifers are assigned in *'cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'*.

9.4.4 The underlying Wilmslow, Helsby and Chester Sandstone Formations are described as Principal Aquifers. Principal Aquifers are layers of rock or drift deposits that have

high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

9.4.5 The EA's 'Source Protection Zones' data, obtained from MAGIC's online mapping [accessed April 2023], indicates that the Site is not located within a Groundwater Source Protection Zone.

### *Hydrological Features*

9.4.6 The Site is intersected by a number of ditches which provide a land drainage function. The following designated main rivers are also present within the Site and are illustrated on Figure 9.1: Ship Street Course which flows along the southern boundary of the Site; Red Wall Ditch which flows along a section of the northern boundary of the Site; and, The Lum and Marsh Green which intersect the central area of the Site. The Site is bordered by the River Weaver along its northern edge and the Manchester Ship Canal is located immediately to the north-west. The Site is separated from the River Weaver and Manchester Ship Canal by flood defences in the form of earth embankments.

9.4.7 The River Mersey Estuary, which is designated as a SSSI, SPA and Ramsar site, is located beyond the Manchester Ship Canal, approximately 80m north of the Site.

9.4.8 The Site forms part of the Frodsham Marshes which is defined by a number of ditches and EA designated main rivers. Information from the EA details that Frodsham Marshes discharges into the River Weaver via 2no. 900 l/s pumps at the Frodsham Pumping Station, operated by the EA. Frodsham Marshes drains low lying land encompassing the Site and a limited catchment area extending immediately south of the M56. The River Weaver flows into the Manchester Ship Canal immediately to the north of the Site. The Manchester Ship Canal drains into the River Mersey approximately 15km downstream of the Site.

9.4.9 Land immediately west of the Site is identified as Ince Marsh which is defined by a number of ditches and EA designated main rivers. Information from the EA details that Ince Marsh is drained to the Manchester Ship Canal via 4no. x 238 l/s pumps at the Ince Marshes Pumping Station, operated by the EA. Ince Marsh drains low lying areas west of the Site together with urban runoff from Helsby. It is not understood to be hydrologically linked to the Site.

9.4.10 There are three Water Framework Directive Water Body catchments within the study area: Weaver (Dane to Frodsham) Water Body; Peckmill Brook, Hoolpool Gutter at Ince Marshes Water Body; and, Mersey Water Body. The status of these water bodies is summarised in Table 9.1 below.

**Table 9.1 - Status of Water Body Catchments within Study Area**

| Water Body Catchment | Summary of Status |
|---|---|
| Mersey | **Water Body Type:** Transitional Water<br>Hydromorphological designation: Heavily modified<br>Ecological Status: Moderate |
| Weaver (Dane to Frodsham) | Water Body Type: River<br>Hydromorphological designation: Heavily modified<br>Ecological Status: Moderate |
| Hoolpool Gutter at Ince Marshes | Water Body Type: River<br>**Hydromorphological designation:** Not designated artificial or heavily modified<br>Ecological Status: Moderate |

### *Flood Risk*

#### *Tidal / Fluvial*

9.4.11 The EA Flood Map for Planning identifies that the western and north-eastern extents of the site are located within Flood Zone 1 – an area considered to have the lowest annual probability of flooding with a less than 0.1% annual probability of fluvial and tidal flooding. The lower central and eastern extents of the Site are located within Flood Zone 3 – an area considered to be at flood risk with a greater than 0.5% annual probability of tidal flooding and / or a greater than 1% annual probability of fluvial flooding.

9.4.12 Flood defences border the north-eastern and northern boundaries of the Site and would provide protection from flood events of the River Weaver and Manchester Ship Canal.

9.4.13 Figure 9.1 illustrates the extent of flood zones on the Site.

9.4.14 There is a residual risk of fluvial flooding which would occur should there be a failure of the pumping stations which serve Frodsham Marshes and Ince Marsh.

*Surface Water Flood Risk*

9.4.15 The EA 'Flood Risk from Surface Water' map indicates that the majority of the Site is at very low risk of surface water flooding, meaning it has a less than 0.1% annual probability of flooding.

9.4.16 Isolated areas on Site are identified at low risk of surface water flooding, with between a 1% and 0.1% annual probability of flooding. The flood extent is marginal and associated with surface water ponding within isolated low points.

9.4.17 Correspondence with the EA has indicated that there have been incidents of surface water flooding in the wider area associated with high rainfall events. The surface water flooding resulted in waterlogging, with areas of standing water across the field systems within the agricultural areas of the Site. Further detail will be provided in the ES and Flood Risk Assessment.

*Sewer Flood Risk*

9.4.18 There are no public sewers crossing the Site. The Site is separated from the nearest urban area (Frodsham) by the M56. As such there is considered to be a low risk of sewer related flooding.

*Groundwater Flood Risk*

9.4.19 No historical records of groundwater flooding are identified at the Site. Groundwater levels will be controlled by the network of ditches and watercourses which drain the Site. As such there is considered to be a low risk from groundwater flooding. Should a failure of the EA pumping stations, which serve Frodsham Marshes and Ince Marsh, occur then groundwater may represent a residual flood risk.

*Artificial Sources Risk*

9.4.20 The EA Flood Risk from Reservoirs map show that under normal conditions (i.e. no concurrent river flooding) the risk of flooding from a failure of reservoirs is very low. When the River Weaver is in flood, the eastern and central extents of the Site are shown to be at risk of flooding from reservoir failure. There are no know reservoirs close to the Site and the source of reservoir flooding can be significant distances upstream of a receptor.

9.4.21 The EA states that reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the EA ensures that reservoirs are inspected regularly and essential safety work is carried out. The assessment of artificial flood risk is therefore considered to be low.

### *Identified Receptors*

9.4.22 Receptors identified from the baseline review which could be potentially susceptible to environmental effects from flooding and drainage during the construction, operational and decommissioning phases include:

i) Surface water bodies within and adjacent to the Site. The ditches on Site have hydraulic continuity to the River Weaver, Manchester Ship Canal and River Mersey.
ii) Groundwater - Secondary Undifferentiated Aquifers (superficial) and Principal Aquifer (bedrock).
iii) Adjacent land uses and residents such as Frodsham Marsh Farm, footpaths, roads.
iv) Existing infrastructure (flood defences and EA owned / operated pumps).
v) Groundworkers at the Site during construction and decommissioning.
vi) Operational maintenance staff.
vii) Future infrastructure associated with the development.

## 9.5 Potential Effects and Mitigation

9.5.1 The potential effects of the Proposed Development during the construction, operational and decommissioning phases will be considered and evaluated against the receptors described above as part of the EIA.

### *Construction & Decommissioning*

9.5.2 Construction and decommissioning activities are likely to generate impacts which have the potential to affect the water environment should no mitigation be applied.

9.5.3 The main receptors that are potentially most susceptible to adverse effects arising during construction and decommissioning are the watercourses which border and cross through the Site. The following potential significant effects may occur:

i) Siltation of Waterbodies - Recently disturbed and vegetation-free ground allows for relatively low velocity surface water runoff to erode its surface. Rainfall could also lead to erosion of stockpiled material if it is left uncovered. This leads to increased surface water runoff and sedimentation of receiving waters, resulting in water quality impacts and an increase in flood risk.

ii) Chemical / Fuel Spillages and Contaminated Runoff - The use of lubricants and fuels on construction sites gives rise to a risk of leakages and spillages, leading to pollution incidents. This could include impacts arising from the use of horizontal directional drilling techniques, where entry and exit pits are located adjacent to watercourses. The surface water runoff from access roads used by heavy plant could contain hydrocarbons. This could affect the water quality in the receiving waterbodies or groundwater if pollution is mobilised. Where fuels and chemicals reach a waterbody, there is a potential for effects on water quality, which can affect local flora and fauna.

iii) Impacts on Hydromorphology – Temporary works within watercourses to facilitate construction and decommissioning e.g. access roads, cable crossings, could impact watercourse morphology if the channel is impacted by the construction or decommissioning works, even if this impact is temporary.

**iv)** Changes in Flood Risk – changes in land use to create access roads and site compound and storage facilities may alter surface water runoff from the Site.

### *Operation*

9.5.4 During the operational phase, the following potential significant effects may occur:

i) Potential increase in flood risk from increased surface water runoff from impermeable areas, including impact of more intensive runoff from panels.

ii) Development within flood zones leading to a potential increase in downstream flood risk.

iii) Impact on water quality from any accidental spillage of chemicals or fuels (from supporting infrastructure such as car parking, substations etc.).

iv) Potential impacts on morphology or flood water conveyance resulting from any crossing structures / culverts constructed to provide operational access.

v) Use of fertiliser and pesticides on areas of arable land within the Site would cease leading to beneficial impacts on the water environment.

### *Mitigation*

9.5.5 There is potential to mitigate many of the effects identified above through appropriate design and effective management processes. During construction, surface water management will be carried out in accordance with a Construction Environmental Management Plan (CEMP) or similar method of agreeing good construction practice. Implementation of a sustainable drainage system and operational pollution prevention measures would reduce the potential for impacts during the operational phase. The Outline CEMP provided with the DCO application will describe types of measures that will be used to mitigate impacts on the water environment.

9.5.6 Where possible all development would be located at least 10m away from all watercourses, including drainage ditches. Where this is not possible the impacts which could arise will be assessed.

9.5.7 All critical infrastructure e.g. substations, control systems and BESS, would be designed so they are kept flood-free based on a 1% annual probability flood event plus 30% for climate change. The design would be based on an undefended scenario. This could involve siting infrastructure so they fall outside flood zones, raising height of infrastructure out of the flood zone or providing bunding.

## 9.6 Assessment Methodology

9.6.1 The assessment will be undertaken with reference to a number of sources as detailed in Table 9.2.

**Table 9.2 - Key Information Sources**

| Data Source | Description |
|---|---|
| EA Flood Map for Planning | Provides information on the Flood Zone designation of the site. |
| EA Flood Risk from Surface Water mapping | Provide information on flood risk from surface water sources (with a high, medium and low risk classification). |
| EA Flood Risk from Reservoir mapping | Provides flood outlines to determine potential risk from a failure of a reservoir. |
| EA Products 4, 5 and 6, model outputs and reporting. | Provides detailed information of flood depths, water levels, velocities and hazards from adjacent major waterbodies such as the River Weaver, River Mersey and Manchester Ship Canal |

| Data Source | Description |
|---|---|
| The Cheshire West and Chester SFRA – March 2016 | Provides a high-level assessment of flood risk on a county wide scale and identifies historical flooding records. |
| LiDAR Data | Identifies ground levels relative to metres Above Ordnance Datum. |
| OS and Aerial mapping | Identifies locations of key hydrological features within and near to the site. |
| BGS geological mapping and borehole records | Identifies the underlying superficial and bedrock geology together with groundwater levels from nearby historical borehole records |
| United Utilities sewer plan | Identifies the location of public sewers as to inform the assessment of flooding from sewers. |
| Proposed Development plans | Identify the location of sensitive equipment (infrastructure) most susceptible to flood damage. |
| ReFH2 Flood Estimation Handbook Web Service | Provides rainfall data to inform the assessment of runoff (drainage impact) pre-and post-development. |

9.6.2 A site-specific Flood Risk Assessment and Drainage Strategy will be prepared which will inform the baseline assessment of flood risk associated with the Proposed Development. The FRA will be informed by advice given in the Cheshire West and Chester SFRA – March 2016 and the EA 'Flood risk assessment in flood zones 1 and critical drainage and areas – How to carry out a flood risk assessment so that you can complete your planning application' and 'Flood risk assessment in flood zones 2 and 3 – How to carry out a flood risk assessment so that you can complete your planning application' (February 2017). In doing so the FRA will apply the Sequential and Exception tests for development within flood risk areas.

9.6.3 The Applicant is in dialogue with the EA to agree the specific parameters which need to be adopted within the FRA.

9.6.4 In relation to surface water drainage, any design measures incorporated into the Proposed Development will be guided by the CIRIA C753 'The SuDS Manual' 2015 and will be assessed with reference to the Simple Index Assessment method.

9.6.5 A WFD screening assessment will be undertaken in accordance with the Planning Inspectorate (PINS) Advice Note 18: The Water Framework Directive. The

assessment will be used to determine if the Proposed Development complies with the overarching objectives of the WFD, namely:

i) Objective 1: To prevent deterioration in the ecological status of the water body;
ii) Objective 2: To prevent the introduction of impediments to the attainment of good WFD status for the water body;
iii) Objective 3: To ensure that the attainment of the WFD objectives for the water body are not compromised; and
iv) Objective 4: To ensure the achievement of the WFD objectives in other water bodies within the same catchment are not permanently excluded or compromised.

9.6.6 The FRA, Drainage Strategy and the WFD screening assessment will inform the impact assessment presented in the Flood Risk and Water Quality chapter of the ES.

9.6.7 The assessment of potential impacts as a result of the Proposed Development will consider the construction, operation and decommissioning phases. The level of effect attributed to each impact will be assessed based on the magnitude of impact/change due to the development proposals and the sensitivity of the affected receptor / receiving environment to change. The frequency, timescale and extent of the impact will also inform the level of the effect and the likelihood of a significant effect occurring.

9.6.8 The magnitude of impact/change and the sensitivity of each receptor will be determined using professional judgement and by reference to the guidance criteria presented in Table 9.3.

**Table 9.3 - Definitions of Impact Significance**

| Magnitude of the impact/change<br>This is the scale of change which the impact may cause compared to the baseline and how this change relates to accepted thresholds and standards. | |
|---|---|
| Major | Significant damage to land and property users. Increase in flood risk offsite by 5mm or greater during any/all flood events.<br><br>Deterioration of a water body leading to a failure to meet Good Ecological Status (GES) under the WFD and reduction in Class (or prevents the successful implementation of mitigation measures for heavily modified or artificial water bodies). |
| Moderate | Damage to land and property, resulting in moderate economic loss. A reduction of the economic value provided by the water feature. Less than 5mm increase in flood risk offsite. |

| | |
|---|---|
| | No reduction in WFD class, but effect may prevent improvement (if not already at GES) or the successful implementation of mitigation measures for heavily modified or artificial water bodies. |
| Minor | Minimal changes in water quality which are unlikely to affect sensitive receptors. No overall change in flood risk elsewhere.<br><br>Negligible changes in WFD attributes which does not lead to a reduction in WFD status or failure to improve. |
| **Sensitivity of the receiving receptor<br>This is a measure of the adaptability and resilience of an environmental parameter to an identified impact.** | |
| High | A watercourse / feature with national hydrological importance to biodiversity and ecosystems; highly and more vulnerable property, site users and land such as emergency services and residential properties. A Principal Aquifer. Flood Zone 3. A watercourse classed as high or good in accordance with the WFD. |
| Medium | A watercourse / feature with regional hydrological importance to biodiversity and ecosystems, more vulnerable and less vulnerable property and land such as public, commercial and industrial buildings. A Secondary Aquifer. Flood Zone 2. A watercourse classed as moderate in accordance with the WFD. |
| Low | A watercourse / feature with local / minimal hydrological importance to biodiversity and ecosystems, undeveloped land. Unproductive strata. Flood Zone 1. A watercourse classed as poor or bad in accordance with the WFD. |

9.6.9 To assist in the assessment process, the below matrix provides a mechanism for assessing the level of the effect (see Table 9.4). An initial indication of the level of effect (adverse or beneficial) is gained by combining magnitude and importance/sensitivity. It should be noted that although the matrix provides a good framework for the consistent assessment of impacts, there is still an important role for professional judgement and further objective assessment to play in understanding the level of effect on any given receptor. Given that the criteria represent levels on a continuum, professional judgement and awareness of the relative balance between magnitude and importance / sensitivity is required. Table 9.5 provides a descriptor for each level of effect which assists in forming the final judgement made by the assessor.

**Table 9.4 - Matrix for the Calculation of Level of Effect**

| Magnitude of Impact | Importance (Value) and/or Sensitivity of Feature | | |
|---|---|---|---|
| | **High** | **Medium** | **Low** |
| **Major** | Major* | Major* | Moderate |
| **Moderate** | Major* or Moderate | Moderate | Minor |
| **Minor** | Moderate or Minor | Minor | Minor or None/Negligible |

*- effects considered to be potentially significant

**Table 9.5 - Description of the level of effect**

| Level of Effect | Definition |
|---|---|
| Major adverse | The impact gives rise to serious concern; it should be considered as unacceptable. |
| Moderate adverse | The impact gives rise to some concern, but it is likely to be tolerable (depending on its scale and/or duration). |
| Minor adverse | The impact is undesirable, but of limited concern. |
| Negligible | The impact is at a threshold of predictive quantification and is not of concern. |
| Minor beneficial | The impact is of minor significance but has some environmental benefit. |
| Moderate beneficial | The impact provides some gain to the environment. |
| Major beneficial | The impact provides a significant positive gain. |

9.6.10 Where adverse effects are identified, potential mitigation measures will be examined and recommended in order to reduce potential effects, as far as possible, to environmentally acceptable levels. Residual effects will then be stated.

9.6.11 Measures proposed within the OCEMP which will form part of the DCO application will be deemed to be embedded into the project from the outset. As such the impacts arising following successful implementation of the OCEMP will be used to inform the judgements made in relation to levels of effect.

**Table 9.6 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Flood Risk | Scoped In | Scoped In | Scoped In | The process of construction could give rise to changes in surface water runoff rates and effects on flood storage on Site. These impacts could continue during the operational phase. As such the effects will be assessed in the ES. Decommissioning works would reduce flood risk in the longer |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | term through the removal of infrastructure items from the Site. However, there could be short term impacts arising from provision of decommissioning compound, access roads, increase number of receptors on site. |
| Water pollution from increased siltation | Scoped In | Scoped Out | Scoped In | There is potential during construction for groundworks to give rise to a source of sediments which could, if uncontrolled, pollute surface water features. During operation this is unlikely as there would be no exposed soils. Impacts during decommissioning would be similar in nature to the construction phase. |
| Impacts on water quality as a result of accidental spills or leaks. | Scoped In | Scoped In | Scoped In | There would be potentially polluting substances present on site during all phases of the Proposed Development. As such an assessment of pollution effects will be undertaken. |
| Changes to existing drainage patterns and overland flow routes | Scoped In | Scoped In | Scoped In | Impacts from construction, and presence during operation, of access tracks and impermeable surfaces could impact current drainage regime. Impacts during decommissioning would be similar to those experienced during construction. |

## 9.7 Assumptions, Limitation and Uncertainties

9.7.1 The FRA, Drainage Strategy and WFD Screening Assessment which will inform the ES will be based on a desktop exercise and will utilise best available data. It is assumed that the EA data which informs the FRA (including modelled outputs) is fit for purpose.

9.7.2 Details on the construction method and final site layout are not yet available. It is assumed that the solar panels will be ground mounted with a gap beneath the panel and ground surface. It is also assumed that a suitable buffer will be provided from the panels to watercourses within the Site, and the flood defences bordering the Site.

# 10.0 GROUND CONDITIONS

## 10.1 Introduction

10.1.1 The Ground Conditions Chapter of the ES will consider the existing ground conditions, particularly contaminated land and ground stability which can impose constraints on land use and construction works. Matters relating to agricultural land quality are considered in Chapter 17.0.

10.1.2 The Proposed Development could introduce new pathways for contamination migration, both in the short-term during construction where contaminants can become remobilised but also in the long-term during site operation. The Proposed Development could also introduce new receptors such as construction and maintenance workers who may be subject to short-term exposure as well as exposure to existing receptors including controlled waters.

10.1.3 This chapter summarises the information gathered to date on the baseline conditions of the Site and uses it to identify the potential for likely significant effects from the Proposed Development during the construction, operational and decommissioning phases. This is used to inform the requirements for further assessment within the EIA.

## 10.2 Study Area

10.2.1 The Study Area includes features likely to be at risk from possible direct and indirect impacts that may arise from the Proposed Development.

10.2.2 As detailed in Chapter 3.0 the principal development and construction area would be the Solar Array Development Area. Some construction works may also be required to provide electrical connections from the Solar Array Development Area to the SPEN Sub-Station and INEOS Inovyn Runcorn Site to the east and north-east, and to lay cables to Protos within the existing access road.

10.2.3 Access would be gained to the Solar Array Development Area from Pool Lane to the west via pre-established roads and tracks. As such no major construction works are anticipated, with only minimal improvements required e.g. repair of potholes. On this basis the Access Road into the Site is not included within the Study Area for this topic.

10.2.4 As such the resulting Study Area focuses on the Solar Development Array Area and the electrical connection routes to the east. The Study Area would extend to 250m of the areas that would be subject to construction / excavation works, in accordance with best practice[47].

## 10.3 Legislation, Planning Policy Context and Guidance

10.3.1 The following contaminated land policy, legislation, regulations and guidance is deemed relevant to the Proposed Development.

### *Legislation*

10.3.2 Land contamination can harm human health, groundwaters, surface waters, soils, ecosystems and property. As such it is controlled, either directly or indirectly, through a range of legislation, including, but not limited to:

i) Part IIA of the Environmental Protection Act 1990: establishes system for identifying and remediating statutorily defined 'contaminated land'; focuses on addressing contaminated land that meets the specific legal definition and cannot be dealt with via other means, including planning.
ii) Water Environment Regulations 2017: replaces previous legislation and outlines duties of regulators in relation to characterisation and classification of water bodies, environmental permitting, abstraction and impoundment of water.
iii) Building Regulations 2010 – Site Preparation and Resistance to Contaminants and Moisture (Approved Document C): requires suitable precautions are taken to avoid risks to health and safety caused by contaminants in ground to be covered by buildings and associated ground.
iv) The Environmental Permitting (England and Wales) Regulations 2016: impose provisions to prevent ground and water contamination from operations requiring an Environmental Permit to operate; implement controls for operations relating to the treatment or handling of contaminated soils.
v) The Water Framework Directive 2000/60/EC: requires the need to improve the quality of water in rivers, streams, lakes, estuaries, coastal waters and

[47] NHBC & Environment Agency, 2008. *R&D Publication 66: 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination*

groundwaters so that it meets the standards required by the EU Water Framework Directive.

### *National Planning Policy*

*10.3.3* As outlined in Chapter 1.0 the Proposed Development must have regard to the relevant policies within NPSs and the NPPF. The NPSs, and current emerging draft NPSs, set out national planning policies in relation to energy development. The only specific reference to contamination in the extant NPS EN-1 is at paragraph 5.10.8, where it is stated that *"For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination.".*

*10.3.4* The Draft NPS EN-1 references the potential requirement to consider contaminated land within section 5.11, setting out at paragraph 5.11.17 that *"Applicants should ensure that a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination.".*

10.3.5 Sections of the NPSs and Draft NPSs relating to Biodiversity and Geological Conservation and Water Quality and Resources may also be relevant in relation to ground conditions.

10.3.6 The NPPF 2021 also provides some guidance to local authorities on taking contamination and land instability into account in planning polices and decisions. Paragraph 174 of the Framework states: *"Planning policies and decisions should contribute to and enhance the natural and local environment by […]*

*e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality; and,*

*f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

10.3.7 The NPPF further states in paragraph 183 that in relation to Ground Conditions and Pollution that:

*'Planning policies and decisions should ensure that:*

*a) site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation measures including land remediation (as well as potential impacts on the natural environment arising from that remediation);*

*b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and,*

*c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.*

*10.3.8* Further specific guidance is provided in the Planning Practice Guidance on Land Affected by Contamination[48] and Land Stability[49] which provides guiding principles on how planning can deal with land affected by contamination and land stability.

### *Local Planning Policy*

10.3.9 The CWaCC Local Plan (Part One) sets out the vision for sustainable development of the borough to 2030. Policy SOC5 Health and Well-Being states:

*'development that gives rise to significant adverse impacts on health and quality of life (e.g. soil, noise, water, air or light pollution, and land instability including residential amenity, will not be allowed.'*

10.3.10 The CWaCC Local Plan (Part Two) Land Allocations and Detailed Policies provides further detailed policies and land allocations which support the strategic objectives and policies set out in the Local Plan (Part One). DM32 refers specifically to land contamination and instability and states:

*DM 32: In line with Local Plan (Part One) policy SOC4 and ENV5, development proposals on land known or suspected to be unstable or contaminated must demonstrate that they will not give rise to significant adverse impacts on health, controlled waters, ecological receptors, property and quality of life.*

[48] *Department for Communities and Local Government, Planning Practice Guidance, Land affected by contamination, published 12 June 2014, last updated 22 July 2019*
[49] *Department for Levelling Up, Housing and communities and Ministry of Housing, Communities and Local Government, Land Stability, published 12 June 2014, last updated 22 July 2019*

*Contamination: Development on previously developed sites or on land known or suspected to be contaminated must be supported by an appropriate contamination assessment which clearly demonstrates that the risks from contamination can be successfully mitigated and managed over the lifetime of the development.*

*Instability: In areas of potential land instability, an assessment should be made to ensure that the land is suitable for the proposed development, and that development can be undertaken, occupied and used without risk to people and property resulting from underground conditions. Areas of potential land instability will include those of vulnerable topography or geological […]*

### *National Best Practice and Guidance*

10.3.11 The Environment Agency (EA) Land Contamination: Risk Management Guidance[50] provides an overarching framework for the assessment and investigation of land contamination. It replaces the previous Contaminated Land Report 11: Model Procedures for the Management of Contaminated Land 2004.

10.3.12 It is designed to be used in a range of regulatory and management contexts such as voluntary remediation, planning, assessing liabilities or under the Part 2A contaminated land regime. The guidance sets out a phased approach to the assessment of land contamination and specifies requirements for reports produced as part of the process, including Preliminary Risk Assessments (PRAs) and Generic and Detailed Quantitative Risk Assessments (GQRAs and DQRAs).

10.3.13 The EA Guidance is supported by, and cross-refers to, an extensive range of additional statutory and non-statutory guidance relating to aspects such as site investigations, protection of groundwater, understanding and managing asbestos, definition of waste and the specific investigation and assessment procedures under Part IIA.

## 10.4 Preliminary Baseline Conditions

10.4.1 Full details of the Site and Proposed Development are provided in Chapter 3.0 and only those aspects of relevance to the ground conditions assessment are described here. The existing preliminary ground conditions baseline for the Site has been

[50] *Land Contamination: Risk Management, issued 5th June 2019, last updated 19 April 2021, www.gov.uk*

established through a review of OS mapping, aerial imagery and previous investigation reports, including investigations undertaken as part of the development of the Frodsham Wind Farm. Relevant reports will be provided as part of the Phase 1 Preliminary Risk Assessment report which would be submitted as a technical appendix to the Ground Conditions chapter of the ES.

### *Current Condition and Land use*

10.4.2 The Solar Array Development Area can be divided for ground condition purposes into three distinct areas, based on former and current land use.

i) Western Area (area i) in paragraph 3.1.9): Former Canal Dredgings: comprises an area of three raised Cells (Cells 1, 2 and 5) that were historically used for the deposition of canal dredgings from the Manchester Ship Canal. This area now forms part of the Frodsham Wind Farm which extends to the west. There are six wind turbines and access tracks within the boundary of the Site, the land is used for grazing. Frodsham Marsh Farm lies in the north-western edge of this area. A hydrocarbon pipeline runs above and below ground across this part of this area.

ii) Central and Eastern Area (area ii) and iii) in paragraph 3.1.9): agricultural land; comprises a series of fields divided by hedgerows and drainage ditches. This area is crossed by overhead and below ground power lines, below ground hydrocarbon pipelines, high pressure gas pipelines, telecoms lines and water mains.

iii) North-eastern Area (area iv) in paragraph 3.1.9): INEOS Inovyn Deposit Ground: comprises the former INEOS Inovyn (formerly ICI) 'Tank' that was used for the deposition of dredgings from the Weaver Navigation. This area is now open rough ground, which has become colonised by scrub.

10.4.3 The dredging deposit cells Western Area and North-eastern Area are generally several metres higher than the surrounding land with each being formed of an outer bank and a lower lying central area.

10.4.4 The Central and Eastern Area is generally flat lying.

### *Geology and Ground Conditions*

10.4.5 The underlying expected ground conditions and geology is described in the available reports as:

i) Western Area:

a) Surrounding ground level is typically flat at around 3.5-5.5m AOD. The dredging deposit cells (Cell 1, 2 & 5) are raised being approximately 8m higher than the surrounding ground level. Dredgings from the Manchester Ship Canal were placed in these cells with water from the arisings returned to the nearby waterways via draw-off towers.

b) Ground conditions within the Cells have been recorded as surface cover of topsoil at 0.1-0.2m underlain by made ground dredging deposits consisting of sand with some gravel, to silt and clay. The top metre of the deposits form a dried surface crust.

c) The bunds have been constructed from layers of clays, silts and sands of varying composition; it is noted that they appear to be of a similar composition to the dredging material within the cells. The maximum recorded depth of the made ground within the bunds is 12.1m below ground level (bgl).

d) Tidal Flat Deposits (clays and silts) onto Glaciofluvial Deposits (sand and gravel) underlay the made ground. Peat deposits were reported in some locations within the Tidal Flat Deposits. Cohesive and granular Glacial Till deposits are present at depths from 22m bgl to >35m bgl. Bedrock is mapped as Chester and Wilmslow Sandstone Formation.

ii) Central and Eastern Area:

e) Possible re-worked natural sand (logged as made ground) was reported within a historical borehole to a depth of 0.91m overlying Tidal Flat Deposits (clays and silts with bands of peat) to depth of 6.7m bgl onto Glacial Till. Bedrock of Mercia Mudstone Group (Tarporley Siltstone Formation) reported at 21.64m bgl in the eastern extent of the Central and Eastern Area. Bedrock across the rest of Central and Eastern Area is mapped as Wilmslow and Helsby Sandstone Formation.

iii) North-eastern Area:

f) Made ground (dredgings and fly-ash) to a maximum depth of 6.2m, recorded as a silty clay with traces of brick fragments, gravel and ash within the embankment. No information of the depth and composition of dredging material within the deposit area is currently available. Tidal Flat Deposits (silty clay with organic material – assumed peat) underlie made ground deposits up to a depth of 19.4m bgl onto Glaciofluvial Deposits (sand and gravel). Glacial Till (granular and cohesive) present below Glaciofluvial Deposits to a depth of >30m bgl. Bedrock is mapped as Helsby Sandstone Formation.

### *Hydrogeological and Groundwater Conditions*

10.4.6 The superficial deposits (Tidal Flat and Glaciofluvial) are characterised as being secondary undifferentiated aquifers with the underlying bedrock (Wilmslow Sandstone Formation, Helsby Sandstone Formation and Chester Formation Sandstone) being a Principal Aquifer. The Tarporley Siltstone Formation in the easternmost part of the Site is mapped as being a Secondary B Aquifer.

10.4.7 The Site is not located within a Source Protection Zone.

10.4.8 Groundwater monitoring undertaken during the site investigation works for the Frodsham Wind Farm Development (western Area of Site) recorded average groundwater levels within the Cells at 1.49-4.55m bgl with average levels within the natural ground around turbines 11-13 at 0.73m bgl.

10.4.9 The shallow groundwater, whether within the secondary aquifer within the superficial deposits or perched water within Cell deposits, is likely to be in direct hydraulic continuity with surface water receptors.

10.4.10 The Principal and Secondary B Aquifer underlies Glacial Till which will act as a barrier, significantly restricting the transmissivity of groundwater within made ground and the superficial aquifer into the bedrock aquifer.

### *Hydrology and Surface Water Conditions*

10.4.11 The Site is occupied by open land with areas of hardstanding limited to the bases of the turbines within the Frodsham Solar Farm (western Area). Drainage will therefore predominantly be via infiltration. The Site ultimately drains into Mersey Estuary via the Manchester Ship Canal (north) and River Weaver (east). Previous investigations

report that the Site's shallow groundwater is assumed to be in lateral continuity with the adjacent estuary. This is considered to be via sub-surface flow or via the network of surface water ditches which extend across the Solar Array Development Area.

### *Nature Conservation Sites*

10.4.12 The Mersey Estuary to the north-west of the Site has several statutory nature conservation designations. A small strip of the Mersey Estuary SSSI (100m wide and 500m long) is located in the north western area of the Site, the remainder of the SSSI is located to the north and west of the Site. The Mersey Estuary Special Protection Area (SPA) and Ramsar extends to within 80m of the Solar Array Development Area to the north / north-west. For further detail reference should be made to Chapter 8.0: Ecology and Biodiversity.

### *Unexploded Ordnance (UXO)*

10.4.13 The Site is located between former Luftwaffe targets of a chemical works in Runcorn to the north-east and a set of bombing decoys to the south-west. A UXO Risk Assessment report relating to the Site area sets out that no references could be found to bomb strikes on the marshes but that anecdotal reports refer to approximately 600 incendiary bombs on Frodsham Marshes (although the exact location of these is unknown). The report concluded that the Site area has a precautionary Medium Risk from UXOs.

10.4.14 A World War I (WWI) prisoner-of-war (POW) camp was located on Frodsham Marshes, potentially within the boundary of the Site. It is unknown if any explosive ordnance were stored, used or disposed here. Several World War II (WWII) era military buildings were also recorded in the Western Area, the use of these buildings is uncertain. Based on the presence of these features, it is considered that the risk from Allied/military ordnance is slightly above background level of risk for this area of Cheshire and so a Low-Medium Risk of Allied ordnance has been given to the Site.

### *Contamination Sources*

10.4.15 Contamination sources are identified as made ground deposits in the Western Area, where dredgings from the Manchester Ship Canal have been historically placed and

in the North-eastern Area where the INEOS Inovyn Deposit Ground received dredgings from the Weaver Navigation.

10.4.16 Dredged silts within waterways can contain a variety of contaminants ranging from heavy metals associated with anti-fouling paints to chemicals associated with the outfall from neighbouring industrial facilities. Many such industrial facilities have historically operated, and continue to operate, alongside the Manchester Ship Canal and Weaver Navigation.

10.4.17 The presence of deep made ground deposits which have been confirmed through previous investigations can also give rise to the generation of ground gases methane and carbon dioxide.

10.4.18 Natural deposits of peat within the Tidal Flat Deposits can also serve as a significant source of ground gas, particularly when thick deposits are present.

*Contamination Sources (Western Area)*

10.4.19 Parts of the Western Area were subject to intrusive investigations in 2014 to inform the proposed Frodsham Wind Farm Development. The investigations focused on the areas of the proposed wind turbines and the access tracks so did not encompass the whole area. This work included investigation entries within Cell 1 and 5 and included soil sampling and analysis for a range of contaminants. The investigations reported hydrocarbon odours within the made ground but did not identify any gross contamination that was expected to pose a risk to human health or controlled waters given the proposed land use.

10.4.20 A single round of groundwater monitoring was undertaken, and it was reported that no specific remedial measures were required but that the design of any piled foundations should consider the nature of the site's contamination and Conceptual Site Model (CSM), such that pathways are not created for contaminated groundwater to flow from the made ground and Secondary Aquifer into the deeper Principal Aquifer.

10.4.21 A Piling Risk Assessment was produced, and it concluded that active mitigation in advance of piling works in relation to surface water receptors was not required. It was recommended that baseline surface and groundwater conditions were obtained, and a compliance monitoring programme implemented during piling works.

10.4.22 Two rounds of ground gas monitoring were undertaken within the Western Area as part of the Frodsham Wind Farm development investigation which recorded significantly elevated levels of methane with a maximum concentration of 86.7%.

*Contamination Sources (North-Eastern Area)*

10.4.23 Limited site investigation information is available for the North-eastern Area (INEOS Inovyn Deposit Ground) as this lies outside the area that forms part of the Frodsham Wind Farm. However, ground and contamination conditions would be expected to be similar to those encountered in the Western Area given the nature of deposits. As such there is the potential for the dredging deposits to contain a variety of contaminants associated with industrial facilities which have historically operated alongside the Weaver Navigation. Further analysis of any existing data and the results from site investigations will be provided within the ES to establish the baseline conditions.

*Contamination Assessment (Central and Eastern Areas)*

10.4.24 The Frodsham Wind Farm investigations reported that there were not any significant depths of made ground and/or potential contamination encountered in the areas outside the former canal dredging Cells. On the basis of current information contamination is not expected across the Central and Eastern Area.

## 10.5 Potential Effects and Mitigation

### *Construction*

10.5.1 Based on the information gathered as part of the wind farm construction works it is expected that shallow piled foundations, typical of solar farms, would be used over the entire development area. It is not anticipated that stripping of turf / surface soils will be required.

10.5.2 Sections of new access tracks will require turf and surface soils to be stripped prior to placing stone, as would laying of below ground cables. Soils would be managed in accordance with best practice[51].

[51] Defra, 2009. *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*

10.5.3 Ancillary structures such as the BESS and transformer stations may be constructed through use of concrete slab foundations or pre-cast concrete piles driven into the underlying Glaciofluvial or Glacial Till Deposits. If this construction technique is used, then stripping of surface topsoil within these areas will be required. At present, it is assumed that there will not be a requirement for the general uplift of levels.

10.5.4 A series of access tracks will be constructed within the Solar Array Development Area. The construction methods will be dependent on the results of ground investigation but may require the use of 'floating roads' as constructed within Frodsham Wind Farm.

*Human Health*

10.5.5 Construction workers may be exposed to any contamination, particularly during any excavation work. Potential exposure routes are via inhalation, ingestion and / or dermal contact with soils, dusts, waters and / or gases / vapours. Existing site investigation works have not identified significantly elevated contaminants within the Western Area, however, there remain areas where canal dredgings within the Western and North-eastern Areas are yet to be investigated. Current development proposals including foundation type, and whether above or below ground electricity connections will be adopted, are yet to be confirmed. However, there will be some requirement for excavations and soil arisings are likely to be generated. Mitigation would be achieved through the adoption of standard occupational hygiene measures as would be detailed in an Outline Construction Environmental Management Plan (OCEMP).

10.5.6 Nearby site users may be exposed to contaminated soils via windblown dust if ground disturbance / dust generation activities take place. The closest properties to the Solar Array Development Area are approximately 140m distant on Hawthorn Road and Wayford Mews. The closest part of the Site to these receptors is agricultural land where dredging deposition has not taken place, so the presence of contaminated soils is highly unlikely. Furthermore, the OCEMP would include mitigation measures to reduce dust generation and would include any specific measures required in relation to potentially contaminated ground. Further reference to air quality effects is given in Chapter 16.0.

10.5.7 The available UXO Risk Assessment has identified a Low to Medium Risk from ordnance on Site with a potential risk of encountering UXO during construction

works. The assessment identified that any ordnance present are likely to be encountered at shallow depth although it is considered that given the deposition of dredgings within the cells in the Western Area that there is potential for ordnance to be present at greater depths within deposition areas. Potential exposure is most likely to occur during site investigation or construction-stage works (e.g. open intrusive works for cable trenching or piled foundations for substation buildings). The OCEMP would include mitigation measures as detailed within the UXO Risk Assessment which would include a UXO Risk Management Plan, site-specific UXO Awareness Briefings to all personnel conducting intrusive works, a UXO specialist on-site support during open intrusive works and an intrusive magnetometer survey of all borehole and pile locations.

10.5.8 On the basis of the above, it is not possible to scope out potential likely significant effects on human health that may arise from contamination or UXO during the construction phase and as such this would be scoped into the ES.

*Controlled Waters*

10.5.9 During the exposure of made ground and ground disturbance works there is a potential for the remobilisation of any leachable contaminants that may be present. The previous investigations and assessments of the Frodsham Wind Farm Site did not report any significant risk to controlled waters during construction within Cells 1 and 5. No investigation was undertaken within Cell 2, however similar ground and contaminants are expected given the history of the area.

10.5.10 There is some uncertainty on the contamination present associated with dredged sediments within the INEOS Inovyn Deposit Ground. Any excavations or foundations which extend through deposits within this area into the underlying superficial deposits could remobilise contaminants. Further investigation will be required to characterise the contamination status of the dredgings and the geotechnical properties of the deposits so the required depth of any foundations can be established.

10.5.11 Foundation solutions for the Proposed Development are yet to be confirmed and will be subject to additional works, however preliminary recommendations are for piled foundations for both ancillary structures and PV panels. Piles could serve as a migration pathway for mobile contaminants, however given the presence of significant thickness of Glacial Till above the bedrock Principal Aquifer they are

unlikely to present a migration pathway to the aquifer. A Piling Risk Assessment would be required to inform the suitability of any proposed pile design.

10.5.12 The shallow groundwater is in hydraulic continuity with surface waters and so any contaminant remobilisation into the groundwater may ultimately enter surface waters.

10.5.13 On the basis of the above an assessment of potential impacts on controlled waters that may arise from contamination during the construction phase is scoped into the ES.

*Ecosystems*

10.5.14 Given the potential for contamination set out above and the proximity of the Site to the designated features of the Mersey Estuary, an assessment of potential impacts on ecological receptors that may arise from contamination during the construction phase is scoped into the EIA.

***Operation***

10.5.15 Potential receptors during the operational phase to adverse impacts from any residual ground contamination would include future maintenance engineers, infrastructure and services, groundwater underlying the site and the nearby surface watercourses.

10.5.16 Due to the nature of the Proposed Development, there would be limited potential for exposure of humans or the surrounding environment to any residual contamination. The Western Area (Frodsham Wind Farm) is currently used for grazing whilst the Central and Eastern Area is used for crops. It is possible that use for grazing may continue during operation of the Site. The Central and Eastern area has not been subject to dredging deposition and so any continued use for grazing is likely to be of low risk. Depending on the construction methods in the Western Area, arisings could be generated which may contain dredging materials and introduce these to surface soils. The North-east (INEOS Inovyn) area is not currently used for grazing or crops. The potential risks to animals through grazing during the operation phase is considered to be low due to the current agricultural practices across much of the Site.

10.5.17 There is potential for hazardous ground gases to accumulate and migrate into any buildings. Ground gas sources have been identified through deep made ground and natural peat deposits. Buildings associated with the Solar Array Development Area are limited to a control compound and buildings within the BESS compound, the details of which are yet to be finalised. If this is to consist of modular unit or similar, then the design of the structure will mitigate against the risk of ground gas ingress as they reside above ground level forming a natural ventilation void. If, however the control compound is to be constructed as a permanent ground-bearing structure then further risk assessment on the potential risk of ground gas ingress at this location and incorporation of in-build design protection measures may be necessary. However, there are a range of established construction techniques which can be used to mitigate the ingress of ground gases into buildings if required.

10.5.18 Sub-surface utility connections and cable routes could serve as potential migration pathways for ground gas. At present it is uncertain as to whether the SPEN Grid Connection or the INEOS Inovyn Private Wire Connection will be underground or via overhead power lines. If underground connections are proposed, as is the case for the Protos Private Pire Connection, then further risk assessment on the potential for ground gas migration and incorporation of in-build design protection measures will be required.

10.5.19 Low bearing capacity and high compressibility made ground (dredgings) and Tidal Flat Deposits (peat) could impact all proposed structures due to settlement.. A supplementary geotechnical investigation will be undertaken to confirm the geotechnical properties of the existing ground conditions so an appropriate foundation solution and remedial works can be determined. There is potential that if a piled solution is adopted that chemical aggressive conditions associated with the dredgings could exist which could impact the integrity of piles. Further assessment on chemical aggressive ground conditions and chemistry of the dredging's will be undertaken prior to construction to ensure that appropriate construction design measures can be adopted. However, based on the evidence of the wind farm construction works it is clear that the ground conditions are such that standard construction methods are likely to be possible.

10.5.20 Risks to future maintenance workers is anticipated to be limited to works on any sub-surface connections or cable routes through potential exposure to elevated ground gas which could accumulate / migrate within such underground utilities. Use of best

practice methods and Personal Protective Equipment would ensure they are not exposed to any unacceptable risks.

10.5.21 Based on the above an assessment of potential impacts on, and the likely mitigation measures to be applied to, human health, controlled waters, ecosystem and property that may arise from contamination during the operational phase, it is proposed the assessment of these impacts is scoped out of the ES.

### *Decommissioning*

10.5.22 Decommissioning works could involve the excavation of some of the buried elements of the Proposed Development e.g. cabling. However, many of the below ground elements, such as the below ground sections of the panel supporting frames, would be left in situ limiting the potential for exposure to or remobilisation of contamination. There would also be the potential for dust generation as a result of vehicle movements as identified within the construction stage. The likely effects experienced during decommissioning would therefore be very similar, and in all likelihood less than, the effects experienced during construction. The impacts could be mitigated through adoption and compliance with a CEMP and to include dust suppression measures when necessary.

10.5.23 Based on the above an assessment of potential impacts on human health, controlled waters, ecosystem and property that may arise from contamination during the decommissioning phase is scoped out of the ES.

## 10.6 Assessment Methodology

### *Information Sources*

10.6.1 The Ground Conditions ES Chapter will be supported by a standalone background report (Phase I Preliminary Risk Assessment) which will form a Technical Appendix to the chapter. The Phase I Desk Study will be produced in accordance with LCRM[52] and will include:

i) Site visit to view the Site and surrounding area
ii) Purchase and review of historical mapping of the Site and surrounding area

[52] *Land Contamination: Risk Management, issued 5th June 2019, last updated 19 April 2021, www.gov.uk*

iii) Review of any third-party reporting made available which relates to the Site
iv) Review of recent Ordnance Survey Maps and other available mapping
v) Review of published geology, hydrogeology, land use and landfill records
vi) Development of a Preliminary Conceptual Site Model (P-CSM) to identify potential source-pathway-receptor linkages
vii) Recommendations for further investigation to assess the source-pathway-receptor linkages determined within the P-CSM and allow refinement.

10.6.2 The background report will be used to inform the expected baseline conditions at the Site with regards to ground and contamination status. The assessment will consider the potential impacts on receptors as a consequence of encountering contaminated land during the construction and operation of the Proposed Development. The assessment uses the source-pathway-receptor concept and considers all potential sources of contamination, all environmentally sensitive receptors that exist now and would exist following the Proposed Development, and all potential pathways between the sources and receptors (referred to as 'pollutant linkages').

10.6.3 The Phase I Preliminary Risk Assessment would also be used to inform a Phase 2 Supplementary Site Investigation that would be undertaken as part of the EIA to provide further information on the ground condition and development proposals. The findings of the assessment work would help refine the P-CSM to assess the risks to the environment.

### *Assessment Approach*

10.6.4 The sensitivity of a receptor is determined through consideration of factors such as human health exposure and the designation and legal status of controlled water and ecological sites. Examples of receptor sensitivity are summarised in Table 10.1 below.

**Table 10.1 - Examples of Receptor Sensitivity**

| Sensitivity | Type | Criteria |
|---|---|---|
| High | Human Health | Construction workers: Extensive earthworks e.g., extensive and deep excavation<br>Future End-Use: Residential, allotments, play areas |
| | Controlled Waters | Groundwater: Principal aquifers, Zone I Source Protection Zone, downstream drinking water abstractions<br>Surface waters: River Quality – High / Good |
| | Ecology | Nature conservations sites with international or national designation |
| | Buildings / Property | High historical value or other sensitivity (Listed Buildings) |

| Sensitivity | Type | Criteria |
|---|---|---|
| Medium | Human Health | Construction workers: Limited earthworks e.g., limited to shallow depth<br>Future End-Use: Public open space, landscaping |
| | Controlled Waters | Groundwaters: Secondary aquifers, Zone II & III Source Protection Zone, industrial abstractions<br>Surface waters: River Quality – Moderate |
| | Ecology | Nature conservations sites with national designation |
| | Buildings / Property | Buildings including services and foundations |
| Low | Human Health | Construction workers: minimal ground disturbance<br>Future End-Use: 'hard' end use e.g., industrial, car parking |
| | Controlled Waters | Groundwaters: no Source Protection Zone, no abstractions, Unproductive strata<br>Surface waters: River Quality – Poor / Bad |
| | Ecology | Nature conservation sites with local designation |

10.6.5 The likelihood of a pollutant linkage being present is classified as set out in Table 10.2 below.

**Table 10.2 - Likelihood of Pollutant Linkages**

| Classification | Definition |
|---|---|
| High likelihood | Pollutant linkage may be present; event very likely in the short-term and almost inevitable in the long-term or there is evidence of harm or pollution at the receptor |
| Probable Likelihood | Pollutant linkage may be present; probable event will occur in the short-term or likely in the long-term |
| Low likelihood | Pollutant linkage may be present; possibility that event may occur but there is no certainty it will occur in the long-term and less likely in the short-term |
| Unlikely | Pollutant linkage is possible but improbable that event would occur even in the long term |

10.6.6 Determination of the potential magnitude of an impact takes into account several factors such as nature and type of potential contamination, duration, spatial extent and the likelihood of a potential pollutant linkages being present.

10.6.7 Criteria for the determination of the magnitude of impacts are set out in Table 10.3 below.

**Table 10.3 - Impact Magnitude Criteria**

| Magnitude | Description |
|---|---|
| Large | Qualitative risk assessment identifies one or more relevant pollutant linkages of high likelihood.<br>Contamination levels encountered in excess of assessment criteria (for human health / environment / property).<br>Total loss of, or alteration to, the baseline resource such that post-development characteristics or quality would be fundamentally and irreversibly changed. |
| Medium | Qualitative risk assessment identifies one or more relevant pollutant linkages of probable likelihood.<br>Contamination levels encountered marginally in excess of assessment criteria (for human health / environment / property). |

| Magnitude | Description |
|---|---|
| | Loss of, or alteration to, the baseline resource such that post-development characteristics or quality would be partially changed. |
| Small | Qualitative risk assessment identifies one or more relevant pollutant linkages of low likelihood.<br>Contamination levels encountered below, but potentially approaching, assessment criteria (for human health / environment / property).<br>Small changes to the baseline resource, which are detectable, but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions. |
| Negligible | Qualitative risk assessment identifies pollutant linkages unlikely.<br>Contamination levels encountered well below assessment criteria (for human health / environment / property).<br>A very slight change to the baseline conditions, which is barely distinguishable, and approximates to the 'no change' situation. |

10.6.8 The resulting scale of effect is determined in relation to the sensitivity of the receptor and potential magnitude of the impacts as illustrated in Table 10.4 below.

**Table 10.4 - Effects Assessment Matrix**

| | | Receptor Sensitivity | | |
|---|---|---|---|---|
| | | High | Medium | Low |
| Magnitude of Impact | Large | Major | Moderate | Minor |
| | Medium | Moderate | Moderate | Minor |
| | Small | Minor | Minor | Negligible |
| | Negligible | Minor | Negligible | Negligible |

*Significance Criteria*

10.6.9 In general, *negligible* or *minor* effects are considered not significant and *moderate* and *major* effects are considered significant, although this is subject to professional judgement. Some moderate levels of effect may be deemed not significant depending on the specific circumstances which would be explained in the ES.

10.6.10 Examples of potential resulting effects are presented in Table 10.5 below.

**Table 10.5 - Examples of Resulting Effects**

| Level of Effect | Description |
|---|---|
| Major | Short-term (acute) damage to human health.<br>Significant water pollution incident caused by uncontrolled release of contaminants e.g. major spillage or leak.<br>Damage to a particular eco-system as a result of acute exposure.<br>Catastrophic damage to crops, buildings or property. |
| Moderate | Long-term (chronic) damage to human health e.g., contaminants present above appropriate threshold values.<br>Pollution of sensitive water resources such as through slow release of contaminants through leaching into an aquifer.<br>A significant change in a particular ecosystem. |

| Level of Effect | Description |
|---|---|
| | Significant damage to crops, buildings, structures and services potentially rendering unsafe or impairing function. |
| Minor | Long-term (chronic) damage unlikely to human health e.g. contaminants present but close to but below appropriate threshold values.<br>Pollution of low or non-sensitive water resource, e.g. non-classified groundwater.<br>Noticeable change to an ecosystem but does not affect integrity and functioning.<br>Significant damage to buildings, foundations and services but not rendering unsafe or impairing function. |
| Negligible | Long-term (chronic) damage unlikely to human health e.g. contaminants well below appropriate threshold values.<br>No appreciable pollution of a low or non-sensitive water resource, e.g. non-classified groundwater.<br>No material impact on ecosystems.<br>Easily repairable damage to sensitive buildings / structures / services or the environment. |

**Table 10.6 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Human Health (potential for exposure to contamination through dermal, ingestion and inhalation pathways) | Scoped In | Scoped Out | Scoped Out | Potential sources of contamination have been identified on The Site associated with dredgings which require further assessment to establish pollutant-receptor linkages and identify any necessary remedial measures. Risks significantly reduced during operation and decommissioning phases, such that significant effects are unlikely. |
| Human Health (UXO) | Scoped In | Scoped Out | Scoped Out | Potential for the presence of UXO which could be encountered during construction works in shallow / deep soils. Recommended mitigation measures to be employed during site investigation, and construction works where open intrusive works or piled foundations are required. |
| Controlled Waters (potential for remobilisation of contaminants) | Scoped In | Scoped Out | Scoped Out | Potential sources of contamination have been identified which could remobilise into controlled waters although this is largely dependent on construction methods which are yet to be finalised. Operation of the development is unlikely to give rise to risks on controlled waters as potential for contamination is very low due to the nature of solar operations. Risk of mobilising contaminants during decommissioning is low. |
| Ecological Receptors (SSSI / SPA) | Scoped In | Scoped Out | Scoped Out | Potential sources of contamination have been identified which could remobilise |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | into controlled waters and into adjacent ecological receptors. Operation of the development is unlikely to give rise to risks to ecological receptors as potential for contamination is very low due to the nature of solar operations. Risk of mobilising contaminants during decommissioning is low. |
| Property (potential for instability / aggressive conditions to sub-surface structures) | Scoped In | Scoped Out | Scoped Out | Low bearing capacity and high compressible soils have been identified on the Site associated with dredgings, cell bunds and natural Glaciofluvial deposits which require further investigations to establish any required remedial works and inform construction design proposals. Once constructed risks to property is very low. |
| Livestock (potential for exposure if deeper dredging soils introduced to surface soils) | Scoped In | Scoped Out | Scoped Out | Potential for deeper dredging soils to be introduced to surface soils depending on construction works. If arisings exceed threshold levels they would be removed from the Site to enable grazing to continue during operation and following decommissioning. |

## 10.7 Assumptions, Limitation and Uncertainties

10.7.1 The above is based on a desk-based review of currently available information. Detailed information is presently available for parts of the western Area but is limited for the north-eastern Area and central and eastern Areas. The proposed Phase 1 Preliminary Risk Assessment and Stage 2 Supplementary Investigation would be used to extend knowledge into all areas of the Site.

# 11.0 CULTURAL HERITAGE AND ARCHAEOLOGY

## 11.1 Introduction

11.1.1 This chapter outlines the baseline archaeological and cultural heritage conditions at the Site and outlines the methodology that will be utilised for the identification and assessment of effects on heritage assets within the ES. This chapter also considers the potential for significant effects on heritage assets arising from the Proposed Development and highlights instances where mitigation measures may be required.

## 11.2 Study Area

11.2.1 In order to assess the potential for significant effects on archaeological and cultural heritage assets resulting from the Proposed Development, the following study areas as shown on Figure 11.3 have been identified:

i) A core study area, which includes all land within the Site, will be subject to assessment for potential direct effects. This study area will be subject to a detailed walkover survey and desk study, cultural heritage assets which may be directly or indirectly impacted by the Proposed Development will be identified.
ii) A 1km study area for the identification of all known heritage assets and known previous archaeological interventions in order to help predict whether any similar hitherto unknown archaeological remains are likely to survive within the Site and thus be impacted by the Proposed Development. An assessment of potential effects on the setting of upstanding non-designated assets within this study area will also be undertaken.
iii) A 3km study area for the assessment of potential effects on the settings of all designated heritage assets including Scheduled Monuments, all Listed Buildings, Registered Parks and Gardens (RPG) and Registered Battlefields, and Conservation Areas.
iv) A 5km study area for the assessment of potential effects on the setting of all designated heritage assets including Scheduled Monuments, Grade I and II* Listed Buildings, Grade I and II* RPG's and Registered Battlefields.

11.2.2 The study areas are focused on the Solar Array Development Area and the SPEN / private wire connections. On the basis that the access road has already been constructed and is used for the maintenance of the wind farm, it is not considered

likely that there would be any significant direct or indirect effects on cultural heritage arising from the use of the access track..

## 11.3 Legislation, Planning Policy Context and Guidance

11.3.1 The ES chapter will be prepared in accordance with relevant national and local legislation, policy, and guidance on the historic environment.

### *Legislation*

i) The Ancient Monuments and Archaeological Areas Act 1979 (as amended).
ii) The Planning (Listed Buildings and Conservation Areas) Act 1990 (as amended).
iii) Historic Buildings and Ancient Monuments Act 1953

### *National Planning Policy*

*National Policy Statements (NPS)*

11.3.2 The relevant NPSs pertinent to the Historic Environment are listed as follows:

i) NPS EN-1, with reference to paragraph 4.1.3 which discusses adverse impacts and benefits, and Historic Environment (Section 5.8).
ii) NPS EN-3, Renewable Energy Infrastructure. Whilst solar projects are not identified within the document, it nevertheless advises that assessments of the impact of other renewable energy developments on the Historic Environment is a requirement. (Part 2). This includes at paragraph 2.5.34 advice on how the impact on the historic environment should be taken into account.

11.3.3 An updated Draft NPS EN-1 and Draft NPS EN-3 were published in March 2023 for consultation. The Draft NPS EN-1 provides policy on the Historic Environment at Section 5.9. The following paragraphs are relevant to this assessment:

'*Those elements of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest are called 'heritage assets'. Heritage assets may be buildings, monuments, sites, places, areas or landscapes, or any combination of these. The sum of the heritage interests that a heritage asset holds is referred to as its significance. Significance derives not only from a heritage asset's physical presence, but also from its setting'* (para 5.9.3)

*There are heritage assets that are not currently designated, but which have been demonstrated to be of equivalent significance to designated heritage assets of the highest significance. These are:*

*• those that the Secretary of State has recognised as being capable of being designated as a Scheduled Monument or Protected Wreck Site but has decided not to designate*

*• those that the Secretary of State has recognised as being of equivalent significance to Scheduled Monuments or Protected Wreck Sites but are incapable of being designated by virtue of being outside the scope of the related legislation.* (para 5.9.5)

*Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to Scheduled Monuments should be considered subject to the policies for designated heritage assets. The absence of designation for such heritage assets does not indicate lower significance.* (para 5.9.6)

*The Secretary of State should also consider the impacts on other non-designated heritage assets (as identified either through the development plan making process by plan-making bodies, including 'local listing', or through the application, examination and decision making process). This is on the basis of clear evidence that such heritage assets have a significance that merits consideration in that process, even though those assets are of lesser significance than designated heritage assets.* (para 5.9.7)

11.3.4 The draft NPS EN-3 includes specific guidance in relation to the Historic Environment and Solar photovoltaic generation in paragraphs 3.10.98 to 3.10.110.

*National Planning Policy Framework (NPPF)*

11.3.5 The NPPF was published by the Ministry of Housing Communities and Local Government (MHCLG) in March 2012, was revised in July 2018, February 2019 and updated in July 2021. The NPPF sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for development can be produced and assessed. Chapter 16 of the document is concerned with 'Conserving and enhancing the historic environment'. It identifies heritage assets as 'an irreplaceable resource' and notes that 'they should be conserved in a manner appropriate to their significance, so that

they can be enjoyed for their contribution to the quality of life of existing and future generations'[53].

11.3.6 The following are pertinent to the Historic Environment:

i) Paragraph 194;
ii) Paragraph 195;
iii) Paragraph 196;
iv) Paragraph 197;
v) Paragraph 199.

### *Local Planning Policy*

11.3.7 Cheshire West and Chester Council adopted the Local Plan (Part One) Strategic Policies on 29 January 2015. The following policies will be relevant to the assessment in the ES Chapter:

i) Strategic Objective 12.
ii) STRAT 1 Sustainable Development.
iii) ENV 5 Historic environment.
iv) ENV 7 Alternative energy supplies.

11.3.8 The Local Plan (Part Two) Land Allocations and Detailed Policies was adopted on 18 July 2019. Section 17, Historic Environment includes detailed policies in regard to:

i) DM47 Listed Buildings.
ii) DM4 Non-designated heritage assets.
iii) DM49 Registered parks and Gardena and Battlefields.
iv) DM50 Archaeology.

[53] *Ministry of Housing, Communities & Local Government (MCHLG) (July 2018 Updated 20th July 2021), National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2*

### *Guidance*

11.3.9 The ES Chapter will adhere to the following guidance:

i) Planning Practice Guidance (PPG) (Historic Environment section updated 2019)[54].
ii) Historic England. Conservation Principles[55].
iii) Historic England. The Setting of Heritage Assets: Good Practice Advice in Planning Note 3[56].
iv) Chartered Institute for Archaeologists (CIfA) Code of Conduct: professional ethics in archaeology[57].
v) CIfA. Regulations for professional conduct[58].
vi) CIfA. Standard and guidance for commissioning work or providing advice on archaeology and the historic environment[59].
vii) CIfA Standard and guidance for historic environment desk-based assessment[60].

## 11.4 Preliminary Baseline Conditions

11.4.1 The preliminary baseline has been informed by the National Heritage List for England (NHLE); an extract of the Chester Historic Environment Record (HER); a brief review of historic Ordnance Survey mapping and the British Geological Survey (BGS).

11.4.2 A Gazetteer of Heritage Assets and Event (Appendix 11.1) within the outlined study areas accompanies this chapter. Each heritage asset and event has been assigned an 'Asset/Event No.' unique to this assessment, and the Gazetteer includes information regarding the type, period, grid reference, HER number, protective

[54] *MCHLG (2018), National Planning Practice Guide. Available at: (http://planningguidance.planningportal.gov.uk/blog/guidance/*
[55] *English Heritage. (2008). Conservation Principles, Policies and Guidance. Available at: https://historicengland.org.uk/advice/constructive-conservation/conservation-principles/*
[56] *Historic England (2017), Historic England Advice in Planning Note 3 (2nd Edition: The Setting of Heritage Assets: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/*
[57] *Chartered Institute for Archaeologists' (CIfA). (2019) (Updated 2022). Code of Conduct: professional ethics in archaeology Available at: https://www.archaeologists.net/codes/cifa*
[58] *CIfA. (2019 Updated 2021). Regulations for professional conduct. Available at: https://www.archaeologists.net/codes/cifa*
[59] *CIfA. (2014 Updated 2020). Standard and guidance for Commissioning Work or Providing Consultancy Advice on the Historic Environment. The Chartered Institute for Archaeologists Available at: https://www.archaeologists.net/codes/cifa*
[60] *CIfA. (2017 Updated 2020). Standard and guidance for historic environment desk-based assessment The Chartered Institute for Archaeologists Available at: https://www.archaeologists.net/codes/cifa*

designation, and other descriptive information, as derived from the consulted sources. The assigned 'Asset/Event No's' are used to identify assets/events in the ensuing text and on the accompanying figures (Figures 11.1-11.3).

11.4.3 The BGS[61] identifies four sedimentary bedrocks underlying the Site. From west to east these are:

i) Chester Formation a sandstone bedrock formed between 250 and 247.1 million years ago during the Triassic period.
ii) Wilmslow Sandstone Formation between 252.2 and 247.1 million years ago during the Triassic period.
iii) Helsby Sandstone Formation formed between 247.1 and 241.5 million years ago during the Triassic period.
iv) Tarporley Siltstone Formation formed between 250 and 241.5 million years ago during the Triassic period.

11.4.4 The superficial deposits recorded on the Site are sedimentary Tidal Flat Deposits of clay, silt and sand formed during the Quaternary period.

11.4.5 The BGS[62] records a number of historic boreholes sunk within the Site. A technical review of the BGS boreholes and exploratory works undertaken in 2015 has been undertaken and divides the Site into three areas; West; Central and Eastern; and North-east. It is noted that Peat deposits are located in the West of the Site. The Peat is recorded as between 0.4m and 2.2m thickness with a 'Lower Peat' c. 0.9m in thickness also recorded. Pockets of Peat, peaty clay and partially decomposed vegetation are also noted as being present within the Tidal Flat Deposits which are found in all three areas of the Site. Paleoenvironmental and archaeological remains can survive in peat deposits.

11.4.6 Made Ground of considerable thickness (c. 0.6m-12m) is expected in the location of the cells which were used for management of the dredging from the Manchester Ship Canal and the Weaver Navigation within the Site. However, it should be noted that the cells are typically 6m to 8m above the surrounding ground level.

[61] *British Geological Survey. (2023) Geology Viewer. Available at: https://geologyviewer.bgs.ac.uk/?*
[62] *BGS (2023b). GeoIndex Onshore- Boreholes records. Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSBoreholes&_ga*

11.4.7 No designated heritage assets are recorded on the Site.

11.4.8 The following heritage assets have been identified on the Site:

i) Probable Post Medieval Flood Defence, East of Frodsham Marsh Farm (Asset 131) in the north-western area of the Site. A pre-groundworks survey[63] of the area around Asset 131 known as *Site 734/729* identified an embankment (Asset 131) which was interpreted as being composed of upcast from post-medieval dredging activities of the Manchester Ship Canal (Asset 132). Stray finds around the embankment included a collection of post-medieval ceramics and glass bottles[64].
ii) The extent of the Manchester Ship Canal (Asset 132) which extends into the north-western boundary of the Site. There are historic reports of prehistoric finds being recovered during the construction of the canal[65];
iii) Cells No. 1, 2 and 5 which were used by the Manchester Ship Canal Company from the mid-20th century to deposit material dredged from the Canal (Asset 132)[66];
iv) The northern extent of an area of medieval / post-medieval ridge and furrow (centred Asset 192) extends to the southern boundary of the Site;
v) Fifty two field plots containing medieval/post-medieval ridge and furrow (centred Asset 191) recorded from historic aerial photography within the western area of the Site;
vi) One field plot containing post-medieval ridge and furrow (centred Asset 194) recorded from historic aerial photography within the western area of the Site; and
vii) Five Second World War Military structures (centred Asset 193) recorded from historic aerial photography within the western area of the Site. These structures may relate to a Prisoner of War (PoW) camp documented as holding German and Italian PoWs and employed in digging local agricultural drainage channels during internment.

[63] *L-P Archaeology. (2016) Archaeological Monitoring of FRODSHAM WIND FARM. Unpublished grey literature report*
[64] *L-P Archaeology. (2016) Archaeological Monitoring of FRODSHAM WIND FARM. Unpublished grey literature report*
[65] *Lancaster University Archaeological Unit (LUAU) (1993) North Western Ethylene Pipeline English Section Archaeological Studies 1988-1993 Final Report. Available at: https://doi.org/10.5284/1030369*
[66] *WSP. (2023) Technical Note 70103419_TN01_Final*

11.4.9 The HER records six previous archaeological investigations (Events 166-168; 177-179; 185; & 189) within and/or extending into the Site. Three of the recorded Events relate to the North Western Ethylene Pipeline and include two desk-based assessments (Events 167 & 168) and a watching brief (Event 166). The remaining recorded Events relate to desk-based assessment work.

11.4.10 A watching brief conducted on works required for the North Western Ethylene Pipeline (Asset 167) noted that the route of the pipeline largely followed the route of the canal (Asset 132) and as such much of the ground was identified as being historically disturbed. Individual unstratified prehistoric and post-medieval finds[67] were identified in the vicinity of the pipeline but no archaeological remains were found on the Site.

11.4.11 The Ordnance Survey map published in 1882[68] annotates the Site within Frodsham Marsh in the ownership of the Frodsham Lordship and depicts the majority of the Site within agricultural fields to the north-west of the town of Frodsham. The northern extent of the Site is depicted within a Volunteer Rifle Range within the tidal zone. The OS maps published in 1968-1970[6970] also record the Site within Frodsham Marsh and depicts three areas annotated “Canal Deposit Dump”. Land drainage is also illustrated within the Site.

11.4.12 Whilst the Site was not developed in the mid-20th century and records from the Rural District of Runcorn notes there being a low density of bombing during the Second World War there are numerous anecdotal and historic location references to bombs being dropped in “Frodsham Marshes” likely in the vicinity of the Site. A UXO Risk Assessment has judged there to be a Medium Risk for UXOs to be encountered on the Site.[71]

[67] *Lancaster University Archaeological Unit (LUAU) (1993) North Western Ethylene Pipeline English Section Archaeological Studies 1988-1993 Final Report. Available at: https://doi.org/10.5284/1030369*
[68] *Ordnance Survey. (1882) Cheshire Sheet XXIV Surveyed: 1873 to 1874, Published: 1882. Available at: https://maps.nls.uk/view/102341023*
[69] *Ordnance Survey. (1968) SJ47NE – A Surveyed / Revised: 1962 to 1968, Published: 1968. Available at: https://maps.nls.uk/view/189187896*
[70] *Ordnance Survey. (1970) SJ57NW – A Surveyed / Revised : 1960 to 1970, Published: 1970 Available at: https://maps.nls.uk/view/189188271*
[71] *1st Line Defence, (2022) Detailed Unexploded Ordnance (UXO)Risk Assessment- Frodsham, Cheshire, WA6 7BQ. Unpublished report*

11.4.13 The following Conservation Areas have been identified within the 1km study area:

i) Frodsham Town (centred Asset 1) inclusive of 31 Grade II Listed Buildings (Assets 8, 9, 13-31; 33-41 & 44); and 49 Locally Listed Buildings (Assets 61-66, 68-103, 108, 109, 121, 122, 125 & 126).
ii) Overton, St Lawrence's (Frodsham) Conservation Area (centred Asset 49) which extends beyond 1km from the Site and includes of one Grade I Listed Building (235); one Grade II* Listed Building (Asset 243); and seven Grade II Listed Buildings (Assets 233, 238, 240, 259, 267, 269 & 289); and one Locally Listed Building (Asset 110).
iii) Weston Village Conservation Area (centred Asset 50) inclusive of one grade II* Listed Building (Asset 3); and six Grade II Listed Buildings (Assets 2, 4-6, 45 & 47).
iv) Castle Park (Frodsham) Conservation Area (centred Asset 51) inclusive of one Registered Park and Garden (centred Asset 52) and one Locally Listed Building (Asset 149).

11.4.14 Within the 1km study area there are nine Grade II Listed Buildings (Assets 7, 10-12, 32, 42, 43, 46 & 48) not within Conservation Areas. These Listed Buildings date from the 16th to 20th centuries and are noted as having been altered since their original construction. The Remains of Rock Savage (Asset 46) locate a late 16th century building on the Site of the former Clifton Hall which now survives as a sandstone wall.

11.4.15 In addition, there are 17 Locally Listed Buildings (Assets 59, 104-107, 111-120, 123 & 124) not within Conservation Areas.

11.4.16 The HER has identified a prehistoric findspot (Asset 144) and the findspot of a Bronze Age Axe (Asset 147) to the south of the Site and a possible Bronze Age burial (Asset 136) to the north of the Site within the 1km study area. Additionally, during the construction of the canal (centred Asset 132) it was reported that prehistoric finds were uncovered[7273]. Evidence for prehistoric activity in the study area is thus largely

[72] *Lancaster University Archaeological Unit (LUAU) (1993) North Western Ethylene Pipeline English Section Archaeological Studies 1988-1993 Final Report. Available at: https://doi.org/10.5284/1030369*
[73] *Cheshire County Council & English Heritage (2003). Cheshire Historic Towns Survey- Frodsham-Archaeological Assessment. Available at: http://www.cheshirearchaeology.org.uk/?page_id=219*

limited to individual findspots, although the location of Frodsham, by marshlands, the hills of the Mid-Cheshire Ridges and the flat land of the Cheshire Plain would have been attractive to settlers in the period.

11.4.17 Three Roman Roads (centred Assets 58, 157 & 158) in the vicinity of Frodsham are located to the south of the Site. Romano-British remains in the 1km study area are otherwise limited to coin findspots (Assets 57, 135 & 146).

11.4.18 Medieval non-designated assets in the 1km study area include Cliton Village (Asset 138) and Deer Park (Asset 140) and Weston Village (Asset 138) to the north of the Site. The majority of medieval assets are recorded within the modern extent of Frodsham to the south of the Site and include the foundation remains of Frodsham Castle (Asset 153) located within Frodsham RPG (centred Asset 52) which is also a Conservation Area (centred Asset 51) and originated as a manorial estate in the 11th century AD. Frodsham grew from an Early Medieval royal estate, to a town in the medieval period. A medieval fortified watermill (Asset 155) and at least one fishpond (Asset 151) are also recorded within Assets 51 and 52.

11.4.19 Post-medieval non-designated heritage assets within the study area largely comprise domestic, industrial and transport structures.

11.4.20 The HER identifies three separate areas of Frodsham to the south of the Site as Areas of Archaeological Potential[74] (Figure 11.2).

11.4.21 Designated heritage assets between 1km and 3km from the Site include:

i) Five Scheduled Monuments (Assets 198-200, 208 & 209);
ii) 44 Listed Buildings, not located within Conservation Areas; and
iii) Two Conservation Areas; Halton Village (centred Asset 210) and Higher Runcorn (centred Asset 211). Halton Village Conservation Area includes one Grade I Listed Building (Asset 224); four Grade II* Listed Buildings (Assets 216, 217, 225 & 277); and 12 Grade II Listed Buildings (Assets 215, 218, 223, 226-228, 274, 276, 278 & 280-282) and the Scheduled Halton Castle (Asset 206). Higher

[74] *Cheshire County Council and English Heritage (EH) (2008) CHESHIRE HISTORIC TOWNS SURVEY- Frodsham Archaeological Assessment. Available at: http://www.cheshirearchaeology.org.uk/?page_id=219*

Runcorn Conservation Area includes six Grade II Listed Buildings (Assets 212, 214, 221, 222, 278 & 287).

11.4.22 There are eleven nationally important designated heritage assets between 3km and 5km from the Site:

i) Eight Scheduled Monuments (centred Assets 195-197 & 201-205); and
ii) Three Grade I Listed Buildings (Assets 290-292).

11.4.23 There are no World Heritage Sites or Registered Battlefields within 5km of the Site.

## 11.5 Potential Effects and Mitigation

### *Construction*

11.5.1 The construction of the Proposed Development has the potential to directly impact on the known heritage assets within the Site as a result of the establishment of compounds and hardstanding, construction of internal access roads, piling, cable trenching etc. Assets that could be impacted include medieval and post-medieval agricultural remains, post-medieval and modern remains associated with the Manchester Canal and its ongoing operation; and probable Second World War buildings. Where possible, the Proposed Development would be designed to preserve heritage assets in situ and thus direct impacts would be avoided by design. However, where this is not feasible and heritage assets cannot be avoided by design, a robust programme of mitigation will be required.

11.5.2 There is the potential for hitherto unknown paleoenvironmental and archaeological deposits and remains to survive on the Site. As such the Proposed Development may have the potential to directly impact hitherto unknown archaeological remains.

11.5.3 Whilst relatively deep made ground deposits have been identified in areas of the Site, there is the potential for archaeological and paleoenvironmental remains to survive on the Site and be impacted by the Proposed Development. Archaeological mitigation on the Site may include geoarchaeological monitoring of geotechnical investigation works or a purposive geoarchaeological borehole survey where Peat deposits have been identified; non-invasive works such as geophysical survey; and or invasive works such as trial trenching/evaluation and excavation. The mitigation strategy for the Site would be developed in consultation with the Cheshire

Archaeology Planning Advisory Service (APAS) archaeological advisors to the local planning authority, Cheshire West and Chester Council. A detailed Written Scheme of Investigation (WSI) will be prepared by the Applicant for each phase of archaeological works and agreed with Cheshire APAS in advance of any works being undertaken.

***Operation***

11.5.4 The Proposed Development has the potential to impact upon the settings of heritage assets that are intervisible or where the Proposed Development can be seen in key views towards assets across the landscape. There is also a potential for cumulative impacts on the settings of heritage assets with other proposed developments in the area.

11.5.5 A Zone of Theoretical Visibility (ZTV) will be used to identify designated heritage assets with theoretical intervisibility with the Proposed Development. A review of designated heritage assets within the study areas will also be undertaken to identify assets with key views in which the Proposed Development may appear. Designated heritage assets within the defined study areas not within the ZTV and not identified as having key views which may include the Proposed Development will be scoped out of further assessment.

11.5.6 The impact of the Proposed Development on heritage assets within the ZTV will be considered as part of the ES Chapter as will the impact of cumulative developments.

11.5.7 The three Frodsham Conservation Areas (centred Assets 1, 49 & 51) inclusive of Grade II* and Grade II Listed Buildings and the Grade II RPG of Castle Gardens (centred Asset 52) extend within 1km to the south-east of the Site. The Conservation Area Character Appraisal for Frodsham Town[75] (centred Asset 1), the Conservation Area closest to the Site, defines specific views that are fundamental to the character of the Conservation Area: these include panoramic views from The Rock - the Conservation Area's high point, which look out over the estuary and towards The Site. This view is complex and features numerous modern developments but a

[75] *Vale Royal Borough Council. (2006). Frodsham (Town) Conservation Area Appraisal. Available at: https://www.cheshireeast.gov.uk/environment/heritage_natural_environment/conservation_listed_buildings/conservation_areas/conservation_areas_appraisals/conservation_areas_appraisals.aspx*

detailed assessment of potential impacts on the setting of the Conservation Area will be included as part of the ES Chapter.

11.5.8 Helsby Hill Camp promontory fort (Asset 198) is located 1.5km to the south of the Site. Cheshire West and Chester Council and Historic England objected to the Frodsham Wind Farm due to the potential effects on the setting of the fort. However the Inspector concluded that those elements of the setting which make a positive contribution to the cultural significance of the fort would be preserved and that there would be no harmful impact. It is similarly predicted that there would be no harm to the setting of the Helsby Hill Camp promontory fort as a consequence of the Proposed Development. There is however, the potential for the Proposed Development to have some impact upon the settings of the Scheduled Monuments, Helsby Hill Camp promontory fort (Asset 198); Bradley Promontory Fort (Asset 199); and the Hillfort on Woodhouse Hill (Asset 200), which are all located to the south-east of the Site in a linear pattern. The impact of the Proposed Development on the setting of these assets will be assessed in detail within the ES Chapter.

### *Decommissioning*

11.5.9 A detailed assessment of the cultural heritage impacts of decommissioning the Proposed Development will be scoped out of the EIA because: (i) the future baseline conditions (environmental and other developments) cannot be predicted accurately at this stage; (ii) the detailed proposals for decommissioning are not known at this stage, and (iii) the best practice decommissioning guidance methods will likely change during the lifetime of the Proposed Development. Furthermore, the removal of the infrastructure at the Site is unlikely to result in any disturbance of any additional below ground heritage resources to those which would have been potentially affected during construction. Also, the removal of above ground infrastructure and restoration to similar conditions to that which prevail at present is unlikely to result in any adverse heritage setting impacts as it will be a return to the current baseline.

## 11.6 Assessment Methodology

11.6.1 The assessment will establish the historic environment baseline for the Site. Baseline data will be collated from the following sources:

i) Historic England (HE) for:

g) Designated asset data;
h) Historic aerial photographs;
i) Aerial Archaeology Mapping Explorer; and
j) Published online National Mapping Project (NMP) reports.

ii) Cheshire Historic Environment Record for:

a) Records of designated and non-designated assets and previous archaeological interventions (Events);
b) Historic Landscape Characterisation (HLC) data; and
c) Identified Areas of Archaeological Potential.

iii) British Library online and Promap for Ordnance Survey maps and pre-Ordnance Survey historical maps.
iv) Cheshire Archives for Historical maps, plans and documents relating to past land use.
v) National Collection of Aerial Photography (NCAP), Britain from Above, Cambridge Air Photos and the Historic England online aerial photographic viewer for Historic aerial photographs.
vi) The Environment Agency National LiDAR programme for LiDAR data.
vii) Frodsham Wind Farm Environmental Statement for Secondary source data contained in Section 16 Archaeology.
viii) British Geological Survey and Geotechnical Investigation Reports for Information regarding the character and depths of below ground deposits and potential for preservation of paleoenvironmental remains.
ix) Walkover Survey to identify any hitherto unrecorded upstanding or earthwork remains which may survive and to establish the survival, extent, significance and relationship to other sites of previously recorded Assets.
x) Setting assessment site visits to designated assets within the Zone of Theoretical Visibility to establish their current settings and the potential impact of the Proposed Development on their settings.

11.6.2 The ES chapter will be supported by a Heritage Impact Assessment (HIA) which will describe in detail the historic environment baseline, identify direct impacts on known heritage assets, and outline the potential for archaeological remains by period to survive within the Site. The HIA will also include an assessment of the impact of the Proposed Development on the settings of designated heritage assets within 5km of

the Site informed by the ZTV and identify the impact of the Proposed Development on these assets. Where necessary, the HIA will recommend appropriate archaeological and setting mitigation.

11.6.3 The ES chapter will briefly outline the baseline historic environment conditions, outline the archaeological potential by period and outline the potential for hitherto unknown buried remains to survive on the Site, and thus potentially be impacted upon. The chapter will identify known archaeological remains on the Site and assess the impact of the Proposed Development on those assets. The assessment will also consider the identified designated heritage assets in the area surrounding the Site which could be subject to potential impacts upon setting, including the potential for cumulative impacts from Cumulative Developments.

11.6.4 The chapter will be supported by a detailed ZTV which will be used to identify assets intervisible with the Proposed Development and/or where the Proposed Development would appear in key views to and from assets. Visualisations (either wireframes or photomontages) will be produced for some assets to aid in assessment of settings impacts. The viewpoints required will be agreed in consultation with Cheshire APAS who provide archaeological advice to the local planning authority of Cheshire West and Chester Council, Historic England and the and the project's LVIA team. Viewpoints are likely to include a photomontage from the higher land at the Rock on High Street near No. 44 and 44a High Street within Frodsham Town Conservation Area (centred Asset 1) and from Helsby Hill Camp promontory fort (Asset 198) towards the Site. Visualisations produced from the LVIA assessment may also be consulted and cross referenced to where relevant.

*Assessment of Significance / Assessment Criteria*

11.6.5 This sub-section sets out the methodology for assessing effects upon heritage assets both direct physical and setting effects. It takes account of the NPS EN-1 & NPS EN-

3, NPPF[76], PPG[77] and Historic England's Good Practice Advice Note 3: The Setting of Heritage Assets[78].

11.6.6 The assessment will distinguish between the following terms: 'impact' and 'effect'. An impact is defined as a physical change to a heritage asset or its setting, whereas an effect refers to the significance of this impact. The first stage of the assessment involves establishing the importance of the heritage asset and assessing the sensitivity of the asset to change (impact). Using the illustrative proposed design for the Proposed Development, and taking into account the Rochdale Envelope parameters, an assessment of the impact magnitude is made and a judgement regarding the level and significance of effect is arrived at.

*Assessing Cultural Significance and Importance*

11.6.7 The definition of cultural significance is readily accepted by heritage professionals both in the UK and internationally and was first fully outlined in the Burra Charter, Article One of which identifies that 'cultural significance' or 'cultural heritage value' means aesthetic, historic, scientific, social or spiritual value for past, present or future generations[79]. This definition has since been adopted by heritage organisations around the world, including HE. In Annex 2: Glossary of the NPPF defines "significance (for heritage policy)" as:

*"The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting"*[80] .

[76] *Ministry of Housing, Communities & Local Government (MCHLG) (July 2018 Updated 20th July 2021), National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2)*
[77] *MCHLG (2018), National Planning Practice Guide. Available at: (http://planningguidance.planningportal.gov.uk/blog/guidance/*
[78] *Historic England (2017), Historic England Advice in Planning Note 3 (2nd Edition: The Setting of Heritage Assets. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/*
[79] *International Council on Monuments and Sites (ICOMOS) (2005). Xi'an Declaration. Available at: https://www.icomos.org/charters/xian-declaration.pdf*
[80] *Ministry of Housing, Communities & Local Government (MCHLG) (July 2018 Updated 20th July 2021), National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2) Annex 2*

11.6.8 All heritage assets have some significance; however, some assets are judged to be more important than others. The level of that importance is, from a cultural resource management perspective, determined by establishing the asset's capacity to inform present or future generations about the past. In the case of many heritage assets their importance has already been established through the designation (i.e. scheduling, listing and register) processes applied by HE.

11.6.9 The rating of importance of heritage assets is first and foremost made in reference to their designation and to the NPS EN-1 & NPS EN-3 and NPPF[81]. For non-designated assets, importance will be assigned based on professional judgement and guided by the criteria presented in Table 11.1 below; which itself relates to the criteria for designations as drawn from the Department of Media, Culture and Sports (DMCS) publication, Principles for Selection of Listed Buildings[82]. Principles for Selection of Listed Buildings and the Scheduled Monuments Policy Statements published by the same body[83] which outline the criteria for designating heritage assets, and the HE guidance written to expand upon the guidance by DMCS[8485].

**Table 11.1 - Criteria for Establishing Importance of Heritage Assets**

| Importance | Criteria |
|---|---|
| Very High | World Heritage Sites;<br>Other designated or non-designated assets with demonstrable Outstanding Universal Value. |
| High | Assets of high importance and rarity and those considered to be important at a national level.<br><br>Scheduled Monuments (Actual and Potential)[86].<br><br>Grade I and II* Listed Buildings[87] |

[81] *Ministry of Housing, Communities & Local Government (MCHLG) (July 2018 Updated 20th July 2021), National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2)p. 194*
[82] *Department for Digital, Culture, Media and Sport (DMCS) (2010); Updated 2018. Principles for Selection of Listed Buildings. Available at: https://www.gov.uk/government/publications/principles-of-selection-for-listing-buildings*
[83] *DMCS (2013). Scheduled Monuments Policy Statements. Available at: https://www.gov.uk/government/publications/scheduled-monuments-policy-statement*
[84] *Historic England (HE). 2023. Listing Selection Guides. Available at: https://historicengland.org.uk/listing/selection-criteria/listing-selection/*
[85] *HE. 2023. Scheduling Selection Guides. Available at: https://historicengland.org.uk/listing/selection-criteria/scheduling-selection/*
[86] *Ancient Monuments and Archaeological Areas Act, 1979 (c46). [Online]. London. UK Government. Available at: http://www.legislation.gov.uk/ukpga/1979/46/pdfs/ukpga_19790046_en.pdf*
[87] *Planning (Listed Buildings and Conservation Areas) Act, 1990 (c9) [Online} London. UK Government. Available at: http://www.legislation.gov.uk/ukpga/1990/9/contents*

| Importance | Criteria |
|---|---|
| | Grade I and II* Registered Parks and Gardens[88]<br><br>Registered Battlefields[89]<br><br>Well preserved historic landscapes, whether inscribed or not, with exceptional coherence, time depth, or other critical factor(s)<br><br>Non-Designated assets considered to meet the criteria for the designation as per the types and grades of designation noted above[90] [91]. |
| Medium | Assets of medium importance and rarity and those considered to be important at a regional level.<br><br>Grade II Listed Buildings;<br><br>Grade II Registered Parks and Gardens;<br><br>Conservation Areas[92];<br><br>Non-designated assets considered to meet the criteria for the designations as set out above[93] [94].<br>Well preserved structures or buildings of historical significance;<br><br>Historic landscapes or assets of a reasonably defined extent and significance, or reasonable evidence of occupation / settlement, ritual, industrial activity etc.<br><br>Examples may include burial sites, deserted medieval villages, Roman roads and dense scatters of finds. |
| Low | Assets of low importance and rarity and those considered to be important at a local level.<br><br>Locally listed buildings or non-designated assets with some evidence of human activity which have the potential to contribute to local research objectives, structures or buildings of potential historical merit.<br><br>Examples include assets such as historic field systems and boundaries, agricultural features such as ridge and furrow, etc.<br><br>Non-designated heritage assets identified by local historic environment records protected by NPPF[95].; |

[88] *Historic Buildings and Ancient Monuments Act 1953, Available at: https://www.legislation.gov.uk/ukpga/Eliz2/1-2/49/contents*
[89] *ibid*
[90] *MCHLG (July 2018 Updated 20th July 2021), National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2. p.194 footnote 63*
[91] *MCHLG (2018), National Planning Practice Guide. Available at: http://planningguidance.planningportal.gov.uk/blog/guidance/. 041 Reference ID: 18a-041-20190723*
[92] *Planning (Listed Buildings and Conservation Areas) Act, 1990 (c9) [Online} London. U Government. Available at: http://www.legislation.gov.uk/ukpga/1990/9/contents*
[93] *MCHLG (July 2018 Updated 20th July 2021), National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2. p.194 footnote 63*
[94] *MCHLG (2018), National Planning Practice Guide. Available at: http://planningguidance.planningportal.gov.uk/blog/guidance/. 041 Reference ID: 18a-041-20190723*
[95] *MCHLG (2018), National Planning Practice Guide. Available at: http://planningguidance.planningportal.gov.uk/blog/guidance/. 041 Reference ID: 18a-041-20190723*

| Importance | Criteria |
|---|---|
| Negligible | Assets of very low importance which are common. Heritage assets with very little or no surviving archaeological interest or buildings and landscapes of no historical significance.<br><br>Examples include destroyed antiquities, buildings of no architectural merit, or relatively modern landscape features such as quarries, field boundaries, drains and ponds etc. |

11.6.10 While determining the relative cultural significance of a heritage asset is essential for establishing its importance, it is widely recognised[96] that the importance of an asset is not the same as its sensitivity to changes to its setting. Thus, in determining effects upon the setting of assets by the Proposed Development, both importance and sensitivity to changes to setting need to be considered.

11.6.11 The Xi'an Declaration[97] set out the first internationally accepted definition of setting with regard to heritage assets and features, indicating that setting is important where it forms part of or contributes to the significance of a heritage asset. The NPPF in Annex 2: Glossary defines the "setting of a heritage asset" as "the surroundings in which a heritage asset is experienced" and states the setting of a heritage asset is not "fixed and may change as the asset and its surroundings evolve"[98]. The NPPF also notes that elements of setting may make a positive, neutral or negative contribution to the significance of an asset.

11.6.12 Setting is a key issue in the case of some, but by no means all assets. An asset of Very High or High importance does not necessarily have high sensitivity to changes to its setting (e.g. does not necessarily have a high relative sensitivity). An asset's relative sensitivity to alterations to its setting refers to its capacity to retain its ability to contribute to our understanding and appreciation of the past in the face of changes to its setting. The ability of an asset's setting to contribute to an understanding, appreciation and experience of it and its significance also has a bearing on the sensitivity of that asset to changes to its setting. Assets with high sensitivity may be vulnerable to changes that affect their settings, and even slight changes may reduce their significance or the ability of setting to contribute to the understanding,

[96] *Historic England (2017), Historic England Advice in Planning Note 3 (2nd Edition: The Setting of Heritage Assets: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/*
[97] *ICOMOS (2013). Burra Charter Article 1.2. Avalable at: https://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf*
[98] *MCHLG (July 2018 Updated 20th July 2021), National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2*

appreciation, and experience of the asset. Less sensitive assets will be able to accommodate greater changes to their settings without a reduction in their significance and, in spite of such changes, the relationship between the asset and its setting will still be legible.

11.6.13 In establishing the relative sensitivity of an asset to changes to its setting, the setting must first be identified. The assessment will outline a range of factors, through qualitative written narrative, which will be considered when establishing the setting of an asset and therefore determining its sensitivity. The factors will be assessed from known records and in the field. In defining these criteria, emphasis has been placed on establishing the current setting of each asset, how this contributes to the significance of the asset and how the Proposed Development would affect it.

11.6.14 The criteria for establishing an asset's relative sensitivity are outlined in Table 11.2. This table has been developed based on professional judgement and experience in assessing setting effects. It has been developed with reference to the policy and guidance noted above including NPPF[99], PPG[100], the Xi'an Declaration[101] and HE's guidance[102] on the setting of heritage assets.

**Table 11.2 - Criteria for Establishing Relative Sensitivity of a Heritage Asset to Changes to its Setting**

| Importance | Criteria |
|---|---|
| Very High | An asset, the setting of which, is critical to an understanding, appreciation and experience of it should be thought of as having Very High Sensitivity to changes to its setting. This is particularly relevant for assets whose settings, or elements thereof, make an essential direct contribution to their cultural significance. |
| High | An asset, the setting, of which, makes a major contribution to an understanding, appreciation and experience of it should be thought of as having High Sensitivity to changes to its setting. This is particularly relevant for assets whose settings, or elements thereof, contribute directly to their cultural significance. |
| Medium | An asset, the setting of which, makes a moderate contribution to an understanding, appreciation and experience of it should be thought of as having Medium Sensitivity to changes to its setting. This could be an asset for which setting makes a contribution to significance but whereby its value is derived mainly from its other characteristics. |

[99] *MCHLG (July 2018 Updated 20th July 2021), National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2*
[100] *MCHLG (2018), National Planning Practice Guide. Available at: http://planningguidance.planningportal.gov.uk/blog/guidance/*
[101] *ICOMOS (2013). Burra Charter Article 1.2. Available at: https://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf*
[102] *Historic England (2017), Historic England Advice in Planning Note 3 (2nd Edition: The Setting of Heritage Assets: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/*

| | |
|---|---|
| Low | An asset, the setting of which, makes some contribution to an understanding, appreciation and experience of it should generally be thought of as having Low Sensitivity to changes to its setting. This may be an asset whose value is predominantly derived from its other characteristics. |
| Negligible | An asset whose setting makes minimal contribution to an understanding, appreciation and experience of it should generally be thought of as having Negligible Sensitivity to changes to its setting. |

### *Criteria for Assessing Magnitude of Impact*

11.6.15 Potential impacts, that is the physical change to known heritage assets, and unknown buried archaeological remains, or changes to their settings, in the case of the Proposed Development largely relate to the possibility of disturbing, removing or destroying in situ remains and artefacts during the construction phase or the placement of new features within their setting during the operational phase.

11.6.16 The magnitude of the impacts upon heritage assets caused by the Proposed Development will be rated using the classifications and criteria outlined in Table 11.3.

**Table 11.3 - Criteria for Classifying Magnitude of Impact**

| Magnitude of Change | Criteria |
|---|---|
| High | Substantial loss of information content resulting from total or large-scale removal of deposits from an asset to the extent that it would result in a substantial loss of cultural significance.<br><br>Major alteration of an asset's baseline setting, which materially compromises the ability to understand, appreciate and experience the contribution that setting makes to the significance of the asset and erodes the key characteristics of the setting to the extent that it would result in substantial loss of cultural significance. |
| Medium | Loss of information content resulting from material alteration of the baseline conditions by removal of part of an asset that would lead to some loss of cultural significance.<br><br>Alteration of an asset's baseline setting that affects the ability to understand, appreciate and experience the contribution that setting makes to the significance of the asset to a degree but whereby the cultural significance of the monument in its current setting remains legible. The key characteristics of the setting are not eroded; there would, however, be some loss of cultural significance. |
| Low | Detectable impacts leading to minor alteration to baseline conditions by removal of a small proportion of the asset, that would lead to slight loss of cultural significance.<br><br>Alterations to the asset's baseline setting, which do not affect the ability to understand, appreciate and experience the contribution that setting makes to the asset's overall significance and would only lead to slight loss of cultural significance. |
| Negligible | Loss of a small percentage of the area of an asset's peripheral deposits/fabric that would leave cultural significance unchanged.<br><br>A reversible alteration to the fabric of the asset. |

| | |
|---|---|
| | A marginal alteration to the asset's baseline setting that would leave cultural significance of the asset unchanged. |
| None | No effect predicted. |

*Criteria for Assessing Significance*

11.6.17 The predicted level of effect on each heritage asset will then be determined by considering the asset's importance or relative sensitivity in conjunction with the predicted magnitude of the impact. The method of deriving the level of effect is provided in Table 11.4.

**Table 11.4 - Level of Effect based on Inter-Relationship between the Importance and/or Relative Sensitivity of a Heritage Asset and/or its setting and the Magnitude of Impact**

| Magnitude of Impact | Importance/ Sensitivity | | | | |
|---|---|---|---|---|---|
| | Negligible | Low | Medium | High | Very High |
| **High** | Minor | **Moderate** | **Moderate** | **Major** | **Major** |
| **Medium** | Negligible/Neutral | Minor | **Moderate** | **Moderate** | **Major** |
| **Low** | Negligible/Neutral | Negligible/Neutral | Minor | Minor | **Moderate** |
| **Negligible** | Negligible/Neutral | Negligible/Neutral | Negligible/Neutral | Minor | Minor |

11.6.18 The level of effect is judged to be the interaction of the asset's importance and / or relative sensitivity (Tables 11.1 and 11.2) and the magnitude of the impact (Table 11.3). In order to provide a level of consistency, the assessment of importance and relative sensitivity, the prediction of magnitude of impact and the assessment of level of effect will be guided by pre-defined criteria. However, a qualitative descriptive narrative will also be provided for each asset to summarise and explain each of the professional value judgements that have been made in establishing sensitivity and magnitude of impact for each individual asset.

11.6.19 Professional judgement will be used to establish those effects which are deemed to be significant. However, with reference to the Guidelines for Environmental Impact Assessment, the level of effect determined from Table 11.4 will help guide the assessor in their judgement. Effects determined to be moderate and greater (bold in Table 11.4), are most likely to be significant, while minor and lesser effects are likely to be considered not significant.

**Table 11.5 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Direct Impacts | Scoped In | Scoped Out | Scoped Out | Likely significant direct impacts of the development on heritage assets would be limited to the construction phase only. During the operational phase there will be no ground disturbance which could directly impact assets. Below ground disturbance during decommissioning would be limited and any disturbance is likely to be in areas of ground which were already affected during construction works. |
| Direct Impacts along the Access Road | Scoped Out | Scoped Out | Scoped Out | The Access Road follows an existing routeway which is considered likely to have disturbed or truncated any archaeological remains within its footprint and no further significant effects on buried remains are anticipated. |
| Settings Impacts on designated heritage assets within the defined study areas | Scoped In | Scoped In | Scoped Out | The impact of the Proposed Development on the settings of heritage assets will be considered up to 5km from the Site. |

## 11.7 Assumptions, Limitation and Uncertainties

11.7.1 This Scoping Chapter is based upon data obtained from publicly accessible archives; National Heritage List for England (NHLE) information was downloaded in February 2023 and data from the Cheshire Historic Environment Record was obtained in November 2022. NHLE and HER data will refreshed for the preparation of the ES.

# 12.0 CLIMATE CHANGE

## 12.1 Introduction

12.1.1 The climate change chapter of the ES will determine how the Proposed Development will interact with a changing climate. This will include the resilience of the Proposed Development to the changing climate and any GHG emissions or reductions which could contribute to future climate change. The assessment will include:

i) a review of existing baseline climate conditions;
ii) determination of the likely future climate conditions as a result of climate change;
iii) the resilience of the Proposed Development to the projected changes;
iv) determination of the significance of effect of the projected climate changes on the Proposed Development.
v) calculation of the net greenhouse gas (GHG) emissions (or emissions savings) associated with the Proposed Development; and
vi) determination of the significance of effect of the net GHG emissions in the context of net zero trajectory.

## 12.2 Study Area

12.2.1 The study area for the climate change resilience assessment will be the Site (i.e. it will cover all assets and infrastructure which constitute the Proposed Development). This will cover the entire lifetime of the Proposed Development.

12.2.2 The GHG emissions assessment will consider all emissions of GHG emissions within the Site and indirect emissions from activities outside the Site. For example, the assessment will include the transportation of materials to the Proposed Development and embodied carbon emissions within the construction materials and the manufacturing of the equipment which will form the Proposed Development (i.e. the solar panels, inverters, BESS etc.).

## 12.3 Legislation, Planning Policy Context and Guidance

### *Legislation*

12.3.1 The following legislation is relevant to the Proposed Development and climate change assessment:

i) The Climate Change Act 2008 – which sets out the UK government's commitment to reduce GHG emissions in the UK to 50% of 1990 levels by 2025, and to 80% by 2050.
ii) The Climate Change Act 2008 (2050 Target Amendment) Order 2019 - which has introduced a new binding target of "Net Zero by 2050".

### *National Planning Policy*

12.3.2 The following national planning policy is relevant to the Proposed Development and the climate change assessment:

i) NPS EN-1:

a) Paragraphs 2.2.9 and 4.8.2 in relation to climate impacts and adaptation;
b) Paragraphs 4.1.3 to 4.1.4 in relation to any adverse effects and benefits caused by a development, which could include those in relation to climate change, for example, the adverse effects of GHG emissions contributing to climate change, or the benefit of GHG savings to the UK's trajectory to net zero;
c) Paragraphs 4.1.3 to 4.1.4 in relation to EU Directives and ES requirements;
d) Paragraphs 4.5.3 and 4.8.1 to 4.8.12 in relation to adaptation measures in response to climate predictions; and
e) Paragraphs 5.7.1 to 5.7.2 in relation to climate projections, food risk and the important of relevant mitigation.

ii) NPS EN-5:

a) Paragraphs 2.4.1 regarding NPS EN-1 and the importance of climate change resilience, and
b) Paragraphs 2.4.2 in relation to ES requirements regarding climate change resilience.

iii) NPPF

a) Paragraphs 8, 11, 20 and 152 to 154 in relation to adaption, mitigation and climate change resilience;

b) Paragraphs 155-158 in relation to the need to developments to plan for reduce carbon dioxide emissions through design and reduced energy consumption; and
c) Paragraphs 159 - 173 in relation to flood risk and coastal change;

iv) Draft NPS EN-1 (Energy):

a) Section 4.9 in relation to climate change adaptation;
b) Section 5.3 in relation to greenhouse gas emissions;
c) Section 5.6 in relation to coastal change; and
d) Section 5.8 in relation to Flood Risk.

v) Draft NPS EN-3 (Renewable Energy Infrastructure):

a) Section 3.4 in relation to climate change adaptation.

vi) Draft NPS EN-5 (Electricity Networks Infrastructure):

a) Section 2.3 in relation to climate change adaptation and resilience; and
b) Paragraphs 2.9.59 to 2.9.64 and 2.10.14 to 2.10.15 and 2.11.16 in relation to the use of sulphur hexafluoride ($SF_6$, a greenhouse gas) as an insulator and arc-suppressant gas within high voltage electricity network switch gear.

### *Local Planning Policy*

12.3.3 The Chester West and Cheshire Council Local Plan (Part One) includes the following strategic objectives relevant to the Proposed Development and the climate change assessment:

i) SO14 – Mitigate and adapt to the effects of climate change by addressing flood risk and water management and support the development of new buildings and infrastructure that are resilient, resistant and adapted to the effects of climate change.
ii) SO15 – Take action of climate change by promoting energy efficient and energy generation from low carbon and renewable resources.

12.3.4 The adopted Local Plan (Part One) also includes the following relevant policies:

i) STRAT 1 – Sustainable Development – the plan seeks to enable development which meets the economic, social and environmental objectives of the borough which mitigated and adapt for the effects of climate change, ensuring that development makes best use of opportunities for renewable energy use and generation.

ii) ENV 6 – the plan seeks to promote sustainable, high quality design and construction which would mitigated and adapt to the predicted effects of climate change.

12.3.5 The Local Plan (Part 2) Land Allocations and Detailed Policies does not contain any climate specific polices. Policy DM 4 Sustainable Construction seeks developments, including during construction, to achieve the highest levels of energy and water efficiency and reduce $CO_2$ emissions.

***Guidance***

12.3.6 The national Planning Practice Guidance (PPG) regarding climate change provides guiding principles on how planning can help to mitigate climate change by reducing emissions from a new development, and how new developments can be built to be resilient and adapt to climate change.

12.3.7 The following good practice guidance will be used to assess the resilience of the Proposed Development to climate change:

i) Environmental Impact Assessment Guide to Climate Change and Resilience and Adaptation, 2020

12.3.8 The following good practice guidance will be used to assess the impact of GHG emissions from the Proposed Development:

i) IEMA – Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2022

12.3.9 The IEMA 2022 Guidance sets out areas for consideration at all stages of the assessment to assist EIA practitioners in taking an informed approached to the treatment of GHG emissions within an EIA. The guidance mentions the legally binding GHG reduction targets and states that an EIA must give due consideration to how a project will contribute to the achievement of these targets.

## 12.4 Preliminary Baseline Conditions

### *Climate Change Resilience*

12.4.1 To assess the potential impact of climate change on the Proposed Development and the resilience of the Proposed Development in the ES, the baseline climate will be established for the area. This will be based on data from the UK Meteorological Office (Met Office) historical climate averages, from the closest meteorological station with historical data, which is Hawarden Airport, and the UK Met Office regional climate summaries for England North West and Wales.

### *GHG Emissions*

12.4.2 To assess the potential impact of GHG emissions from the Proposed Development, the existing land use for the area will be considered and the alternative sources of electricity generation which the solar generated electricity will displace. This will be the baseline scenario or "business as usual" scenario whereby the Proposed Development is not implemented.

12.4.3 In this case, the existing land use is a mixture of arable and marsh land. The carbon impact of the current farming practices (for example the use of machinery, the use of fertiliser, the sequestration of carbon in the crops and soil) will be qualitatively considered.

12.4.4 The UK government annually publishes the Fuel Mix Disclosure data tables. These contain the energy generation split in the UK for the past year, and the carbon dioxide emissions from the operational phase of each energy source. It is therefore proposed to use a weighted average of the energy source and relevant carbon emissions, to calculate an average energy carbon emission for current energy generation in the UK. This value will be used to calculate the carbon emissions displaced by the electricity generated at the Proposed Development. It is expected that the renewable energy generation will increase into the future. Therefore, the assessment will include a sensitivity analysis for a range of alternative electricity generation carbon intensities over the lifetime of the Proposed Development. However, future scenarios with increased renewable energy in the energy mix clearly relies on projects such as the Proposed Development being consented and constructed.

## 12.5 Potential Effects and Mitigation

### *Climate Change Resilience*

12.5.1 The potential effects of climate change on the Proposed Development during each phase are as follows.

*Construction*

12.5.2 Climate change is unlikely to impact upon the construction phase of the Proposed Development given that, if consented, construction would occur in the near future when the climatic conditions are well understood and would be accounted for in the construction practices. Weather conditions would have the greatest effect on the construction and measures to minimise the effects would be detailed in the outline Construction and Environmental Management Plan (OCEMP) which would be submitted with the DCO Application.

*Operation*

12.5.3 The following effects of climate change have the potential to impact upon the Proposed Development over its operational lifetime:

i) Increased winter precipitation – which could lead to fluvial or pluvial flooding of the site.
ii) Decreased summer precipitation – which increase the possibility of drought which may impact the ecology and vegetation/landscaping.
iii) Changes in water availability – which has the potential to cause changes to the mobilisation of pollutants. More acidic soils and/or water can increase the deterioration of building materials.
iv) Increased frequency and magnitude of wind and storms – which would have the potential to damage the Proposed Development.
v) Increase in summer temperatures – which could affect electrical infrastructure.
vi) Changes in cloud cover – which would impact upon solar radiation received and the amount of power generated.
vii) Sea level rise – which could lead to flooding of the site.
viii) Changes to snow and ice – which could affect loading of the solar panels.

12.5.4 The UKCP18 predictions anticipate less snow and ice than the current baseline and as such the risk from snow and ice is not anticipated to increase due to climate change.

12.5.5 The materials used will be chosen to be appropriate for existing ground conditions and would be able to withstand changes in soil acidity as a result of changes in water availability.

*Decommissioning*

12.5.6 Climate change is unlikely to impact upon the decommissioning phase of the Proposed Development given that this would occur over a relatively short period. Weather conditions would have the greatest effect on the decommissioning and measures to minimise the effects would be included in the Decommissioning Environmental Management Plan which is likely to be secured through a DCO requirement.

***GHG Emissions***

12.5.7 The potential sources of GHG emissions released and saved during each phase of the Proposed Development are:

*Product manufacturing*

i) Raw material extraction, transportation and manufacturing of products required for the Proposed Development (i.e. solar panels, inverters, and BESS)
ii) Transportation of products to the Proposed Development.

*Construction*

i) On-site construction activities including construction compounds – emissions from plant, vehicles and generators.
ii) Transportation of construction materials – where not included in the product-stage embodied GHG emissions).
iii) Travel of construction workers.
iv) Loss of peat – loss of carbon sequestration.

*Operation*

i) Energy consumption from the provision of clean water and treatment of wastewater.
ii) Leakage of GHGs such as $SF_6$.
iii) Energy produced.
iv) Emissions from energy consumption, material use and waste generation from ongoing site maintenance.
v) Travel of maintenance workers.

*Decommissioning*

i) Onsite decommissioning activities – emissions from plant, vehicles and generators.
ii) Transportation and disposal of waste materials.
iii) Travel for workers.

## 12.6 Assessment Methodology

### *Climate Change Resilience*

12.6.1 The assessment of the resilience of the Proposed Development to climate change will be undertaken in line with the IEMA guidance Environmental Impact Assessment Guide to Climate Change and Resilience and Adaptation, 2020 (referred to as the IEMA (2020) Guidance). This includes quantifying the future baseline climate, identification of receptors sensitive to the projected changes to climate and their level of sensitivity, determining the magnitude of impacts, and the significance of any effects.

12.6.2 In order to determine the existing baseline climate, climate averages from the period 1991-2020 will be sourced from the Met Office website for Hawarden Airport which is the nearest meteorological site to the Proposed Development. The future baseline will be defined using UK Climate Projections 2018 (UKCP18). UKCP18 are a set of climate projections and tools to access climate data. The identified changes will then be applied to the current baseline climate conditions to give a prediction of the local future climate.

12.6.3 For each receptor, the significance of each predicted effect of climate change will be assessed. This will consider the sensitivity of the receptor and the magnitude of impact.

12.6.4 The IAQM guidance states that sensitivity of a receptor is “the degree of response of a receiver to a change and its capacity to accommodate and recover from a change if it were to be affected”. The sensitivity of a receptor should take into account the susceptibility, vulnerability, and the value / importance of the receptor.

12.6.5 Susceptibility is defined as “the ability of the receptor to be affected by a change”; and vulnerability is defined as “the potential exposure of the receptor to a change and sensitivity is the degree of response of a receiver to change and a function of its capacity to accommodate and recover from a change if it is affected”. Vulnerability is the inverse of climate resilience.

12.6.6 The scale of the susceptibility and vulnerability will be determined using the IEMA (2020) Guidance as set out in the following table.

**Table 12.1 - Climate Change Receptors – Susceptibility and Vulnerability Scale**

| Scale | Susceptibility | Vulnerability |
|---|---|---|
| High | Receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevailing climatic factors (e.g. lose much of its original function and form). | Receptor is directly dependent on existing/prevailing climatic factors and reliant on these specific existing climate conditions continuing in future (e.g. river flows and groundwater level) or only able to tolerate a very limited variation in climate conditions |
| Moderate | Receptor has some limited ability to withstand/not be altered by the projected changes to the existing/prevailing climatic conditions (e.g. retain elements of its original function and form). | Receptor is dependent on some climatic factors but able to tolerate a range of conditions (e.g. a species which has a wide geographic range across the entire UK but is not found in southern Spain). |
| Low | Receptor has the ability to withstand/not be altered much by the projected changes to the existing/prevailing climatic factors (e.g. retain much of its original function and form). | Climatic factors have little influence on the receptors (consider whether it is justifiable to assess such receptors further within the context of EIA – i.e. it is likely that such issues should have been excluded through the EIA scoping process). |

12.6.7 The value / importance of a receptor is determined using professional judgement. All human health receptors (e.g. on-site workers, occupants, local residents) are considered as high value/importance. Any receptor integral to the Proposed

Development (such as buildings, infrastructure or operating systems) would also be considered as high value/importance. The value/importance of receptors such as habitats and species would be determined on a case by case basis.

12.6.8 The susceptibility, vulnerability and the value / importance of the receptor will be used to reach a reasoned conclusion on sensitivity using professional judgement. The greater the susceptibility, and/or vulnerability of the receptor, the greater the likelihood that receptor would also be of higher sensitivity. For instance, a high-value receptor that has very little resilience (high vulnerability) to change in climate is considered to be more likely to have a higher sensitivity than a high-value receptor that is very resilient (low vulnerability) to changes in climate.

12.6.9 The sensitivity of the receptor to the effect of climate change will be deemed to be low, medium or high using professional judgement and will be supported by evaluation and evidence in line with the IEMA (2020) Guidance.

12.6.10 For each receptor and each identified climate change effect, the magnitude of change will be determined. The magnitude is "*the degree of a change from the relevant baseline conditions which derives from the construction and operation of a development*". This is based on a combination of:

i) Probability, which would take into account the chance of the effect occurring over the lifespan of the development if the risk is not mitigated, and
ii) Consequence, which would reflect the scale or complexity of the effect, considering degree of harm, duration, frequency and reversibility of effect.

12.6.11 A combination of probability and consequence will be used to reach a reasoned conclusion on the magnitude of change using professional judgement. Where a probability and /or consequence of the effect is high then the magnitude of change would also be high. Descriptors of negligible, small, medium and large will be used to define the magnitude of change.

12.6.12 The significance of effect will then be determined taking into account the sensitivity for each receptor and the magnitude of change for each climate change effect using professional judgement. The following matrix provides an example of how the sensitivity of receptor and magnitude of change can be used to determine the significance of the effect.

**Table 12.2 - Climate Change Significance of Effect Matrix**

| Sensitivity of receptor | Magnitude of change descriptors | | | |
|---|---|---|---|---|
| | Negligible | Small | Medium | Large |
| Low | Negligible | Negligible | Negligible | Slight |
| Medium | Slight | Slight | Moderate | Substantial |
| High | Moderate | Moderate | Substantial | Substantial |

### *GHG emissions*

12.6.13 The assessment of GHG emissions will be undertaken in line with the Institute of Environmental Management and Assessment (IEMA) guidance Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2022 ( “the IEMA 2022 Guidance”). This acknowledges that there are many different methods available for measuring and quantifying GHG emissions. However, the guidance provides a framework of six steps that an assessment should incorporate, as follows:

i) Set the scope and boundaries of the assessment: These include system boundaries and temporal boundaries. These have been set out in Section 12.5.7 above.
ii) Develop the baseline: This includes current, future and alternative baselines.
iii) Decide upon the assessment methodologies: The methodology should result in a relevant, complete, consistent, transparent and accurate assessment of the reasonable worst case.
iv) Data collection: Project activity data and GHG emissions factors should be collated.
v) Calculate the GHG emissions inventory: Although the quantification of GHG emissions for an EIA may vary in methodology and approach between projects, it is expected that in almost all cases, a calculated (not measured) approach is taken because these are completed in advance of a project commencing development. it is recommended that the following structure should be used to calculate GHG emissions in the ES chapter:

    a) GHG emission/removal =GHG emission factor ×Activity data .
    b) Both annual and lifetime GHG emissions should be calculated and reported. In addition, as part of this inventory uncertainty should be considered.

vi) Mitigation opportunities: Once the magnitude of emissions has been determined, mitigation measures should be proposed.

12.6.14 In order to determine the significance of carbon impacts the IEMA 2022 Guidance recommends that the project emissions are compared to the UK's net zero compatible trajectory. The guidance states that:

*"The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050."*

12.6.15 The following examples to distinguish the significance of effects are provided in Table 12.3:

**Table 12.3 - Climate Change Significance of Effect Example Descriptors**

| Significance of effect | Example descriptors |
|---|---|
| **Major adverse** | The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero. |
| **Moderate adverse** | The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero. |
| **Minor adverse** | The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero. |
| **Negligible** | The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions. |
| **Beneficial** | The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact. |

12.6.16 Major or moderate adverse effects and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

12.6.17 The IEMA 2022 Guidance sets out 'good practice' approaches for contextualising a project's carbon emissions by comparing them to sector-based, local, and/or national carbon budgets, policy goals and/or performance standards. This is useful to provide the context to a project's carbon emissions or reductions. In line with this, in the ES chapter the carbon impact of the Proposed Development will be compared to:

i) The UK fourth, fifth and sixth carbon budgets, for the periods 2023-2027, 2028-2032 and 2033-2037 respectively, and the net zero trajectory. Future continuation in the reduction of these budgets is expected in order to reach net zero by 2050, although the seventh, eighth and ninth budgets have not yet been quantified by the Government.
ii) Local authority and region carbon emissions. The data will be sourced from the latest UK local authority and regional $CO_2$ emissions national statistics data tables from BEIS. The BEIS tables provide carbon emissions of various sectors, including 'power generation'.

12.6.18 When considering the impact in relation to the carbon budgets, local carbon emissions, and sector carbon emissions, the IEMA Guidance suggests a threshold of 5% is used as an indicative threshold for which carbon impacts above this level are likely to be significant.

12.6.19 The GHG emissions assessment will quantify the following GHG emissions over the Proposed Development's lifecycle in line with the Kyoto Protocol guidelines:

i) Carbon dioxide
ii) Methane
iii) Nitrous oxide
iv) Sulphur hexafluoride
v) Hydrofluorocarbons
vi) Perfluorocarbons; and
vii) Nitrogen trifluoride

**Table 12.3 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| **Resilience** | | | | |
| Increase in winter precipitation | Scoped Out | Scoped In | Scoped Out | An increase in winter precipitation over the operational lifetime of development could lead to fluvial or pluvial flooding of the site, which the Proposed Development may need to be resilient to. It is not expected for the climate to change significantly within the shorter timescales of construction and decommissioning, so this has been scoped out. Mitigation for any risks of flooding at the time of construction or decommissioning would be included within a CEMP or DEMP for the full range of expected conditions. |
| Decrease in summer precipitation | Scoped Out | Scoped In | Scoped Out | A decrease in summer precipitation over the operational lifetime of development could lead to drought which may affect the ecology and vegetation/landscaping proposed as part of the Proposed Development.<br>It is not expected for the climate to change significantly before or within the expected timescales of construction, which are much shorter than the development lifetime so this has been scoped out. Mitigation for any risks of dust impacts at the time of construction would be included within in a CEMP.<br>Similarly, the timescales for decommissioning will be short, and the climate is not expected to change significantly within a short timescale, so this has been scoped out. Mitigation for demolition dust impacts will be assessed in relation to the climate at the time and included within a DEMP.<br>. |
| Changes in water availability | Scoped Out | Scoped Out | Scoped Out | This could affect mobilisation of pollutants resulting in more acidic soils which can deteriorate construction materials. The materials chosen will be appropriate for the existing ground conditions and would be able to withstand any anticipated changes in water availability. Operationally, the Proposed |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | Development does not have a significant water demand with water usage being purely for cleaning purposes when needed. |
| Increased frequency and magnitude of wind and storms | Scoped Out | Scoped In | Scoped Out | This would have the potential to cause damage to the operational Proposed Development.<br>It is not expected for the climate to change significantly before or within the expected timescales of construction, which are much shorter than the development lifetime so this has been scoped out. Mitigation for any risks of wind and storms at the time of construction would be included within in a CEMP.<br>Similarly, the timescales for decommissioning will be short, and the climate is not expected to change significantly within a short timescale, so this has been scoped out. Mitigation for any risks of wind and storms will be assessed in relation to the climate at the time and included within a DEMP. |
| Increase in summer temperatures | Scoped Out | Scoped In | Scoped Out | This has the potential to affect the operational electrical infrastructure of the Proposed Development.<br>It is not expected for the climate to change significantly before or within the expected timescales of construction, which are much shorter than the development lifetime so this has been scoped out. Mitigation for any risks of high temperatures at the time of construction would be included within in a CEMP.<br>Similarly, the timescales for decommissioning will be short, and the climate is not expected to change significantly within a short timescale, so this has been scoped out. Mitigation for any risks of high temperatures will be assessed in relation to the climate at the time and included within a DEMP. |
| Changes in cloud cover | Scoped Out | Scoped In | Scoped Out | This would affect the incoming solar radiation received and the amount of power generated during the operation of the Proposed Development. |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | It is not expected for changes in cloud cover to have any negative impact on construction or decommissioning. Furthermore, it is not expected for the climate to change significantly within the shorter timescales of construction and decommissioning, so this has been scoped out. |
| Sea level rise | Scoped Out | Scoped In | Scoped Out | This could lead to flooding of the operational site and given the proximity to the coastline it is appropriate to consider this in the assessment.<br>It is not expected for the climate to change significantly before or within the expected timescales of construction, which are much shorter than the development lifetime so this has been scoped out. Mitigation for any risks of coastal flooding at the time of construction would be included within in a CEMP. Similarly, the timescales for decommissioning will be short, and the climate is not expected to change significantly within a short timescale, so this has been scoped out. Mitigation for any risks of coastal flooding will be assessed in relation to the climate at the time and included within a DEMP. |
| Changes to snow and ice | Scoped Out | Scoped Out | Scoped Out | The UKCP18 predictions anticipate less snow and ice than the current baseline and as such the risk from snow and ice is not anticipated to increase due to climate change. |
| **GHG emissions** | | | | |
| Raw material extraction and manufacturing of products required for the Proposed Development and transportation of raw | Scoped In | - | - | The embodied emissions may have a significant carbon burden which would impact upon the overall GHG emissions savings of the Proposed Development. |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| materials to the place of manufacturing. | | | | |
| Transportation of product to the Proposed Development | Scoped In | - | - | The distance the product needs to be transported may have a significant carbon burden which would impact upon the overall GHG emissions savings of the Proposed Development. |
| Onsite construction activities – emissions from plant vehicles and generators | Scoped In | - | - | The on-site plant and fuel it will be using may have a carbon burden which would impact upon the overall GHG emissions savings of the Proposed Development. |
| Transportation of construction materials (where not included in the product-stage embodied GHG emissions) | Scoped In | - | - | The distance other construction material needs to be transported may have a significant carbon burden which would impact upon the overall GHG emissions savings of the Proposed Development. |
| Travel of construction workers | Scoped Out | - | - | The workers would be travelling to this or an alternative site. The location workers would travel from is unknown. The emissions from workers travel are expected to be negligible in context of the other sources of emissions during construction and the overall GHG emission savings associated with the Proposed Development. |
| Loss of peat | Scoped In | - | - | Areas of peat are known to be present across the marshes and loss of peat would result in a loss of a carbon store, resulting in a net increase in GHG emissions. It is considered unlikely that these will be disturbed, but site investigation is required to confirm this. It is proposed to scope this in and assess within the ES chapter following the information from the site investigations once they have occurred. |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Energy consumption from the provision of clean water and treatment of wastewater | - | Scoped Out | - | These operational emissions are expected to be negligible in context to the overall GHG emission savings. |
| Leakage of GHGs | - | Scoped In | - | Minor leakage of highly potent GHGs has the potential to be a significant carbon burden given the size of the Proposed Development. |
| Energy generated | - | Scoped In | - | The energy generated will displace energy generated from other sources. Displacing non-renewable sources would result in GHG savings. |
| Energy consumption, material and waste generation from ongoing site maintenance | - | Scoped Out | - | These operational emissions are expected to be negligible in context to the overall GHG emissions. |
| Onsite decommissioning activities – emissions from plant vehicles and generators | - | - | Scoped In | The on-site plant and fuel it will be using may have a carbon burden. |
| Transportation and disposal of waste materials | - | - | Scoped In | The distance that materials would need to travel and follow up use may have a carbon burden / benefit which would impact upon the overall GHG emissions savings of the Proposed Development. |
| Travel for workers | - | - | Scoped Out | The workers would be travelling to this or an alternative site. The location workers would travel from is unknown. These emissions are expected to be negligible in context of the other sources of emissions during the decommissioning phase and |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | the overall GHG emission savings associated with the Proposed Development. |

## 12.7 Assumptions, Limitation and Uncertainties

12.7.1 Limitations of the assessment will be taken into account wherever possible as detailed in the following sections.

### *Climate change resilience*

12.7.2 The specific impact of climate change on construction has not been considered as it is assumed that climate change impacts will not be significant within the anticipated construction period.

12.7.3 There may be some uncertainty over the climate change projections. Being projections, they are in their nature not definite. However, they will be taken from UKCP18, which provide the most up to date assessment of how the UK climate may change in the future and are supported by BEIS and DEFRA. The assessment will use projections for 2040-2059 for a 'high emissions scenario'. This is considered to be conservative. However, any under or over estimations will not impact the outcome of the assessment, as the significance of effect is based on the impacts which the climate changes cause, for which small differences in the magnitude of change will not impede on.

12.7.4 The baseline time period from which the UKCP18 predicted changes are based is not the same as the baseline climate data. Therefore, some of the projected changes may be slight over or under estimations. Nevertheless, they offer an estimate which is sufficiently accurate for this assessment.

### *GHG emissions*

12.7.5 The GHG emissions assessment will consider the impact over the lifetime of the Proposed Development using current estimates of future conditions such as the energy mix of the grid. It is uncertain what the changes will be. This will be qualitatively assessed within the sensitivity section.

12.7.6 To allow for the limitations of using carbon factors where there are alternative assumptions available, the sensitivity of using the alternative will be investigated.

# 13.0 NOISE AND VIBRATION

## 13.1 Introduction

13.1.1 This chapter sets out the potential noise and vibration impacts of the proposal on nearest sensitive receptors (NSR) during both the construction, operation and decommissioning phases of the Proposed Development. It also provides information on the noise mitigation measures that would be included in the design of the Proposed Development to mitigate or minimise noise at NSR.

13.1.2 The potential effects of noise arising from the Proposed Development are as follows:

i) direct and temporary effect of noise and vibration associated with the construction works;
ii) direct and permanent operational noise associated with the associated plant of the Proposed Development;
iii) increase in temporary construction road traffic noise; and
iv) direct and temporary effect of noise associated with the decommissioning works.

13.1.3 This chapter is supported by a detailed noise assessment (Appendix 13.1) which provides an assessment of the likely noise impacts which would arise from the Proposed Development. The assessment has been informed by background noise monitoring undertaken specifically for this project and has been based on worst case noise assumptions e.g. the use of centralised inverter/transformer stations distributed across the Site, and a BESS and central control compound located in a worst case location.

## 13.2 Study Area

13.2.1 The Study Area for noise and vibration is based on establishing the NSR relevant to the Proposed Development. Relevant NSR are typically located within circa 500m of noise sources as this is the area where noise levels would be most likely to exceed background sound levels based on the nature of the development and characteristics of the local noise environment. This is particularly relevant where relatively high background noise levels exist e.g. in close proximity to an industrial area or a motorway as is the case with the Site. It is unlikely that beyond the closest NSR established (in a specific direction) that the impact would be greater, as noise and ground-borne vibration naturally reduces over increasing distance.

## 13.3 Planning Policy Context, Standards and Guidance

13.3.1 The scoping review has considered the following legislation, national and local planning policies, guidance and standards that are relevant to noise and vibration:

### *Legislation*

*i)* Control of Pollution Act 1974 (Part III Noise: Control of noise on construction site)

*ii)* Environmental Protection Act 1990 (Part III Statutory Nuisances)

### *National Policy*

iii) iii) NPS EN-1[103] July 2011 (section 5.11);

iv) iv) Draft NPS EN-3 [104] March 2023 (paragraph 2.5.2 and section 3.10);

v) National Planning Policy Framework[105] – July 2021 (Chapter 15, paragraph 174e & 185);

vi) Noise Policy Statement for England (NPSE)[106] – March 2010 (paragraphs 2.19 to 2.25);

vii) Planning Practice Guidance[107] – June 2021 (Noise: paragraphs 003 to 005);

### *Local Policy*

*viii)* Cheshire West & Chester Council – Local Plan (Part One) Strategic Policies: January 2015[108] (Policy ENV7);

ix) Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies: July 2019[109] (Policy DM30);

### *Standards & Guidance*

x) BS4142: 2014+A1:2019[110] `Methods for rating and assessing industrial and commercial sound';

[103] *Department of Energy & Climate Change: Overarching National Policy Statement for Energy (EN-1) (July 2011).*
[104] *Department for Energy Security and Net Zero: Draft National Policy Statement for Renewable Energy Infrastructure (EN-3).*
[105] *Ministry of Housing, Communities & Local Government: National Planning Policy Framework (July 2021).*
[106] *Department for Environment, Food & Rural Affairs (March 2010): Noise Policy Statement for England.*
[107] *Ministry of Housing, Communities & Local Government: National Planning Practice Guidance (June 2021) – Noise (July 2019) & Minerals (October 2014).*
[108] Cheshire West & Chester Council – Local Plan (Part One) Strategic Policies: January 2015
[109] *Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies: July 2019*
[110] *BS 4142:2014+A1:2019 `Methods for rating and assessing industrial and commercial sound'*

xi) BS8233: 2014[111] `Guidance on sound insulation and noise reduction for buildings';

xii) BS5228: 2009+A1:2014[112] `Code of practice for noise and vibration control on construction and open sites';

xiii) BS 7445: 2003[113] Description and measurement of environmental noise;

xiv) World Health Organisation (WHO) Guidelines for Community Noise: April 1999[114]

xv) Night Noise Guidelines for Europe: 2009[115] – World Health Organisation;

xvi) Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11)[116];

xvii) The Institute of Acoustics (IOA) and the Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Noise Impact Assessment' 2014[117]; and

xviii) ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors[118].

## 13.4 Methodology

13.4.1 To support this Chapter a Noise Impact Assessment (NIA) has been prepared (Appendix 13.1). The NIA provides details on the nature of the local noise environment, and an assessment of the potential impacts and effects associated with noise and vibration from the Proposed Development.

13.4.2 As part of the NIA the following has been undertaken:

i) Establish location of representative NSR (refer to section 2.4 of NIA, Appendix 13.1);

ii) Baseline assessment at NSR (refer to section 4.0 of NIA, Appendix 13.1);

iii) Review of Policies, Guidance and Standards (refer to section 3.0 of NIA, Appendix 13.1);

*[111] BS 8233: 2014 `Guidance on sound insulation and noise reduction in buildings'.*
*[112] BS 5228-2009+A1:2014 `Code of Practice for noise and vibration control on construction and open sites' – Part 1: Noise & Part 2: Vibration*
*[113] BS 7445: 2003[113] Description and measurement of environmental noise*
*[114] World Health Organisation (WHO) Guidelines for Community Noise: April 1999*
*[115] Night Noise Guidelines for Europe: 2009[115] – World Health Organisation*
*[116] Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11)*
*[117] The Institute of Acoustics (IOA) and the Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Noise Impact Assessment' 2014*
*[118] ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors*

iv) Analysis of construction and decommissioning effects including road traffic impacts (refer to section 5.0 of NIA, Appendix 13.1); and

v) Analysis of operational effects including plant noise and road traffic impacts (refer to section 6.0 of NIA, Appendix 13.1).

13.4.3 The following sections summarise the key details relating to the NSR and the baseline noise assessment carried out as part of the NIA, Appendix 13.1.

### *Residential Receptors*

13.4.4 The most relevant, and closest, NSR are generally located to the south to southwest of the Site. The closest residential receptors to the Solar Array Development Area are located to the south in Frodsham off Hawthorn Road and Wayford Mews (circa 140m from the Site), Williams Way (circa 230m from the Site), and Waterside Drive (290m from the Site).

13.4.5 There are other residential receptors located at greater distance than the above to the north-east at a distance of 760m (off Cholmondley Road in Clifton) and to the north off Cavendish Farm Road at Weston at a distance of circa 840m. The impact would be lower at these receptors than the closest receptors and as such they are not specifically included in the assessment tables but are shown on the noise contour mapping results. The NSR are indicated on Figure 1 of Appendix 13.1.

13.4.6 We are not aware of any other future receptors proposed that would be of greater sensitivity than those considered in this report.

### *Ecological Receptors*

13.4.7 The sensitive ecological receptors include designated sites located to the north-west of the Site (i.e. SSSI, SPA and Ramsar) and the River Weaver which borders the northwest to northeast boundaries of the Site.

### *Baseline Study*

13.4.8 A detailed environmental baseline sound survey was carried out at the nearest sensitive residential receptors to determine details of the noise climate to provide typical and representative background sound data.

13.4.9 The baseline sound survey was undertaken over a weekend period during December 2022 at three fixed locations in proximity to NSR to the Site and is therefore considered to provide representative baseline sound levels. The background sound survey was carried out in accordance with the advice given in BS4142: 2014+A1:2019

13.4.10 The NSR relative to the Proposed Development are located on the opposite side of the M56 Motorway to the Site. The noise generated by the motorway (daytime and night-time) generally dominates the local noise climate. Other more distant receptors are located to the north at the edge of Runcorn and adjacent to the Weston Point Expressway and the associated industrial area.

13.4.11 The baseline monitoring positions which provide information on representative background and residual sound levels adjacent to NSR were as follows, illustrated on Figure 1 of Appendix 13.1.

*Position A (Southeast of Site – on opposite side of the M56 Motorway) – Rear of Saltworks Close*

13.4.12 Monitoring position A is representative of the nearest receptor located southeast of the Site in proximity to Saltworks Close. Noise levels at this location are generally affected by distant road traffic noise from the M56 Motorway. The monitoring position was chosen just to the north and rear of Saltworks Close.

*Position B (South of Site) – Adjacent to Wayford Mews*

13.4.13 Position B was chosen as a suitable monitoring position to represent typical baseline levels in the vicinity of properties south of Site off Wayford Mews. Noise levels at this location are formed in general by road traffic noise from the M56 Motorway. The monitoring position was chosen in the field just to the east of Wayford Mews and north of the properties off Ship Street.

*Position C (Southwest of Site) – off Williams Way*

13.4.14 This monitoring position is representative of the closest receptors southwest of the BESS Site off Williams Way. Noise levels at this location are generally formed by local road traffic noise off the M56 Motorway. Monitoring at this location was in the field just to the east of the receptors.

13.4.15 Details of the survey results and analysis are provided in sections 4.1 and 4.2 of the NIA (Appendix 13.1).

13.4.16 The monitoring positions were located in nearby amenity areas close to the representative properties and monitoring was undertaken over a weekend period. As such it is considered that the results represent a robust indication of existing background sound levels.

13.4.17 The main source of existing sound affecting nearest receptor properties relates to local and distant road traffic noise and bird sound.

13.4.18 The results of the study show that background sound levels at NSR are relatively high due to the locality of the M56 Motorway.

## 13.5 Potential Effects and Mitigation

### *Construction*

13.5.1 The potential effects of the Proposed Development in relation to noise and vibration during the construction phase are likely to include:

i) noise and vibration associated with the temporary effects of construction activities; and
ii) noise from construction traffic, including the movement of HGVs to and from Site.

#### *Construction Activities*

13.5.2 Initial construction work is likely to involve site preparation, the movement of soil, installation of access tracks and piling works, which would be followed by the construction of plant infrastructure and installation of solar PV and BESS plant equipment. The final activities would involve any proposed landscaping works and installation of security measures. It is considered that plant such as excavators, piling rigs, front loaders, telehandlers, vehicles, dumpers, generators, cranes, compressors, concrete mixers and power tools etc. would be required.

13.5.3 The above noise sources and their associated activities will vary from day to day and may be in use at different stages of the construction phase, at different locations and for relatively short durations.

13.5.4 Details of the construction activities and noise predictions are provided in sections 5.2, paragraphs 5.3.1 to 5.3.5 and Table 5.1 of the NIA (Appendix 13.1). Proposed mitigation measures, which would be included as part of any Construction Environmental Management Plan (CEMP) are provided in paragraph 5.3.11 of the NIA (Appendix 13.1). The predictions conclude that the noise levels at residential NSR are not significant.

13.5.5 Effects on any designated sites are unlikely as the closest ecological receptor is the SSSI area at the north-western edge of Site and located approximately 65m to 130m from the nearest solar panels and approximately 1 km from the BESS compound. At these distances significant effects are unlikely, as demonstrated in Table 5.1 of the NIA (Appendix 13.1) which shows that construction effects at this distance would not exceed threshold levels.

13.5.6 The edge of the River Weaver is within circa 25m to 50m of the construction area and as such would be affected construction works. Details of the construction noise predictions relative to the River Weaver (without mitigation) are provided in Table 5.1 of the NIA (Appendix 13.1). The mitigation measures detailed in paragraph 5.3.11 of the NIA (Appendix 13.1) includes, for example, the use of boundary hoarding screening, use of broadband reversing alarms, careful choice of piling rigs and plant switched off when not in use. These measures, together with limiting hours of operation, would minimise noise ensure the short-term impacts would not be significant. , The ecology chapter will consider the potential effects of the construction phase in more detail.

13.5.7 Effects from ground-borne vibration from construction or decommissioning works would be imperceptible at residential NSR due to the separation distance relative to the Proposed Development. Refer to Table 5.3 and paragraphs 5.4.1 to 5.4.7 of NIA (Appendix 13.1). Impacts would therefore be not significant.

13.5.8 Effects from ground-borne vibration from construction or decommissioning works would be either imperceptible or just above perceptible at ecological NSR and BPM would be applied, and vibration minimised and defined in the CEMP. Refer to Table 5.3 and paragraphs 5.4.5 and 5.4.7 of the NIA (Appendix 13.1) for further detail. The level of vibration would be negligible to slight and therefore not significant.

*Mitigation*

13.5.9 In accordance with BS5228-1:2009+A1:2014, BPM would be employed to control the noise generation. In accordance with BS5228-2:2009+A1:2014 BPM would be employed to control vibration generation.

13.5.10 This would be managed and controlled by the implementation of mitigation and management measures through a Construction Noise Management Plan (CNMP) which would form part of the CEMP, this would likely form a requirement attached to the DCO. An Outline CEMP will be produced as part of the DCO application which will describe the type of measure that could be implemented during the construction phase, likely to include, the use of boundary hoarding screening, use of broadband reversing alarms, careful choice of piling rigs and plant switched off when not in use. The outline CEMP would be carried forward to the detailed CEMP, which would be produced by the appointed construction contractor and agreed with the relevant LPA prior to construction.

*Construction Traffic*

13.5.11 There are potential effects from noise associated with construction traffic, due to the movement of HGVs to and from the Proposed Development to deliver materials and equipment. The vehicle trips would be temporary and, the nature of the Proposed Development would not require large scale material removal or delivery.

13.5.12 The NIA in Appendix 13.1 (paragraphs 5.3.12 to 5.3.15) provides an assessment of the likely impact from any temporary increase in road traffic noise along the local road network based on the highest likely vehicle traffic demand set out in Chapter 15.0. The results show that there would be a negligible impact at NSR from this temporary activity.

13.5.13 In respect of the ecological NSR, the separation distance and number of HGV movements would give rise to relatively low levels of noise and therefore negligible impact. Refer to Appendix 13.1 (paragraphs 5.3.12 to 5.3.15 of NIA, Appendix 13.1).

13.5.14 The assessment concludes that traffic related impacts would not result in a significant effect due to the temporary nature, relatively low volume of traffic and intensity of movement. Refer to NIA in Appendix 13.1 at paragraph 5.3.15.

13.5.15 Any effects from construction traffic vibration on the local road network would not be significant due to the nature of the source, low volume of traffic and intensity.

Vibration from HGV movements even when very close to properties does not tend to produce any measurable vibration unless the road condition is very poor and the intensity of movement is significant. Refer to NIA (Appendix 13.1) at paragraph 5.4.7).

13.5.16 No construction traffic is proposed to be routed through the village of Frodsham, and this would be managed by the implementation of management measures through a Construction Traffic Management Plan (CTMP).

13.5.17 Noise predictions from construction works have been provided in Appendix 13.1 (section 5.3 and 5.4 of NIA, Appendix 13.1), which shows that noise and vibration levels would be well below significant levels and therefore it is proposed that the assessment of noise and vibration from construction and decommissioning activities is scoped out of the EIA.

### *Operation*

13.5.18 The potential effects of the Proposed Development in relation to noise and vibration during the operation phase are likely to include:

i) operational noise from the solar array and BESS plant (which could include inverters, transformers, battery storage cooling plant, and on-site substation plant); and
ii) noise from road traffic to and from the Proposed Development.

#### *Operational Activities*

13.5.19 Solar farms are an inherently quiet installation with no noise generated from the panels themselves. The associated plant to convert the DC current to AC at the correct voltage involves the use of inverters and transformers, which do produce noise.

13.5.20 Transformers are not particularly noisy plant and generate a low level ‘hum’ at relatively close distances driven by the mains frequency. By its nature the solar array is only operational during daylight hours, however during peak generation over the summer months (i.e. under conditions of high temperatures) there may be occasional periods when the operation of the inverters and transformers occurs just after sun rise (i.e. around 0500 hours to 0700 hours), but this would not be at full capacity and noise levels would be lower than during daylight periods.

13.5.21 The BESS plant typically includes cooling systems, inverters and transformers, which would be available for operation 24hrs/day and would provide energy when required and recharge during off peak electricity demand periods.

13.5.22 Appendix 13.1 provides an assessment of the likely impact from the operation of the plant based on the highest likely noise levels using empirical data from technology providers. The results show that there would be a negligible impact at NSR.

13.5.23 The assessment therefore concludes that this activity would result in a low impact and therefore not significant due to the separation distance and predicted noise levels at residential NSR relative to the representative background sound level in accordance with BS4142:2014+A1:2019. Refer to NIA in Appendix 13.1 (paragraphs 6.3.1 to 6.3.6).

13.5.24 In respect of ecological NSR the assessment concludes that operational noise levels would be within acceptable limits to protect winter birds from noise and therefore this activity would be not significant. Refer to NIA in Appendix 13.1 (paragraphs 6.3.7 to 6.3.13).

13.5.25 Vibration from this type of plant would be imperceptible and not significant due to the type and nature of the plant. Refer to NIA in Appendix 13.1 (paragraph 6.3.15).

*Mitigation*

13.5.26 Noise levels from the operation of the Proposed Development are shown to be well below the daytime and night-time representative background sound levels at NSR and vibration levels insignificant (refer to Appendix 13.1 NIA at Table 6.1). Mitigation of operational noise and vibration is therefore not required. On this basis, operational noise and vibration impacts are proposed to be scoped out of the EIA.

### *Decommissioning*

13.5.27 The potential effects of the Proposed Development in relation to noise and vibration during the decommissioning phase are likely to include:

i) noise and vibration associated with the temporary effects of decommissioning activities; and
ii) noise and vibration from decommissioning traffic, including the movement of HGVs to and from Site.

13.5.28 The NIA in Appendix 13.1 does not specifically consider the decommissioning phase but using expert judgment and guidance it is considered that the noise and vibration levels would be similar to, or lower than, construction levels which have been assessed in the NIA and shown to not be significant.

13.5.29 The works involved in the decommissioning phase the noise and vibration levels would be similar to or lower in impact magnitude than for the construction phase. As the effects would be similar or lower and subject to similar control and management procedures it is proposed that effects would not be significant.

*Mitigation*

13.5.30 In accordance with BS5228:2009+A1:2014, Part 1:Noise & Part 2: Vibration, BPM would be employed to control noise and vibration.

13.5.31 This would be managed and controlled by the implementation of mitigation and management measures through a Decommissioning Environmental Management Plan (DEMP) likely to form a requirement attached to the DCO.

## 13.6 Conclusions

13.6.1 Based on the detailed assessment of representative baseline levels in the NIA (Appendix 13.1), the temporary nature of construction and decommissioning works, proposed noise mitigation and control measures and the predicted noise levels relative to background sound levels as set out in the NIA (Appendix 13.1), any noise or vibration impacts would have limited effect and would not be significant.

13.6.2 It is therefore proposed that noise and vibration during the construction, operation and decommissioning of the Proposed Development is scoped out of the assessment with suitable mitigation measures and management measures secured through the CEMP, CTMP and DEMP that are likely to form requirements attached to the DCO.

13.6.3 The attached NIA (Appendix 13.1) shows that there would be no significant impacts during the construction, operation and decommissioning of the Proposed Development. Table 13.1 provides a summary of the assessment scope in respect of noise and vibration and the rationale for scoping these matters out of the ES.

**Table 13.1 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Noise and vibration associated with plant and machinery | Scoped Out | Scoped Out | Scoped Out | Noise during the construction phase would not be significant as has been demonstrated in the NIA. Noise impacts would be controlled through the measures, commitments and management secured through the CEMP. Effects from decommissioning phase would be controlled in a similar way to construction via a detailed DEMP.<br><br>Noise and vibration levels of plant and machinery during the operational period are well below representative background sound levels at NSR during daytime and night-time periods due to the influence of the local road network and separation distance. As such the impacts are not significant.<br><br>A noise assessment has been provided which assesses the Proposed Development against the relevant British Standards in relation to construction noise and industrial noise sources. The assessment has shown that there would be no significant noise impacts. |
| Impacts associated with Proposed Development traffic Movement | Scope Out | Scoped Out | Scoped Out | The noise generated from road traffic noise has been calculated based on the predicted traffic flows. This has shown that there would be no significant noise impacts. |

# 14.0 SOCIO-ECONOMICS, LAND USE AND TOURISM

## 14.1 Introduction

14.1.1 This chapter will assess the scope of the likely direct and indirect effects of the Proposed Development on socio-economic receptors, considering whether any of these effects are likely to be significant. A range of potentially beneficial and adverse socio-economic effects are considered. Potentially beneficial effects include:

i) Employment and (direct and indirect) and skills and training opportunities arising from both the construction of the Proposed Development and its subsequent operation;
ii) Gross value added (GVA) (direct and indirect) generated by the construction and operation; and
iii) Potential enhancements to access within the Site by the public during operational period.

14.1.2 The following potentially adverse effects of the Proposed Development on socio-economic receptors, are also considered:

i) Effects on health and other social infrastructure capacity related to an increase in workplace population; in the construction phase this would relate to temporary demand generated by a workforce spending time at and around the Site who may require such public services;
ii) Economic effects on the volume and value of leisure use related to disruption to local tourism assets and effects on the wider tourism offer of the Site and surrounding area; and
iii) Economic effects related to disruption to public rights of way (PROW) and recreational users, which are related to impacts on the visitor economy and the amenity value of the Site and its surrounding area.

## 14.2 Study Areas

14.2.1 Relevant study (impact) areas to consider for an assessment of socio-economic effects for the Proposed Development of a solar PV electricity generation and storage facility vary depending on both the nature and type of receptor, as well as the likely scale and nature of the potential impacts on that receptor. The relevant

study area for the socio-economic impacts considered for the Proposed Development are as follows.

14.2.2 **Construction Phase:** For employment and GVA (direct and indirect) effects arising from the construction phase, relevant study areas will be a regional impact/study area and the UK. The regional study area refers to the area from which a substantial part of the workforce required to deliver the construction activity would be expected to be drawn, implying employment and GVA impacts would be realised in that area. This is assumed to be a travel to work area within an hour of the Site, approximately covering Cheshire and Warrington, Merseyside and part of North East Wales[119]. However, materials and infrastructure are likely to be sourced from suppliers across the UK and internationally. There would therefore be a UK impact area in which construction of the Proposed Development would generate employment and GVA impacts.

14.2.3 Workplace related effects on social and community infrastructure including health and education facilities would arise in a smaller impact area, limited to services and facilities in the immediate area around the site including Frodsham, Helsby, Ellesmere Port and potentially Runcorn as this is the area any construction works that are not commuting to the Site are likely to find temporary accommodation in

14.2.4 Effects on the volume and value of the local visitor economy relating to potential disruption to tourism activity are assumed to occur for an impact area within a 2.5 km radius of the Site, which includes the town of Frodsham and the large village of Helsby.

14.2.5 Effects relating to potential disruption to PROW and the National Cycle Network (NCN) during the construction phase would arise in an area within 500 metres of the Site to reflect users' experience during construction and on the proposed access route for construction traffic.

14.2.6 **Operation:** Employment and GVA effects for the operational phase are considered to cover the same regional impact area as the construction phase representing the travel to work area for any operational staff. Any relevant workplace-related effects

*[119] Cheshire = Cheshire East, Cheshire West and Chester, Halton and Warrington – Merseyside = Liverpool. Knowsley, Sefton and Wirral – North East Wales = Wrexham and Flintshire.*

on social and community infrastructure are also considered over the same area as for construction.

14.2.7 Effects on the volume and value of the local visitor economy, and permanent effects relating to PROW and the NCN would relate to the same localised impact areas as those of the construction phase.

## 14.3 Legislation, Planning Policy Context and Guidance

14.3.1 The relevant legislation, planning policy context and guidelines which underpin the consideration of socio economic effects are outlined in this section.

14.3.2 There is no legislation specific to the assessment of socio-economic effects. National planning and economic policies are relevant considerations, and there is a limited amount of legislation which is indirectly relevant to specific socio-economic receptors such as the Countryside and Rights of Way Act (2000).

### *National Planning Policy*

14.3.3 NSP EN-1 includes guidance on the socio-economic and tourism matters that need to be considered, which include: Creation of jobs and training opportunities; Effects on tourism; Effects on maintaining coastal recreation sites and features. In addition, NPS EN-1 indicates that the assessment should describe the existing socio-economic conditions in the areas surrounding a proposed development and should also refer to how the proposal's socio-economic impacts correlate with local planning policies. NPS EN-1 states that the inter-relationships of socio-economic impacts with other impacts should also be considered. The Draft NPS EN-1 incudes similar advice in respect of socio-economic and tourism matters.

14.3.4 NPS EN-3, Renewable Energy Infrastructure is currently in the process of being updated. The current NPS does not include specific reference to solar technologies. However, the latest Draft EN-3 NPS Renewable Energy Infrastructure includes a section on solar photovoltaic generation. Of relevance are references to the potential for PROW to be affected by construction and operation of a solar PV facility, including the need for an outline Public Rights of Way Management Plan. It also addresses the need to manage the movement of vehicles during construction, although there is no specific reference to PROW or to recreational and amenity uses. Finally, the Draft

NPS EN-3 recognises that traffic and transport impacts from the operation of a solar PV facility are generally very light.

14.3.5 The National Planning Policy Framework (NPPF) emphasises that one of the overarching objectives of the planning system is to contribute to the achievement of sustainable development. This includes backing the transition to low carbon. In paragraph 148, the NPPF notes that the planning system should support the transition to a low carbon future, that the planning system should contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and provide resilience to the impacts of climate change, whilst also supporting the delivery of renewable and low carbon energy and associated infrastructure.

14.3.6 In relation to socio-economic effects the NPPF includes a section on Building a strong, competitive economy (Section 6), paragraphs 80,82 and 83; Achieving well designed places (Section 12), paragraphs 127 and 128; and Conserving and enhancing the natural environment (Section 15), paragraphs 170b, 174 and 175, and footnote 58, which will be taken into account in developing the ES.

14.3.7 Planning Practice Guidance provide advice and guidance in relation to planning and the economy and the potential future needs of the population in terms of economic development, jobs and employment opportunities.

14.3.8 In addition, there are a range of relevant national economic development policy documents (for example, Build Back Better: Our Plan for Growth[120], the Government's Industrial Strategy and the recent Powering Up Britain document suite) which emphasise the importance and benefits of employment creation and productivity in relation to the renewable energy sector.

### *Local Planning Policy*

14.3.9 The Proposed Development lies within the administrative boundaries of Cheshire West and Chester. Planning policy of relevance to socio economics includes:

i) Cheshire West and Chester Council Local Plan (Part One) (2015)[121].

[120] Build Back Better: our plan for growth - GOV.UK (www.gov.uk)
[121] Local Plan (Part One) Strategic Policies

ii) Cheshire West and Chester Council Local Plan (Part Two) (2019)[122]

14.3.10 In addition, there are a number of relevant sub-regional policy documents, including the Cheshire and Warrington LEP's Strategic Economic Plan which set priorities including employment creation and which identify both the visitor economy and renewable energy as strengths of the LEP area.[123]

14.3.11 The local policy documents prioritise the creation of jobs and sustainable development in the region.

## 14.4 Preliminary Baseline Conditions

### *Employment*

14.4.1 Data from the ONS[124] indicates that, in 2021, there were approximately 1.35 million jobs (total employment) in the regional study area (which covers Cheshire, Merseyside and North East Wales). In Great Britain[125] there were approximately 31.4 million jobs (total employment) in 2021.

14.4.2 In 2021 the construction sector comprised of 67,000 jobs in the regional study area and 1.57 million jobs nationally. This accounted for 5% of total employment in both the regional study area and nationally.

14.4.3 The Site supports a limited number of employment opportunities with employment linked to the part of the Site used for agriculture, both in terms of arable farming and livestock.

### *GVA*

14.4.4 Data from the ONS[126] indicates that the Cheshire and Warrington Local Enterprise Partnership (LEP) and Liverpool LEP areas contributed just over £66 billion GVA to the UK economy in 2020 (3.4% of the UK total - £1,949 billion). The construction

[122] Local Plan (Part Two) Land Allocations and Detailed Policies
[123] Cheshire and Warrington Local Enterprise Partnership (2017) Strategic Economic Plan, Our plans for the future - Cheshire and Warrington
[124] ONS, (2022). Business Register & Employment Survey (BRES).
[125] Great Britain is used here as UK data is not available.
[126] https://www.ons.gov.uk/economy/grossvalueaddedgva/datalist?filter=datasets

sector accounts for 5.4%% / £3.6 billion of GVA in the Cheshire and Warrington LEP and Liverpool LEP combined area and 5.8% / £112 billion in the national study area.

### *Solar Farm Supply Chain Capabilities*

14.4.5 Currently, solar PV facilities source the majority of the manufactured solar PV technology from outside of the UK. There is no evidence to suggest that this would not continue to be the case for the majority of the equipment to be installed as part of the Proposed Development. Whilst the UK may seek to increase is 'home grown' supply chain opportunities the approach to how this will be achieved, and evidence that a competitive manufacturing sector can be developed, is not known and so cannot yet be taken into account.

### *Workplace Population*

14.4.6 The regional study area, which covers Cheshire, Merseyside and North East Wales has a core working-age resident population (aged 16-65) of approximately 2.05 million people[127]. This represents the area in which the majority of the potential construction and operational workforce would be expected to be resident.

### *Tourism and Recreation*

14.4.7 Several PROW have been identified within 500 m of the Site through analysis of a PROW map produced by Cheshire West and Chester Council[128].

14.4.8 This includes the proposed Access Route which incorporates a section of Restricted Byway - Ellesmere Port and Neston RB40. This route includes Marsh Lane and Lordship Lane.

14.4.9 Other PROW which run through the Site include:

i) Restricted Byways:

a) RB40
b) Frodsham RB97;
c) Frodsham RB98;

[127] *ONS. (2022). Census.*
[128] *Public Map Viewer (cheshirewestandchester.gov.uk)*

d) Frodsham RB108;
e) Frodsham RB99;
f) Frodsham RB102.

ii) Footpaths:

a) Frodsham FP91;
b) Frodsham FP81; and
c) Frodsham FP93

14.4.10 These PROW are illustrated on Figure 1.4.

14.4.11 National Cycle Route 5 follows the access route to the Site (RB40) and a short section of RB97. It then runs along a section of the southern boundary of the Solar Array Development Area (RB98). Route 5 is a long distance route connecting Reading to Holyhead via Oxford, Stratford-upon-Avon, Bromsgrove, Birmingham, Stoke-on-Trent, Chester, Colwyn Bay and Bangor.

14.4.12 A desk-based research exercise has been undertaken, including a review of recent planning application information to Cheshire West and Chester Council. This indicated that there are four businesses and organisations which are involved in leisure and recreation activities to the immediate south-west of the Site. The table below summarises the relevant information.

**Table 14.1 - Other tourism and recreation assets within 500m of the site**

| Business/ Organisation Name | Nature of Activity |
|---|---|
| Hover Force | Open all year round, Hover Force provides activities including hover crafting, off road vehicle driving, shooting, archery and axe throwing.<br><br>Hover Force Has a live planning application for a permanent building and it is understood that it has extended its operations recently. The company's main operation is based just outside the redline boundary off Brooks Furlong.<br><br>None of its activities are run within the Site. |
| DTV Shredder. | DTV Shredder Operates also from the Hover Force site but is based in Frodsham. The business provides off road vehicle experiences. There is no published information about its customer numbers and use of the area. |

| Business/ Organisation Name | Nature of Activity |
|---|---|
| Runcorn Model Flying Club | This club uses land to the west of the Hover Force operation on the edge of Frodsham Marshes. The club is understood to use a small building, but there is no published information about usage. |
| Frodsham & District Wildfowlers Club | A recreational wildfowl shoot club with land within the Site which is managed to increase the wildfowl population. The club shoot wildfowl across the Site and within the Mersey Estuary. |

14.4.13 Much of the surrounding area to the east and west of the Proposed Development is the location of active, large scale industrial operations. This includes several large industrial sites for operations including the former CF Fertilisers UK, Ince Park Biomass Energy Plant, Stanlow oil refinery, Protos and Encirc Glass. For this reason, the area north of the M56 is considered unlikely to attract visitors seeking an outdoor experience where tranquillity / remoteness is a priority.

14.4.14 The town of Frodsham is situated approximately 500 m to the south east of the Site. It is a locally well-known market town with visitor attractions including Castle Park and its Arts Centre; Foxhill Arboretum and Lady Heyes Craft and Antiques Restoration Centre. It has a broad range of food, drink, retail and visitor accommodation businesses, and is located at most northerly point of the Sandstone Trail, a leisure route for walking between Frodsham and Whitchurch.

14.4.15 No published data on visitor numbers and expenditure is available for the town. According to one economic impact study there were 24.5 million visitors to Cheshire West and Chester in 2021, the visitor economy exceeded £1.7billion and supported 17,206 FTE jobs[129] (down from pre covid levels). However, the focus of tourism in Cheshire West and Chester is primarily the city of Chester with major attractions including Chester Zoo, its historic retail area, cathedral, Roman and medieval heritage.

## 14.5 Potential Effects and Mitigation

14.5.1 Given the Site's location and the characteristics of a solar PV energy operation, the Proposed Development has the potential to generate limited socio-economic and

[129] Culture and tourism | Cheshire West and Chester Council

effects, many of which would be temporary and arise only during the construction phase.

14.5.2 The following sections summarise the potential effects which could arise as a result of the Proposed Development, with reference to embedded mitigation which would described in detail within outline management documents submitted with the DCO application.

### *Construction Phase*

14.5.3 **Employment and GVA:** Construction of the Proposed Development will generate employment and supply chain opportunities, and related GVA benefits. Evidence from other similar sized solar PV developments demonstrates that these benefits will be substantial in their own right and will represent a positive impact to the local economy. However, the employment opportunities during construction will be temporary. It is anticipated that over the 15 month construction period an average of 150 full time equivalent jobs would be created. In addition to this the construction phase would support indirect employment, with research undertaken by the Centre of Economics and Business Research estimating that large scale solar would have a multiplier effect of 1.33, leading to the creation of approximately 200 jobs on average over the construction period. Some of these jobs would be created locally but there would be some 'leakage' to wider in the region and nationally for more specialised solar installation professionals.

14.5.4 In the context of current employment in both the regional and UK impact areas the temporary jobs created are not deemed to be significant. Similarly, the related GVA impacts would also be expected to be minor – negligible when viewed in the context of the study area.

14.5.5 Associated benefits including skills and training opportunities would be positive impacts of the construction phase, but would not be expected to represent a significant effect. The Applicant proposes to maximise these local opportunities through the development of a local Construction Employment and Skills Plan, with a framework of this plan provided with the DCO application.

14.5.6 On the basis of the above, the likely construction phase employment and GVA effects would not be significant and so it is proposed that this matter is scoped out of the ES.

14.5.7 **Workplace population and demand for social and community infrastructure**: The development will require a construction workforce to work onsite to deliver preparatory works, site infrastructure, installation and commissioning of the solar PV operation. Some construction workers may temporarily be required to relocate to live closer to the Site and would therefore increase the existing workplace population of the local area.

14.5.8 However, given the large working age population and construction workforce resident in the regional study area and the accessibility of the Site to large centres of population it is considered that this would be a relatively limited, with the majority of the workforce travelling directly to site from their normal place of residence. In turn, this would imply no substantial increase in demand for local health and other social and community infrastructure. It is considered that a construction workforce travelling to the Site is unlikely to register with local general practices or other social and community infrastructure. On this basis it is proposed that this effect be scoped out of the ES.

14.5.9 **Effects on volume and value of local tourism**: The Site is separated from Frodsham and Helsby by the M56 and access for construction vehicles would avoid routing through these towns, using a route which enters the Site from the west via roads which serves the existing industrial development in the area. As such the construction works would not be expected to generate large vehicle movements, or other construction phase effects, which might affect visitors' experience of the two towns. It should also be noted that there is no ex-post evidence of any substantial and sustained impacts on tourism from the construction of other solar PV energy facilities.

14.5.10 On this basis it is proposed that this effect be scoped out of the ES.

14.5.11 **Effects on recreational use of PROW and NCN**: The baseline has identified a number of PROW within 500m of the Site, including a section of the NCN that follows the construction access route into the Site.

14.5.12 The Site is located within and adjacent to a large scale wind farm, with the M56 located to the south of the Site. Large industrial operations are located at the western and eastern ends of walking and cycling routes through the area. As such it is considered unlikely that the PROW and NCN act as key attractors which bring visitor spending to Frodsham and its surrounding area. Despite this the Applicant is aware

that the PROW on Frodsham Marshes is recognised as a valuable local community resource.

14.5.13 Drawing on the experience of the construction works for the Frodsham Wind Farm the Applicant is committed to minimising impacts on users of the PROW throughout the construction period. A range of measures will be employed to avoid or reduce impacts on the PROW, these include:

i) Avoiding any permanent development on the PROW which would prevent their use, with any development limited to that below ground e.g. cable routing.
ii) Avoiding regular use of PROW by construction vehicles by providing segregated construction access routes, where necessary this may include fencing of PROW.
iii) Where this is not possible implementing measures to ensure they remain open and safe for use during the majority of the construction period e.g.:

a) Use of banks people or traffic light systems if construction vehicles are required to cross a PROW
b) Provision of short term temporary diversions;
c) Fencing short sections of routes if safe segregation of users from vehicles is deemed necessary due to proximity.

14.5.14 Measures adopted during the construction of the Frodsham Wind Farm, which were subject to agreement with CWaCC via discharge of planning conditions, included procedures for holding construction traffic when cyclists were using the section of the NCN which was also used as a construction access into the wind farm site. Construction traffic was only allowed to continue travelling along the NCN route once cyclists had passed. The same construction access route would be utilised for Frodsham Solar, and as such a similar approach to mitigating effects on this section of the NCN is proposed, noting that the traffic numbers and length of construction period would be less for the Proposed Development than the wind farm.

14.5.15 The wind farm had a construction period of 18-24 months, with a maximum two-way daily total for HGV trips of 318 trips (159 in and 159 out), with an average of approximately 168 two-way HGV trips per day. In comparison, as presented in Chapter 15.0, the construction period of the Proposed Development would be approximately 15 months and would have a peak of approximately 70 daily two-way HGV movements (35 in and 35 out) for a period of 12 weeks. For the remainder of the construction programme, the level of daily HGV traffic is anticipated to be much

lower. As such it is evident that there is the ability to effectively maintain the use of the NCN during the construction period using the previously agreed approach.

14.5.16 The Applicant proposes to set out the measures it would implement to minimise effects on users of the PROW network within an outline Public Rights of Way Management Plan, which would be submitted with the DCO application.

14.5.17 On the basis of the measures proposed the Applicant is confident that any temporary closures to PROW would be minimal and therefore the impact on users of the PROW network would be negligible and not significant. As such it is proposed that this matter is scoped out of the ES.

14.5.18 **Effects on existing businesses operating in the area:** There are four businesses and organisations identified in the baseline within 500 m of the Site providing leisure and recreational activities. Employment is also provided by the agricultural businesses associated with the Site i.e. livestock farming at Marsh Farm, and the arable farming on the land in the Site immediately to north of the M56.

14.5.19 With the exception of the Frodsham & District Wildfowlers Club, the leisure and recreational businesses identified in Section 14.4 do not use the area within the Site for their activities and the access to these businesses is from Frodsham via Brook Furlong, which would not be impacted by the Proposed Development. As such there would be limited potential for these activities to be temporarily affected by the construction process. The nature of those activities including hovercraft experiences, archery, off-road driving and remote-controlled aircraft flying is not expected to be affected by the construction works. The Frodsham & District Wildfowlers Club activities would be restricted across the Site by the construction of the Proposed Development. However, it is noted that the club is a landowner who is currently negotiating with the Applicant to include its land within the Proposed Development, notwithstanding this it is understood the club will continue to function and maintain a recreational resource for the local community.

14.5.20 Mitigation measures including a Construction Environmental Management Plan (CEMP) and a Construction Traffic Management Plan (CTMP) would further limit any potential impacts of the construction process.

14.5.21 Furthermore, the nature of the leisure and recreational activities undertaken by these organisations, suggests that the experience of the users would be unaffected, and it

is unlikely that the presence of construction works would have a negative effect on user numbers.

14.5.22 The Site also supports agricultural employment in the form of sheep farming and arable farming, which would have to cease for the duration of the construction works. As set out below this would be a temporary impact as the Proposed Development would be capable of supporting low intensity sheep grazing during operation. Given the quality of the land within the Site (see Section 17.3 below, Agricultural Land Classification) and the relatively small scale nature of the agricultural operations the construction phase impact is considered to be negligible in terms of employment and GVA impacts.

14.5.23 For this reason, it is proposed to scope out this matter out of ES.

***Operation***

14.5.24 The socio-economic effects of the solar PV energy development's operation are anticipated to be minimal.

14.5.25 **Employment and GVA effects:** Solar PV energy facilities generate limited employment opportunities associated with operating and maintenance staff. No permanent, on-site employment is expected to be required. Maintenance such as landscape management and cleaning of solar panels will be required but these would not be full time roles. In general the monitoring and operation of the facility would be undertaken remotely. Based on other similar scale developments it is anticipated that the facility would support less than 20 full time equivalent jobs. This would not be significant in the context of the 1.35 million jobs in the regional labour market. As the Proposed Development would generate renewable energy it would enable CWaCC to retain the business rates generated by the operator. This would have a positive economic impact locally but in the context of the wider business rates gathered from businesses across the authority area this is unlikely to be deemed significant. It is therefore proposed that operational employment and GVA is scoped out of the ES.

14.5.26 **Economic effects on volume and value of local tourism**: The impact on local tourism from the operation of the solar PV facility is anticipated to be negligible. The area in which the Proposed Development is located includes numerous industrial operations including Frodsham Wind Farm, and there is no evidence to suggest that an operational solar PV array would have an adverse impact on visitors' experience

of the area, or on recreational and leisure use. Landscape and visual impacts from Frodsham and other locations would be addressed elsewhere in the Environmental Statement but it is understood that there would be no view of the operation from Frodsham town centre, and limited visibility from other locations close to the Site. As such it is unlikely that there would be any significant effects on the volume and value of local tourism and it is therefore proposed that this matter is scoped out of the ES.

14.5.27 **Effects on recreational use of PROW and NCN**: It is considered that the operation of the solar PV facility would have little or no permanent impact on recreational use of the PROW and NCN. There will be no permanent changes to the routes, and potential mitigating measures include the application of a 10m PROW buffer and landscape treatment to preserve users enjoyment of the routes through the Site. Furthermore, the Applicant is considering a range of enhancements to the local footpath network as part of the Proposed Development. On this basis there is unlikely to be a significant effect on user experience or user numbers and it is proposed that this matter is scoped out of the ES.

14.5.28 **Effects on existing businesses operating in the area:** As set out above existing businesses do not carry out activities in the area of the Site with the exception of the agricultural businesses and the Frodsham Wildfowlers. Traffic for site operation and maintenance will be minimal and would not have any adverse effect on the activities the identified businesses carry out. In addition, the nature of those activities including hovercraft experiences, archery, off-road driving and remote-controlled aircraft flying is not expected to be affected by the solar array's operation. During the operation of the Proposed Development it is anticipated that the Site would be capable of continued agricultural use through low intensity sheep grazing, and as such this element of the current agricultural use on the Site would continue. Frodsham and District Wildfowlers would be impacted by the development and would not be able to shoot within the Site. However, as set out above it is relevant that the club is a landowner who is currently negotiating with the Applicant to include its land within the Proposed Development. Notwithstanding this, it is understood the club will continue to operate in the surrounding area and so will continue to offer a community and recreational resource. On this basis it is not anticipated that there would be any likely significant effects on existing businesses or organisations operating in the area. This matter would therefore be scoped out of the ES.

### *Decommissioning*

14.5.29 When the operational phase ends (the timing for this is highly uncertain at this stage), the Proposed Development will require decommissioning. The cost of this additional activity could generate further direct and indirect socio-economic effects through jobs and GVA to deliver the decommissioning, and related traffic movements to carry out the process.

14.5.30 Typically the scale of socio-economic effects during the decommissioning phase would not exceed the effects identified during the construction phase and therefore all of the effects during the decommissioning phase are proposed to be scoped out of the ES.

## 14.6 Conclusion

14.6.1 It is recognised that Solar PV developments have the potential to result in a range of socio-economic effects, which vary in magnitude through the different phases of the development. The most notable effects occur during the construction and decommissioning phase and are therefore relatively short term, temporary effects.

14.6.2 A range of mitigation measures have been outlined in this chapter which would be implemented to reduce the potential adverse effects of the Proposed Development. On the basis of the findings of the work undertaken as part of the scoping exercise it has been determined that the effects of the Proposed Development would be very limited, particularly in the context of the study areas identified. It is therefore proposed that all socio-economic effects are scoped out of the assessment.

14.6.3 Whilst the Proposed Development would not result in significant effects in the context of the wider study area, it will deliver positive effects on construction employment and GVA both directly and indirectly, as well as opportunities for skills development and training. Regardless of the fact that these are anticipated to be negligible, such benefits are likely to be positive in terms of local policy priorities and the objectives of stakeholders and this project would form part of a wider renewables sector which will play a very important role in the future success of the UK economy as a whole. The Applicant is therefore considering producing a socio-economic benefits statement for submission with the DCO application, together with a skills and employment plan to assist in maximising the benefits of the construction process.

**Table 14.2 - Summary of Socio Economic Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Employment and GVA (direct and indirect) and skills and training | Scoped Out | Scoped Out | Scoped Out | Due to the likely scale of employment and GVA effects this is predicted to be negligible in the context of baseline regional and national study area levels of employment and GVA. |
| Workplace population | Scoped Out | Scoped Out | Scoped Out | This is most relevant for the construction phase. However even during the construction phase much of the construction workforce is likely to be sourced from within an hour of the site due to the proximity to a number of large population centres. In addition, the scale of employment effects relative to the baseline for this regional study area is likely to be negligible. Since the effect on workplace population is likely to be negligible, there is likely to be little or no effect on demand for social and community infrastructure. |
| Economic effects on volume and value of tourism | Scoped Out | Scoped Out | Scoped Out | The industrial characteristics of the site area and characteristics of the visitor offer nearby and evidence of potential impacts on tourism from infrastructure development imply that the site would have a negligible impact on the volume and value of tourism. |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Economic effects related to disruption to PROW or NCN and recreational users | Scoped Out | Scoped Out | Scoped Out | Providing appropriate mitigation is implemented during the construction phase the effects on recreation are predicted to be negligible. The site will use existing PROW for access but beyond this there is unlikely to be any significant disruptive effect on use of the PROW or NCN . |
| Effects on existing businesses and organisations operating in the area | Scoped Out | Scoped Out | Scoped Out | Activities of businesses and organisations operating in the area are carried out outside the redline boundary of the Proposed Development, with the exception of the Frodsham and District Wildfowlers. Temporary impacts are likely to be minimal and mitigated during the construction process, and operation of the solar PV facility is not expected to affect activities, with the exception of the Frodsham and District Wildfowlers who are involved in the Proposed Development and would continue to operate the club. |

# 15.0 TRAFFIC AND TRANSPORT

## 15.1 Introduction

15.1.1 This chapter describes the potential traffic and transport impacts associated with the Proposed Development and potential for it to give rise to significant environmental effects associated with this topic.

15.1.2 The baseline conditions for the Proposed Development in relation to traffic and transport are described and an outline of the potential impacts that could occur during the construction, operation and decommissioning of the Proposed Development is set out. This chapter also provides a description of the measures that will be included in the design of the Proposed Development to mitigate impacts.

15.1.3 During construction and decommissioning, traffic and transport impacts could arise from vehicles travelling to and from the Site to deliver or collect construction materials, in addition to workforce trips. During the operational phase, there will be occasional traffic to and from the Site, primarily light vehicles for maintenance purposes, and ad-hoc HGV deliveries.

## 15.2 Study Area

15.2.1 The study area for the assessment of the likely significant effects of the Proposed Development has been identified based on the proposed route to the Site for construction traffic from the Strategic Road Network (SRN). It is proposed that construction traffic will approach the Site via the A5117 from either Junction 14 of the M56 or Junction 10 of the M53.

15.2.2 The impact from construction activities will largely be experienced on the local unclassified roads between the A5117 and the Site since these have a lower baseline traffic flow. During the operational phase the impact of maintenance trips will be negligible on the wider highway network.

15.2.3 The extent of the local highway network that is considered relevant to potential traffic and transport impacts is:

i) A5117 (E) between Pool Lane and M56 Junction 14 Hapsford Interchange roundabout;

ii) A5117 (W) between Pool Lane and M53 Junction 10 Stanlow Halt Interchange roundabout;
iii) Pool Lane between A5117 and Grinsome Road;
iv) Grinsome Road between Pool Lane and Ince Resource Recovery Park (Protos); and
v) Marsh Lane between Protos site and Proposed Development site.

15.2.4 The impacts of traffic on the M56 and M53 have not been considered as part of this assessment since the anticipated low level of trip generation from the Site is not anticipated to have any impact on these highly trafficked routes.

## 15.3 Legislation, Planning Policy Context and Guidance

### *Legislation*

15.3.1 There is no applicable legislation specific to the assessment of traffic and transport effects.

### *National Planning Policy*

15.3.2 The following planning policies are pertinent to the Proposed Development:

i) NPS EN-1, Section 5.13 (Traffic and Transport)
ii) Draft NPS EN-1, Section 5.14 (Traffic and Transport);
iii) Draft NPS EN-3, Section 3.10, specifically paragraphs 3.10.20, 3.10.26, 3.10.111–3.10.117, 3.10.130–3.10.132, 3.10.152, 3.10.153; and
iv) National Planning Policy Framework, specifically paragraphs 104, 110-113.

### *Local Planning Policy*

15.3.3 Cheshire West and Chester Local Plan (Part One) Strategic Policies was adopted in January 2015 and provides the overall vision, strategic objectives, spatial strategy and strategic planning policies for the period to 2030.

15.3.4 Specifically, policy STRAT 10 (Transport and Accessibility), which identifies that new development will be required to demonstrate that "*additional traffic can be accommodated safely and satisfactorily within the existing, or proposed, highway network*", and that "*satisfactory arrangements can be made to accommodate the additional traffic before the development is brought into use*".

15.3.5 STRAT 10 also states the “developments that would generate significant amounts of movements should be accompanied by a Transport Assessment and Travel Plan”.

15.3.6 Section 8 (Transport and Accessibility) of Local Plan (Part Two) Land Allocations and Detailed Policies, adopted in July 2019, expands on the priorities identified in STRAT 10. None of the policies within Part Two of the Local Plan are considered relevant to the Proposed Development.

### *Guidance*

15.3.7 The IEMA Guidelines for the Environmental Assessment of Road Traffic (1993) provides guidance on examining the environmental impacts of developments in terms of traffic and transportation and has been used to outline the scope of the assessment.

15.3.8 Other key guidance documents will include:

i) Department for Levelling Up, Housing and Communities (2014) National Planning Practice and Guidance – Travel Plans, Transport Assessment and Statements;
ii) Design Manual for Roads and Bridges; and
iii) Manual for Streets.

## 15.4 Baseline Conditions

### *Local Highway Network*

15.4.1 The Site is located on land occupied by the Frodsham Wind Farm, to the west of the Protos and approximately 500m to the north of Frodsham Town Centre at the closest boundary.

15.4.2 As noted above, the Site will be accessed from the SRN via the A5117, Pool Lane, Grinsome Road and Marsh Lane.

15.4.3 The A5117 east of Pool Lane is a two-lane dual carriageway road subject to the national speed limit (70mph). It features a carriageway width of approximately 6.6m in the westbound direction, and 7m in the eastbound direction. The A5117 forms signalised junctions with Pool Lane and Ince Lane, which provides access to Elton village, as well as a grade-separated roundabout junction with the M56 J14. A short

length of segregated footway is present adjacent to the eastbound carriageway between Pool Lane and School Lane, but otherwise there are no footways present along this section of the A5117. The road is well lit with street lighting.

15.4.4 West of Pool Lane the A5117 is a two-way single carriageway road with a carriageway width of approximately 8.4m and is subject to the national speed limit (60mph). The road forms a signalised junction with Thornton Green Lane and a grade-separated signalised roundabout junction with the M53 J10. On-carriageway cycle lanes are present in both directions, and there is also a shared foot/cycleway present along the northern side of the carriageway. Street lighting is only present for approximately 1.2km to the west of Pool Lane.

15.4.5 There are a small number of properties located along the A5117 (approximately 19 in total). The majority of these are located immediately north-east of the A5117 / Pool Lane junction.

15.4.6 Pool Lane runs in a general north-south alignment from the signalised junction with the A5117, forming a signalised junction with the Stanlow Refinery access road, and roundabout junctions with Meadow View and Grinsome Road / Oil Site Road. Pool Lane is subject to a 50mph speed limit.

15.4.7 Between the A5117 and the Meadow View roundabout Pool Lane is a two-lane single carriageway road with a carriageway width of approximately 14.5m. Street lighting is present, and a footway is present along the western side of the carriageway. North of the Meadow View roundabout, Pool Lane is a two-way, single carriageway road with a carriageway width of approximately 6.4m, although narrowing to approximately 5.5m as it crosses the Ellesmere Port – Helsby railway line. Signage is present to warn drivers of this carriageway narrowing. Intermittent street lighting is present although there are no footways along this stretch of Pool Lane. There are no residential properties located directly on Pool Lane. Pool Lane is used by local bus services and bus stop facilities are present on the northbound side of the road immediately south of the Meadow View roundabout.

15.4.8 Grinsome Road is an unadopted private link road that runs in a general east-west alignment and provides access to the former CF Fertilisers and Protos sites. It is a two-way single carriageway road with a carriageway width of approximately 7m, subject to a 30mph speed limit. There is a footway along the southern side of the

carriageway, although no street lighting is present. There are no residential properties located directly on Grinsome Road.

15.4.9 At the eastern end of Grinsome Road the Protos site access road provides a connection to Marsh Lane, which continues in an easterly direction along the northern side of the former CF Fertilisers site. Marsh Lane is a narrow, two-way, single carriageway track, with a varying width of between 3.5m and 4m. The track is unadopted with a loose surface. No street lighting is present. Marsh Lane is a restricted by way and designated cycle route, forming part of National Cycle Network (NCN) Route 5.

### *Existing Public Transport Facilities*

15.4.10 There are no bus stops or routes along Marsh Lane or Grinsome Road. The 2/2A bus service, which provides an hourly frequency service between Chester and Runcorn, runs along the A5117 and Pool Lane. The nearest served stops are located on Pool Lane and Meadow View approximately 3.25km south-west of the Site. The nearest railway station is Ince & Elton, located approximately 2.5km south-west of the Site. The station is served by a Parliamentary service providing two trains per day in each direction to Ellesmere Port and Warrington Bank Quay.

### *Non-Motorised User Networks*

*Pedestrian, Cycle and Equestrian Facilities*

15.4.11 The Site is accessible on foot via Grinsome Road and Marsh Lane to the west, and several unadopted lanes and bridleways from the east. These are generally unlit tracks. As noted above, there is intermittent footway provision along the majority of the key highway links within the study area.

15.4.12 NCN Route 5 runs along Marsh Lane along the southern boundary of the Site, and routes along the shared foot/cycleway along the northern side of the A5117.

15.4.13 There are various rights of way suitable for equestrian use within the vicinity of the Site, as discussed further in the PRoW section below.

*Public Right of Way (PRoW) Network*

15.4.14 There are a number of PRoW which either cross the Site or pass close to the Site boundary, as follows:

Within the Site:

i) Ellesmere Port and Neston Restricted Byway (RB) 40, adjacent to Grinsome Road and along Marsh Lane;
ii) Frodsham RB103, between Lordship Lane and Manchester Ship Canal Pools Nature Reserve;
iii) Frodsham RB98, between Moorditch Lane and Manchester Ship Canal Pools Nature Reserve;
iv) Frodsham RB99, along Brook Furlong;
v) Frodhsam RB108, along Brook Furlong and Alder Lane;
vi) Frodsham Footpath (FP) 91, between RB99 and FP81;
vii) Frodsham FP81, between Frodsham and River Weaver; and
viii) Frodsham FP93, alongside River Weaver along eastern boundary of site.

Close to the Site:

ix) Frodsham RB106, along Lordship Lane;
x) Frodsham RB97, along Lordship Lane; and
xi) Frodsham RB101, along Moorditch Lane.

15.4.15 It is not anticipated that any of these routes will require permanent closure as a result of either the construction or operation of the Proposed Development, but some temporary diversions and user management may be required for health and safety purposes during construction. The potential impact on these routes in terms of amenity and delay is discussed in paragraphs 15.5.20-15.5.23 below. Chapter 14 Socio-Economics, Land use and Tourism also provides further information on this matter in relation to the impacts on recreational use.

### *Sources of Baseline Information and Consultation*

15.4.16 For the purpose of this scoping exercise, baseline traffic data for the local highway network has been obtained from a Transport Assessment (TA) prepared in 2021 by HyNet North West in support of a planning application for a proposed Hydrogen Production Plant located within the Stanlow Manufacturing Complex (application ref. 21/04091/FUL). This included baseline traffic count data obtained in 2018 along the A5117 School Lane and Pool Lane for the AM and PM peak hours, which had been factored up to a 2025 assessment year.

15.4.17 The baseline traffic count data is summarised in Table 15.1 below.

**Table 15.1 - Baseline Traffic Flows**

| Data Source | Year | Highway Link | Period | Direction | Flow | |
|---|---|---|---|---|---|---|
| | | | | | All Vehs | HGVs |
| HyNet North West TA | 2025 | Pool Lane bet. A5117 & Stanlow site access | AM Peak | NB | 808 | 81 |
| | | | | SB | 317 | 48 |
| | | | PM Peak | NB | 204 | 31 |
| | | | | SB | 879 | 71 |
| | | A5117 west of Pool Lane | AM Peak | EB | 1091 | 55 |
| | | | | WB | 567 | 46 |
| | | | PM Peak | EB | 971 | 30 |
| | | | | WB | 749 | 15 |
| | | A5117 bet. Pool Lane & Ince Lane | AM Peak | EB | 790 | 40 |
| | | | | WB | 1040 | 42 |
| | | | PM Peak | EB | 745 | 15 |
| | | | | WB | 902 | 19 |

## 15.5 Potential Effects and Mitigation

15.5.1 The nature of the Proposed Development is such that the greatest impact is likely to occur during the construction phase. However, the effects relating to the operation and decommissioning phase are also described below.

### *Construction Effects*

15.5.2 During construction there will be temporary increases in traffic flows on the local highway network as a result of materials and contractors travelling to and from the Site.

15.5.3 The construction works will be of a temporary nature (approx. 15 months) and during the construction phase the main considerations and potential effects due to the Proposed Development are:

i) Severance (change in traffic flows);
ii) Driver delay;

iii) Pedestrian and cyclist amenity (change in traffic flows on routes used by pedestrians and cyclists, including PRoWs); and
iv) Accidents and safety.

15.5.4 In order to understand the scale of potential effects, an estimate of the potential level of construction traffic the Proposed Development could generate has been calculated based on experience of other solar farm facilities within the UK.

15.5.5 The trip generation forecasts will take into account the key construction-related activities to be undertaken, including for the setting up and decommissioning of site compound areas, welfare delivery/collection and servicing, as well as:

i) Establishment of site access point and erection of gates and perimeter fencing;
ii) Construction of site access tracks and hard standing areas;
iii) Installation of solar panels and frames;
iv) Installation of inverters, storage buildings, control and switchgear buildings;
v) Installation of BESS containers and associated electrical infrastructure; and
vi) Grid connection works and transformer stations.

15.5.6 The number and type of deliveries that are anticipated to be generated during the 15-month construction period are summarised in Table 15.2.

**Table 15.2 - Estimated Construction Traffic (for duration of construction phase)**

| Description of Temporary / Ancillary Works and Equipment | Details of Load | Number of Loads |
|---|---|---|
| Welfare and Waste Management | Mixed | 140 |
| Fencing / CCTV | HGV | 20 |
| Aggregate for roadways | Tipper truck | 1,760 |
| Trenching | Mixed | 130 |
| Foundations | Tipper Truck | 150 |
| Compounds / Laydowns | Tipper Truck | 200 |
| Construction Support Total | | 2,400 |
| PV Modules | HGV | 550 |
| PV Structures | HGV | 350 |
| Cabling | Mixed | 50 |
| Inverters and Transformers | Mixed | 40 |
| BESS Containers | Mixed | 100 |

| Description of Temporary / Ancillary Works and Equipment | Details of Load | Number of Loads |
|---|---|---|
| Substations | Mixed | 30 |
| Other (Misc.) | Mixed | 110 |
| PV Equipment / Components | | 1,230 |
| TOTAL (one-way deliveries) | | 3,630 |

15.5.7 As summarised in Table 15.2, it is anticipated that the total number of deliveries requiring access to the Proposed Development would be approximately 3,630 one-way trips (7,260 two-way trips i.e. 3,630 in and 3,630 out) across the full 15-month construction period. Assuming construction deliveries will occur over 5.5 days per week on average during the construction period, this would equate to an average of approximately 22 two-way HGV movements per day (11 in and 11 out) across the construction period. However, the most intensive phase of activity is anticipated to relate to the delivery of aggregate for the construction of access tracks and compounds. This is likely to occur over a 12-week period during which construction trips could peak at approximately 70 daily two-way HGV movements (35 in and 35 out). For the remainder of the construction programme, the level of daily HGV traffic is anticipated to be much lower.

15.5.8 In addition, typically around 100-150 construction-related staff will require access to the Site per day on average, with a maximum of around 240 staff during peak activities. It is anticipated that a significant number of staff would partake in a car share, with staff minibuses also being provided from nearby transport hubs, thereby reducing the number of trips to the Site. Assuming a conservative average occupancy of 2.5 per vehicle, this would equate to a maximum of approximately 100 daily staff trips during peak activities. Parking for vehicles making trips to the Site would be provided in a temporary car park provided as part of the on-site construction compound.

15.5.9 As described previously the Site would be accessed from the highway network via roads of a good standard, which are used by HGV traffic travelling to and from the Protos site, as well as being used for construction traffic access during construction of the Frodsham Wind Farm. As such it is not anticipated that the proposed access route to the Site would present any accessibility issues to the Site.

15.5.10 Furthermore, the junctions leading to the Site are very likely to have sufficient capacity to manage the relatively small temporary increase in HGV numbers set out above. In this regard it should be noted that the Protos development provided for a total of 718 HGV movements (718 in and 718 out) as stipulated via Condition 9 of the Protos planning permission (ref. 14/02277/S73). Since the grant of the current operative planning permission in 2015, the plots developed at Protos have only 'utilised' 108 of the approved 718 HGV movements. Based on the historic build out rate it is likely the temporary HGV movements associated Frodsham Solar, along with likely Protos development rated traffic, would fall well within the overall HGV numbers which were assessed as acceptable under the Protos application. It is also worth noting that the CF Fertilisers plant, which was accessed via Grinsome Road, Pool Lane and the A5117, ceased operation in 2022. The development gave rise to a significant number of HGV movements associated with the import of raw materials and export of fertiliser, with the plant historically having a production capacity of 990,000 tonnes of fertiliser and associated compounds[130].

15.5.11 Based on the above points, the relatively low estimated average daily trip generation and the temporary nature of the works, it is not considered that junction capacity modelling will be required.

15.5.12 With regard to assessing the environmental impact of development-related traffic, the Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (January 1993) identify the following 'rules' when considering the initial appraisal or screening of traffic-related environmental effects to determine if more detailed assessment is required:

i) **Rule 1**: include highway links where traffic flows would increase by more than 30% (or the number of heavy goods vehicles would increase by more than 30%); and

**ii)** **Rule 2**: include any other specifically sensitive areas where traffic flows have increased by 10% or more.

15.5.13 It should be emphasised that irrespective of the proportional increase in traffic flows, an increase of fewer than 30 additional vehicle trips per hour (inclusive of all vehicles,

[130] https://agritradenews.co.uk/news/2022/06/09/cf-to-close-ince-factory/ - *accessed 27th April 2023*

not just HGVs) during each of the development peak hours is to be categorised as a negligible magnitude of impact. This threshold has been determined based on professional judgement and previous experience including DCOs and solar farm projects, as it is considered that an increase of fewer than one vehicle every two minutes would not result in any significant effects.

15.5.14 IEMA sets out a number of criteria by which the magnitude of impact can be measured, as outlined below. Where specific thresholds for measuring impacts are unavailable, impacts will be measured qualitatively.

15.5.15 It should be noted that noise and air quality effects arising from traffic have been considered separately within Chapter 13 and 16 of the Scoping Report. Based on the traffic generation figures presented above, these chapters have determined that there is unlikely to be any significant noise or air quality related effects from traffic generated by the Proposed Development.

*Severance*

15.5.16 Severance is defined in the IEMA guidelines as the '*perceived division that can occur within a community when it becomes separated by a major traffic artery*'. Severance may result from the difficulty of crossing a heavily trafficked road and can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities. IEMA guidelines suggest that a 30%, 60% and 90% increase in traffic flows will result in a low, medium and high change in severance, respectively, but also that '*marginal changes in traffic flows are, by themselves, unlikely to create or remove severance*'.

15.5.17 The forecast trip generation presented above indicates that on the majority of highway links within the study area, based on the baseline traffic flows presented in Table 15.1, even during periods of peak construction activity there is likely to be less than 10% change in daily and peak hour traffic flows, and an increase in HGV movements of less than 30%. Furthermore, the forecast trip generation will equate to approximately 20 two-way trips per hour on average, including staff trips. As such, even on links where the baseline flow will be relatively low, for example Grinsome Road and Marsh Lane (both private roads), the impact will still be categorised as negligible as these roads do not provide a separation between communities.

15.5.18 Mitigation measures, including Travel Plan measures and HGV management during the construction phase will be incorporated into an Construction Traffic Management

Plan (CTMP) this is likely to form a requirement attached to the DCO. Therefore, given the forecast change in flow (less than 10% overall and less than 30% HGVs, and fewer than 30 trips per hour), and through the application of mitigation measures to be set out in the CTMP, no significant severance impact is anticipated. It is therefore proposed that the assessment of severance from the construction of the Proposed Development is scoped out of the ES.

*Driver and NMU Delay*

15.5.19 The assessment of Driver Delay is determined through the analysis of junction capacity assessments, with delay measured in terms of change in delay per vehicle (in seconds) from the baseline situation. As noted above, during the construction phase it is expected that the majority of trips, those associated with construction staff, will largely occur at the start and end of the working day, outside of the main highway peak hours. As noted above, even during periods of peak construction activity the forecast development traffic will generally result in a less than 10% increase compared to the indicative baseline traffic flows. As such, construction traffic is not expected to have a significant impact on driver delay, and it is not anticipated that there will be any parts of the local highway network where detailed junction capacity assessments will be required as part of a Transport Assessment. Therefore, it is proposed that impacts of driver delay are scoped out of the ES assessment.

15.5.20 There are a range of factors affecting non-motorised user (NMU) delay. The IEMA guidelines do not set out thresholds for judging the significance of changes in levels of delay. However, as noted above, the forecast development traffic will generally result in a less than 10% increase compared to the indicative baseline flows. This is within the general range of daily variation in background traffic flows, and as such construction traffic is not expected to have a significant impact on NMU delay. Therefore, it is proposed that impacts on NMU delay are scoped out of the ES assessment.

*Pedestrian and Cyclist Amenity*

15.5.21 Pedestrian and Cycle Amenity (including Fear and Intimidation) is broadly defined as ‘the relative pleasantness of a journey and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic’. The guidance suggests that a tentative threshold for judging the significance on pedestrian and cycle amenity would be where the traffic flow is halved or doubled. A change of

between 25% and 50% would represent a medium impact, while a change of less than 25% would constitute a low impact. As noted above, the daily traffic flow change is likely to be less than 10%.

15.5.22 As described in the Baseline Conditions above, the proposed access route will not pass along any routes supporting significant numbers of residential dwellings, and the forecast change in traffic flows is likely to be low (fewer than 30 trips per hour). As such, it is not anticipated that pedestrian and cyclist amenity on the local highway network would be affected by the Proposed Development.

15.5.23 It is acknowledged that pedestrian and cyclist amenity on the PRoW network in the area might be affected, and that an increased HGV presence could produce a change in the character of the walking environment along these routes. However, through the application of mitigation measures it is anticipated that access would be retained along the PRoW network during the majority of the construction phase and would be able to be diverted with minimal delays and so would not be impacted during the operation of the Proposed Development.

15.5.24 Further consideration of the PRoW network is given in Chapter 14. Socio-Economics, Land use and Tourism, paragraphs 14.5.11-14.5.17. It is considered that due to the presence of a large scale wind farm within and adjacent to the Site, the close proximity of the M56, and large industrial operations to the western and eastern ends of the PRoW network, it is unlikely that the PRoW and NCN routes in the vicinity of the Site act as key attractors. As such, it is proposed that the impacts on pedestrian and cyclist amenity are scoped out of the construction traffic ES assessment.

*Accidents and Safety*

15.5.25 The change in traffic related to the Proposed Development is expected to be within the daily variation of traffic flows, and established points of access onto the public road network will be used. It is therefore considered that there is no reason to consider the effects of the Proposed Development on accidents and safety any further, and that this is scoped out of the ES.

*Hazardous Loads*

15.5.26 The IEMA guidelines state that some developments include hazardous loads, which should be recognised by the assessment. The construction of the Proposed

Development would not require delivery of hazardous loads. Furthermore, analysis of the local highway network within the study area indicates there are no particular features, such as significant drops immediately beyond the carriageway, which would suggest that the transfer of materials poses a particular risk beyond that which would be expected on the general highway network. Measures employed to ensure safe vehicular transport of components such as panels and batteries will be set out within the CEMP / CTMP. It should also be noted that the local highway network is regularly used by vehicles carrying hazardous substances associated with Stanlow oil refinery and other nearby industrial businesses.

### *Construction Mitigation*

15.5.27 The measures to be included within the CTMP will be in line with the measures successfully adopted during the construction of the Frodsham Wind Farm. Such measures are likely to include:

i) Restriction of construction traffic to a specific, defined access routes;
ii) Use of banksmen to monitor and control construction traffic entering and leaving the Site, and manage any interface between site activities and the PRoW network;
iii) Appropriate signage and safety fencing/barriers will be implemented at major crossing points and intersections with the PRoW network; and
iv) Provision of hardstanding areas within the site to allow construction vehicles accessing the site to manoeuvre within the site and drop off loads without impacting on the local highway network.

### *Operational Effects and Mitigation*

15.5.28 During the operational phase it is anticipated that there will be a nominal number of staff on-site at any one time, primarily undertaking maintenance tasks. There will also be a small number of visitor trips per week for deliveries and servicing of equipment. It is not anticipated that vehicle numbers (cars and lights good vehicles / vans) would exceed 16 movements per day during periods of routine maintenance. There would be no routine HGV movements.

15.5.29 Staff and maintenance vehicles will primarily be four-wheel drive vehicles or vans. The requirement for HGV access to the Site during the operational phase will be rare,

for example for exceptional maintenance activities such as the replacement of PV panels.

15.5.30 Due to the low level of trips likely to be generated within the network peak hours, it is proposed that operational phase transport effects are scoped out of the ES.

### *Decommissioning Effects and Mitigation*

15.5.31 At this stage the number of vehicle movements required during the decommissioning phase is not known, and as such the level of potential significant effects cannot be identified at this stage. However, given the nature of the decommissioning works, it is predicted to be similar or less than the construction phase. As a result of the analysis for the construction phase above, it is not anticipated that the decommissioning phase would give rise to likely significant environmental effects related to traffic and transport.

15.5.32 A Decommissioning Environmental Management Plan will be prepared detailing management and mitigation measures setting out the general principles to be followed in the decommissioning of the Proposed Development, which would be agreed with the relevant authorities in advance of the commencement of decommissioning. It is expected that principles agreed to minimise the impact of development-related traffic during the construction phase will be reviewed and applied during decommissioning. It is anticipated that the preparation of the plan would be likely be secured through a DCO requirement.

15.5.33 On this basis it is proposed that decommissioning phase traffic and transport effects are scoped out of the ES.

### *Summary*

15.5.34 Table 15.3 summarises each of the traffic and transport effects discussed and identifies whether they should be scoped in or scoped out of the assessment in relation to the construction, operation and decommissioning of the Proposed Development.

15.5.35 It should be noted that whilst it has been concluded that there is unlikely to be any significant traffic and transport related environmental effects associated with the Proposed Development and therefore this matter is proposed to be scoped out of the ES, the ability of the highway network to accommodate the development traffic

will be assessed and reported in a Transport Statement (TS). The TS will accompany the DCO Application, but will be separate to the ES. The TS will include information on:

i) Description of the existing baseline conditions, including a review of road safety data and up to date baseline traffic flow data;
ii) Description of the Proposed Development;
iii) Estimated trip generation including a description of the methodology used to derive forecast development trips;
iv) Distribution and assignment of trips on the local highway network;
v) Analysis of HGV and abnormal loads requirements and routing, including swept path analysis to assess access suitability for construction vehicle movements; and
vi) Consideration of mitigation measures.

**Table 15.3 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Severance | Scoped Out | Scoped Out | Scoped Out | The change in traffic flows is expected to be within daily variation (less than 10% increase in daily flows, less than 30% increase in HGVs). A CTMP will ensure access is appropriately managed to minimise the impact on severance. |
| Driver and Pedestrian Delay | Scoped Out | Scoped Out | Scoped Out | The Proposed Development is not expected to generate significant amounts of increased traffic that would cause delay during the weekday highway peak hours and flows fall below the established IEMA guidance thresholds at which potential significant effects could occur. |
| Pedestrian and Cyclist Amenity / Fear and Intimidation | Scoped Out | Scoped Out | Scoped Out | The Proposed Development is not expected to generate significant amounts of increased traffic that would impact on pedestrian and cyclist amenity on the local highway network. Further consideration of the effects of the Proposed Development on the PRoW network is provided within the Socio-economic and land use chapter, which concludes it is unlikely there would be any significant effects. The flows fall below the established IEMA guidance thresholds at which potential significant effects could occur. |
| Accidents and Safety | Scoped Out | Scoped Out | Scoped Out | The Proposed Development is not expected to generate significant amounts of increased traffic that would result in a significant increased risk to public safety. |
| Hazardous Loads | Scoped Out | Scoped Out | Scoped Out | Analysis of the local highway network within the study area indicates there are no particular features, such as significant drops immediately beyond the carriageway, which would suggest that the transfer of materials poses a particular risk beyond that which would be expected on the general highway network. Measures employed to ensure safe vehicular transport of components such as panels and batteries will be set out within the CEMP / CTMP. It should also be noted that |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | the local highway network is regularly used by vehicles carrying hazardous substances associated with Stanlow oil refinery and other nearby industrial businesses. |

## 15.6 Assumptions, Limitation and Uncertainties

15.6.1 As noted in paragraph 15.4.17, the baseline traffic used to derive a high-level indication of the likely impact of development traffic was obtained from a TA submitted for another planning application. This data was in turn obtained from an earlier planning application for the creation of a geological research facility on land at Ince Marshes (application ref. 18/04894/FUL). It has not been possible to obtain and review the raw count data and growth assumptions that underpin the future year baseline traffic flow data presented in the HyNet North West TA. However, it should be noted that this data was accepted by CWaCC, and there are no clear reasons why traffic counts on the roads of interest would be materially different.

# 16.0 AIR QUALITY

## 16.1 Introduction

16.1.1 This chapter considers the impact of the Proposed Development on air quality. The chapter considers identified relevant sensitive receptors and the nature and scale of potential impacts that may arise from the Proposed Development to determine the likelihood for any resulting significant effects. This is used to inform the requirements for further assessment within the EIA and scope of any required assessment.

16.1.2 The principal aspects requiring consideration with regards to air quality are:

i) Dust: potential impacts of deposition dust and particulate matter ($PM_{10}$ and $PM_{2.5}$) arising during construction and decommissioning activities;
ii) On-road vehicle exhaust emissions: potential impacts of vehicle exhaust emissions ($NO_x$ / $NO_2$, $PM_{10}$ and $PM_{2.5}$) arising from traffic associated with the Proposed Development; and
iii) Non-road mobile machinery (NRMM) and combustion plant exhaust emissions: potential impacts of exhaust emissions ($NO_x$ / $NO_2$, $PM_{10}$ and $PM_{2.5}$) arising from machinery used during the construction and decommissioning activities.

## 16.2 Study Area

16.2.1 The Study Area includes features likely to be at risk from possible direct and indirect impacts on air quality that may arise from the Proposed Development. Different Study Areas are adopted for different sources of air quality pollutants due to the differing spatial extents at which likely significant effects could potentially arise.

16.2.2 As detailed in Chapter 3.0 the principal development and construction area would be the Solar Array Development Area. Some construction works may also be required to provide connections from the Solar Array Development Area to the SPEN Sub-Station and INEOS Inovyn Runcorn Site to the west and north-west. Access would be gained to the Solar Array Development Area via the 10km long Access Road from the Pool Lane and Grinsome Road roundabout in the east. The Access Road would be along pre-established roads and tracks. Some minor maintenance works may be required to the access road, such as infilling of potholes. The grid connection to Protos would also be located along a section of the access road, terminating at the crossing of Hoolpool Gutter, to the north-east of the former CF Fertiliser plant.

16.2.3 Taking into account the location of construction works and roads set out above, the resulting Study Areas are:

i) Construction Dust:

a) up to 350m from the boundary of areas to be subject to construction works (the Solar Array Development Area and any other applicable areas); and,
b) up to 50m from edges of roads used for construction traffic for up to a distance of 500m from the egress point onto paved highway,

ii) Vehicle Exhaust Emissions:

a) up to 200m from edges of roads likely to be used by development vehicles; extent of road network dependant on the volume of traffic.

16.2.4 These Study Areas are in line with IAQM guidance[131, 132].

## 16.3 Legislation, Planning Policy Context and Guidance

16.3.1 The following air quality policy, legislation, regulations and guidance is deemed relevant to the Proposed Development.

### *Legislation*

16.3.2 Ambient air quality standards in the UK are established through the combination of transposition of European legislation and additional UK legislation and requirements.

16.3.3 A series of Limit and Target Values have historically been established through the European legislation on the UK as a whole through the Air Quality Standards Regulations 2010 (and subsequent amendments). Responsibility for meeting these is devolved to the national administrations. The Department for Environment, Food and Rural Affairs (Defra) co-ordinates assessment and quality plans for the UK as a whole.

16.3.4 Following the departure of the UK from the EU the air pollution limits established under EU requirements remain in place having been enshrined in UK law.

[131] *Institute of Air Quality Management (2017), Land-use Planning & Development Control: Planning for Air Quality. v1.2.*
[132] *Institute of Air Quality Management (2014), Guidance on the Assessment of Dust from Demolition and Construction. v1.1.*

16.3.5 The Government's policy on air quality within the UK is set out in the national Air Quality Strategy (AQS). This was last reviewed and published in 2007[133] and sets out air quality objectives (AQOs) and policy options to improve air quality within the UK. The strategy sets AQOs for specific pollutants deemed to pose a risk for human health or other receptors, a number of which were derived from the EU limit and target values, although requirements for compliance varied.

16.3.6 In addition, Part IV of the Environment Act 1995 imposes a duty on local authorities in the UK to review existing and projected air quality in their area. Any location likely to exceed the UK AQOs must be declared an Air Quality Management Area (AQMA) and an Action Plan prepared and implemented, with the aim of achieving the objectives. This process is referred to as Local Air Quality Management (LAQM). The LAQM process is supported by national statutory policy[134] and technical guidance[135] provided by Defra.

16.3.7 The standards and objectives relevant to the LAQM framework are prescribed through the Air Quality (England) Regulations (2000) and Air Quality (England)(Amendments) Regulations 2002.

16.3.8 For many parts of the UK the primary pollutants of concern are those relating to road traffic emissions, and to a lesser extent, heating and commercial sources. The principal pollutants of interest are oxides of nitrogen ($NO_x$), nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$ and $PM_{2.5}$). The applicable current air quality standards relevant to the Site and Proposed Development are summarised in Table 16.1 below.

**Table 16.1 - Relevant Current Air Quality Standard and Objectives**

| Pollutant | Objective | Averaging period |
|---|---|---|
| $NO_2$ | 40 µg/m$^3$ | annual mean |
| | 200 µg/m$^3$ | hourly mean, not to be exceeded more than 18 times per annum |
| $NO_x$ (v) | 30 µg/m$^3$ | annual mean |
| | 75 µg/m$^3$ | daily mean |
| $PM_{10}$ | 40 µg/m$^3$ | annual mean |
| | 50 µg/m$^3$ | 24-hour mean, not to be exceeded more than 35 times per annum |
| $PM_{2.5}$ | 20 µg/m$^3$ | annual mean |

[133] *Defra, (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007*
[134] *Defra, Local Air Quality Management, Policy Guidance (PG22), August 2022*
[135] *Defra, Local Air Quality Management, Technical Guidance (TG22), August 2022*

| Pollutant | Objective | Averaging period |
|---|---|---|
| | % reduction relative to average exposure indicator (AEI), dependant on initial concentration; to at least 10 µg/m$^3$ | annual mean |

1: $PM_{2.5}$ – responsibility for meeting the $PM_{2.5}$ target sits with national government.

(v) – established for the protection of vegetation and sensitive ecosystems

16.3.9 For the purposes of the AQOs ambient air refers to the outdoor air and excludes workplaces where members of the pubic do not have regular access.

16.3.10 In January 2019 Defra published the Clean Air Strategy[136] which outlined a comprehensive suite of actions required across all parts of Government to improve air quality and maximise public health benefits. This included national regulations to reduce emissions from domestic burning, industry and farming, alongside stronger powers and an improved framework for local government to tackle more localised issues, as well as a commitment to set a legally binding target for $PM_{2.5}$.

16.3.11 The Environment Act 2021 establishes a legally binding duty on government to bring forward at least two new air quality targets in secondary legislation by 31 October 2022, including a target to reduce $PM_{2.5}$ ambient concentrations. The secondary legislation was enacted on 31 January 2023 through the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. The new targets are summarised in Table 16.2:

**Table 16.2 - New UK $PM_{2.5}$ Targets**

| Pollutant | Objective | Averaging period |
|---|---|---|
| $PM_{2.5}$ | 12 µg/m$^3$ (interim target; to be achieved by 2028) | annual mean |
| | reduction in population exposure of 22% compared to 2018 by 2028 | NA |
| | 10 µg/m$^3$ (legal target; to be achieved by 2040) | annual mean |
| | reduction in population exposure of 35% compared to 2018 by 2040 | NA |

[136] *UK Government, Clean Air Strategy, published 14 January 2019, https://www.gov.uk/government/publications/clean-air-strategy-2019*

*Dust Standards and Control*

16.3.12 Larger particulate matter (or dust) can cause loss of amenity through the soiling of surfaces. Ecological receptors can also be affected by dust soiling, both directly on vegetation and aquatic ecosystems or indirectly on fauna. Deposition dust as such is not regulated as a pollutant under the above requirements. There are no UK statutory or recommended levels that define the point when deposited dust causes annoyance or disamenity ('disamenity dust') although standard 'custom and practice' thresholds are referred to.

16.3.13 Public concerns in relation to dust accumulation and soiling may be related to a range of factors including the nature of a site and locality and baseline levels. Controls of soiling and annoyance impacts are typically achieved through conditions within planning permissions and / or environmental permits requiring the implementation of a dust management plan to prevent amenity impacts. Deposited dust may also give rise to 'nuisance', as Statutory, private and public nuisance as defined in environmental law and insofar as nuisance relates to unacceptable effects of emissions.

### *National Planning Policy*

16.3.14 As outlined in Chapter 1.0 the DCO Application must have regard to the relevant policies within NPSs and the NPPF. The NPSs, and current emerging draft NPSs, set out national planning policies in relation to energy development. Relevant sections of these policies in relation to air quality are:

i) NPS EN-1: Section 5.2: Air Quality and Emissions
ii) NPS EN-1: Section 5.6 Dust, Odour, Artificial Light, Smoke, Steam and Insect infestation.
iii) NPS EN-1: Section 5.3: Biodiversity and Geological Conservation *(where relevant with regards to air quality and emissions)*
iv) Draft NPS EN-1: Section 5.2: Air Quality and Emissions
v) Draft NPS EN-1: Section 5.7 Dust, Odour, Artificial Light, Smoke, Steam and Insect infestation.
vi) Draft NPS EN-1: Section 5.4: Biodiversity and Geological Conservation *(where relevant with regards to air quality and emissions)*

16.3.15 The NPPF 2021 also provides some guidance to local authorities on taking air pollution into account in planning polices and decisions. Paragraph 174 of the NPPF states: *"Planning policies and decisions should contribute to and enhance the natural and local environment by […] preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality."*

### *Local Planning Policy*

16.3.16 The CWaCC Local Plan (Part One)[137] was adopted in 2015 and sets out the vision for sustainable development of the borough to 2030. Policy SO5 Health and Well-being states:

*'development that gives rise to significant adverse impacts on health and quality of life (e.g. soil, noise, water, air or light pollution) […] including residential amenity, will not be allowed.'*

16.3.17 The CWaCC draft Local Plan (Part Two) Land Allocations and Detailed Policies document[138] provides further detailed policies and land allocations which support the strategic objectives and policies set out in the Local Plan (Part One). DM31 refers specifically to air quality and states:

*"DM 31: In line with Local Plan (Part One) policy SOC 5, development must not give rise to significant adverse impacts on health and quality of life, from air pollution. In particular, development proposals within or adjacent to an Air Quality Management Area will be expected to be designed to mitigate the impact of poor air quality on future occupiers. An air quality assessment will be required for development proposals that have the potential for significant air quality impacts, including those which:*

*1. are classed as major development and have the potential, either individually or cumulatively, for significant emissions; or,*

[137] *Cheshire West and Chester Council, Local Plan (Part One) Strategic Policies, 29th January 2015*
[138] *Cheshire West and Chester Council (Part Two), Land Allocations and Detailed Policies, Publication Draft, 29 November 2017*

*2. are likely to result in an increase in pollution levels in an Air Quality Management Area (AQMA); or,*

*3. are likely to expose people to existing sources of air pollutants.*

*"Where an air quality assessment identifies an unacceptable impact on or from air quality, an appropriate scheme of mitigation must be submitted, which may take the form of on-site measures or, where appropriate, a financial contribution to off-site measures. Applicants must demonstrate that appropriate mitigation will be provided to ensure that the new development is appropriate for its location and unacceptable risks are avoided."*

### *National Best Practice and Guidance*

16.3.18 The IAQM Planning for Air Quality[1] document provides specific non-statutory guidance on air quality and the planning system for new development. The guidance clarifies when an air quality assessment is required, what it should contain and how impacts should be described and assessed. The guidance sets out a recommended approach to assess the significance of the air quality impacts and sets out suggested approaches to reducing emissions and impacts.

16.3.19 The IAQM Guidance on the Assessment of Dust from Demolition and Construction[2] document provides specific non-statutory guidance in relation to dust and emissions from construction and demolition. Parts of this guidance may also be applied to soil importation and handling activities, where these present similar risks of impacts.

16.3.20 The IAQM Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites[139] provides specific non-statutory guidance in relation to the assessment of air quality impacts of development on designated nature conservation sites.

*[139] Institute of Air Quality Management (IAQM), A guide to the assessment of air quality impacts on designated nature conservation sites, version 1.1, May 2020*

16.3.21 Further guidance is provided in the national Planning Practice Guidance regarding Air Quality (PPG-AQ)[140] which provides guiding principles on how planning can take account of the impact of new development on air quality.

## 16.4 Preliminary Baseline Conditions

16.4.1 Full details of the Site and Proposed Development are provided in Chapter 3.0 and only those aspects of relevance to the air quality assessment are described here.

16.4.2 The existing air quality baseline in the area has been established through a review of OS mapping, aerial imagery, Defra predicted background data and air quality reports produced by CWaCC, including the CWaCC 2022 Air Quality Status Report (2022 ASR, issued in June 2022) which reports monitoring data up until the end of 2021.

### *Potential Sensitive Receptors*

16.4.3 The nearest residential properties to the Solar Array Development Area are within the community of Frodsham beyond the M56 to the south / south-east. Properties on Hawthorn Road and Wayford Mews extend to within 140m. Other properties within 350m of the Solar Array Development Area include those on Williams Way (230m distant) and Waterside Drive (290m distant).

16.4.4 Frodsham Primary Academy School lies 150m to the south of the Solar Array Development Area on the outskirts of Frodsham. Open ground located between the M56 and the school buildings is presumed to form part of the grounds associated with the school. Playing fields, a play-ground and a fishing pond lie to the east of the school.

16.4.5 There are no residential or other sensitive human receptors within 50m of the Access Road.

### *Nature Conservation Sites*

16.4.6 The Mersey Estuary to the north-west of the Site has several statutory nature conservation designations. The Mersey Estuary SSSI adjoins the Solar Array

[140] *Ministry of Housing, Communities and Local Government (2014). Planning Practice Guidance: Air Quality, issued 6 March 2014; last revised 1 November 2019*

Development Area to the west, with a small section lying within the Site. The Mersey Estuary Special Protection Area (SPA) and Ramsar extends to within 80m of the Solar Array Development Area to the north / north-west. For further detail reference should be made to Chapter 8.0 Ecology and Nature Conservation.

### *Air Quality Management Areas (AQMAs)*

16.4.7 CWaCC has declared four Air Quality Management Areas (AQMAs) within its area, three of which were declared with respect to traffic-related $NO_2$ emissions and the fourth due to industrial emissions of $SO_2$.

16.4.8 The Frodsham AQMA, declared in 2015 due to exceedances of the annual mean $NO_2$ objective, encompasses an area at the junction of Fluin Lane and A56 High St in Frodsham, about 520m to the south-east of the Site. The location of the Frodsham AQMA in relation to the Site is shown in Figure 1.1 in Appendix 16.1. As access will be taken to the Site from the west, this AQMA is distant from the local road network that may be affected by development-related vehicle movements.

16.4.9 The other two AQMAs that have been declared due to traffic-related $NO_2$ emissions are all distant from the Site and local road network.

16.4.10 The Thornton-le-Moors AQMA, declared due to exceedances of the 15-minute sulphur dioxide ($SO_2$) objective due to industrial emissions, is located to the west of the Site. An area of this AQMA extends to within 80m of the Site boundary, close to the western most part of the Access Road at the Pool Lane / Grinsome Road roundabout. However, this AQMA is not of relevance to the Proposed Development which would not result in additional emissions of $SO_2$.

16.4.11 Halton Borough Council (HBC) has not declared any AQMAs within Runcorn to the east of the Site.

### *Local Ambient Air Quality Monitoring Data*

16.4.12 CWaCC undertakes monitoring for ambient air quality monitoring across the Council area using a combination of automatic continuous analysers and diffusion tubes. Automatic monitoring stations are located within Frodsham (site ID: FMH), Elton (site ID: ELT) and Thornton-le-Moors (site ID:TLP; only monitors $SO_2$). Several diffusion tube monitoring locations (used to monitor annual mean $NO_2$ concentrations) are

also present in Frodsham and Elton. Locations of these monitoring sites in relation to the Site are shown in Figures 1.2 and 1.3 in Appendix 16.1.

16.4.13 None of these monitoring sites are within either 500m of the Site boundary or 200m of the local road network that may be affected by development-related traffic. Data from these sites has however been used to provide background information on the wider local ambient air quality. Full details on these monitoring sites and data is provided in Appendix 16.1.

16.4.14 Monitoring results for 2018 and 2019 for $NO_2$ were all below the relevant UK objectives, although some locations in the Frodsham AQMA were close to the long-term objective. Results for 2020 and 2021 were lower, consistent with expectations due to the reduced traffic movements over the Covid-19 pandemic lockdowns[141]. Monitored concentrations for $PM_{10}$, and predicted concentrations for $PM_{2.5}$, across the 2017-2021 period were also all well below relevant current UK objectives.

16.4.15 Ambient air quality monitoring is also undertaken by HBC across its administrative area. The nearest monitoring locations to the Site are in Runcorn, over 1km from the Site boundary and are not considered of relevance to inform baseline conditions for the area with regards to the Proposed Development.

16.4.16 Reference to predicted background air pollutant concentrations provided by Defra for the grid squares in which the Site is located indicates concentrations of key potential pollutants to be substantially below the UK established objectives.

## 16.5 Potential Effects and Mitigation

### *Construction*

#### *Construction Dust*

16.5.1 Earthworks and internal haulage movements during the construction phase may give rise to dust which could impact the sensitive receptors identified within the relevant Study Area. Identified potential receptors include housing and a school within the northern area of Frodsham and the Mersey Estuary to the northwest. It is noted the

[141] *COVID-19: Following the outbreak of a global pandemic of the Coronavirus disease 2019 (COVID-19) due to the SAR-CoV-2 virus, the UK Government declared several restrictions on non-essential travel and movement from 23rd March 2020 onwards. Some restrictions continued through 2021 and early 2022 with unknown impacts on long-term travel movements.*

IAQM guidance provides a screening distance of 50m from a Site boundary for ecological sites with respect to requiring an assessment construction dust. Only a narrow strip of the Mersey Estuary therefore falls within this screening distance.

16.5.2 The potential for any such impacts is dependent on aspects such as the scale of dust generation, the prevailing wind direction, distance and orientation of receptors to the source and presence of any screening and the sensitivity of the receptors.

16.5.3 The principal sources of construction dust would be soil stripping, excavation of soils for underground structures and cable routes, internal haulage and wind scouring of exposed surfaces. The generation of dust during construction works can however be readily mitigated using standard techniques employed by the industry. Typical techniques include:

i) Controlling of vehicle speeds through maintenance of an internal site speed limit;
ii) Maintenance of smooth-running surfaces;
iii) All traffic to keep to designated haul routes;
iv) Minimisation of drop heights of excavated materials;
v) Clear delineation of any stockpiles to deter vehicles running over edges;
vi) Care to ensure sure soil stripping, stockpiling and reinstatement do not take place in conditions likely to result in significant dust (i.e. very dry and windy conditions) or movement towards sensitive boundaries;
vii) Equipping all site vehicles and plant with upswept exhausts and radiator fan shields where practical;
viii) Provision of dust suppression where necessary, and particularly during dry windy conditions.

16.5.4 It is generally recognised that construction activities should not result in significant adverse impacts due to dust, subject to appropriate management and mitigation techniques being employed[2].

16.5.5 The nature of a solar farm is such that there would be some, albeit limited, earthworks. Most of the built development involves construction of prefabricated buildings, plant and machinery, rather than more conventional construction works which could give rise to greater sources of dust. The nearest sensitive receptors are at Frodsham and are greater than 100m from the construction works. As such the area would be deemed to be of low sensitivity with regards to dust deposition[2].

16.5.6 The DCO Application would be supported by an outline Construction Environmental Management Plan (OCEMP), which would include measures in relation to the mitigation of dust, including those outlined above. The required mitigation measures would be informed through a Construction Dust Assessment undertaken in accordance with the guidance outlined in the IAQM guidance[2] and which would be appended to the OCEMP. This assessment would be undertaken in light of the presence of nearby sensitive receptors identified above, and the nature of the construction works proposed. The assessment would also take into account any additional specific measures that may be required due to the presence of any contaminated materials that may be released during the works.

16.5.7 On the basis of the above, and following implementation of mitigation, it is considered unlikely that there would be any significant effects associated with construction phase dust and as such it is proposed to scoped this matter out of the ES.

*On-Road Vehicle Exhaust Emissions*

16.5.8 Potential impacts and effects due to on-road vehicle exhaust emissions depends on the quantity, routing and duration of construction traffic. The IAQM[1] provides screening thresholds for vehicle movements that would indicate the need for an air quality assessment. The screening thresholds take into account whether or not the vehicles may pass through an AQMA or an area of potential poor air quality.

16.5.9 Construction phase vehicle movements would be distant from any relevant AQMAs, the Thornton-le-Moors AQMA not being of relevance to the Proposed Development. This is because the appropriate IAQM screening criteria are changes in HGV movements of +100 Annual Average Daily Traffic (AADT) and +500 AADT. Based on the vehicle numbers presented in Chapter 15.0 it is anticipated that the construction phase vehicle movements would fall well below the relevant criteria both generally and within this AQMA. Potential effects are not therefore likely to be significant.

16.5.10 The DCO Application will be supported by an outline Construction Traffic Management Plan (OCTMP), which would include measures in relation to the management of routing of construction vehicles.

16.5.11 On the basis of the above it is considered unlikely that there would be any significant impacts associated with construction phase on-road vehicle exhaust emissions and as such it is proposed to scope this matter out of the ES.

*Non-Road Mobile Machinery (NRMM) and Plant*

16.5.12 The use of NRMM and plant will give rise to combustion emissions. However, given the nature of construction, which does not demand a high number of NRMM and plant vehicles, these are not likely to result in significant impacts and effects. Suitable mitigation measures for NRMM and plant e.g. use of plant that meet required standards, ensuring NRMM is regularly maintained, preventing NRMM idling unnecessarily, would be included in the OCEMP.

16.5.13 On the basis of the above it is considered unlikely that there would be any significant impacts associated with construction phase NRMM and plant emissions and as such it is proposed to scoped this matter out of the ES.

***Operation***

16.5.14 Due to the nature of the Proposed Development no emissions that may impact local air quality are anticipated from the on-site infrastructure. Any vehicle movements to or from the Proposed Development would be low in number and well below the IAQM screening thresholds during the operational phase.

16.5.15 Draft NPS EN-3 paragraph 2.45.10 states that:

*"Once solar farms are in operation, traffic movements to and from the site are generally very light, in some instances as little as a few visits each month by a light commercial vehicle or car. Should there be a need to replace machine components, this may generate heavier commercial vehicle movements, but these are likely to be infrequent. Therefore, it is very unlikely that traffic or transport impacts from the operational phase of a project would prevent it from being approved by the Secretary of State."*

16.5.16 As set out in Section 17.0 below, battery units within the BESS have the potential to generate heat and therefore there is a risk of a fire developing. As such an Outline Battery Safety Management Plan (OBSMP) is proposed to be provided with the DCO application to describe how the BESS facility would be managed to prevent a fire occurring.

16.5.17 On the basis of the above, it is considered unlikely that there would be any significant air quality impacts during the operational phase of the Proposed Development and as such it is proposed to scoped this matter out of the ES.

***Decommissioning***

16.5.18 Potential impacts and effects that may arise during the decommissioning phase due to local air quality pollutants are often similar, or of a lesser magnitude, than during the construction phase.

16.5.19 On the basis of the above comments with regards to the construction phase assessment it is considered unlikely that there would be any significant air quality impacts arising from the Proposed Development during the decommissioning phase and as such it is proposed to scoped this matter out of the ES.

**Table 16.3 - Summary of Assessment Scope**

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| Dust (deposition dust and $PM_{10}$ / $PM_{2.5}$) and potential impacts on human and ecological receptors | Scoped out | n/a | Scoped out | Construction (and decommissioning) dust can be readily mitigated using standard industry techniques and is not likely to potentially result in significant effects.<br><br>The required management and mitigation of dust would be incorporated into the OCEMP which would be informed by a dust assessment and submitted with the DCO Application. |
| On-road Vehicle Exhaust Emissions ($NO_x$, $NO_2$, $PM_{10}$ and $PM_{2.5}$) and potential impacts on human and ecological receptors | Scoped out | Scoped Out | Scoped out | On-road construction (and decommissioning) phase vehicle movements are anticipated to be well below relevant IAQM screening thresholds that indicate the need for an air quality assessment.<br><br>Access is to be taken from the west and on-road movements would be distant from any AQMAs or identified areas of potential poor air quality. |
| Non-road mobile machinery (NRMM) and Plant Exhaust Emissions ($NO_x$, $NO_2$, $PM_{10}$ and $PM_{2.5}$) and potential impacts on human and ecological receptors | Scoped out | Scoped Out | Scoped out | Small amount of NRMM and plant associated with the Proposed Development. Any potential emissions would not be of a level that may result in significant effects in relation to local air quality.<br><br>The required management and mitigation of dust would be incorporated |

| Topic | Construction | Operation | Decommissioning | Summary of Rationale |
|---|---|---|---|---|
| | | | | into the OCEMP which would be informed by a dust assessment and submitted with the DCO Application. |

## 16.6 Assumptions, Limitation and Uncertainties

16.6.1 The above is based on the findings in Chapter 15.0 which provide a detailed breakdown of predicted on-road vehicle movements during the construction and decommissioning phases. This establishes that numbers would be well below the IAQM screening thresholds. In the event there is a change to this situation the requirements for further air quality assessment would be reviewed.

# 17.0 OTHER ENVIRONMENTAL TOPICS

## 17.1 Introduction

17.1.1 The aim of the scoping stage is to focus the EIA on those environmental aspects that may be significantly affected by the Proposed Development. The following sections provides a summary of other environmental topics which have not been covered in the previous assessment chapters but have been considered during the preparation of this Scoping Report. The initial assessment work has determined that the effects associated with these topics will not be significant and so it is proposed to scope these topics out of detailed assessment within the ES.

## 17.2 Glint and Glare

17.2.1 Sunlight can under certain circumstances and at particular times of the day be reflected off solar panels in the direction of a receptor. This type of impact is referred to as glint and glare. Glint is defined as a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel. Glare is a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel.

17.2.2 Footnote 85 of Draft NPS-3 recognises that “most commercially available solar panels are designed with anti-reflective glass or are produced with anti-reflective coating and have a reflective capacity that is generally equal to or less hazardous than other objects typically found in the outdoor environment, such as bodies of water or glass buildings.” However, there are instances where glint or glare can present harm to receptors.

17.2.3 As such a preliminary assessment has been undertaken for Frodsham Solar. This assessment is contained at Appendix 17.1. The preliminary assessment has been undertaken using recognised modelling techniques and was conducted on a worst case basis for a fixed panel array with smooth glass without any anti-reflective coating. The assessment determines the level of impact that could be experienced at receptors (residential, aviation and road users). Where ‘no impact’ or ‘low impact’ is identified, the Proposed Development would not result in unacceptable effects and no mitigation is recommended. Where ‘moderate impact’ or ‘high impact’ is identified additional assessment and / or mitigation is deemed necessary to ensure impacts are not unacceptable i.e. significant.

17.2.4 The assessment has assumed that the entirety of the open areas of the Solar Array Development Area is developed with panels and the modelling does not take into account any vegetation or localised topography which could reduce or eliminate glint and glare effects. Where vegetation is clearly evident from aerial photography this is taken into account in the judgement on likely impact.

17.2.5 The assessment has concluded that Frodsham Solar would not result in any significant effects on Liverpool John Lennon Airport in relation to users of the Air Traffic Control (ATC) Tower, aircraft on runway approaches or aircraft on visual circuits of the airport.

17.2.6 Road receptors were identified on highways within 1km of the Site including the M56 located to the south of the Site. The need for potential mitigation was only identified on two relatively short sections of the M56, either side of Weaver Lane overbridge (refer to Figure 2 of Appendix 17.1), totalling a length of about 500m. There are areas of screening vegetation adjacent to the M56 to the east of the overbridge which could provide effective mitigation to potential glint and glare impacts, to the west there is less vegetation to mitigate potential effects. It is proposed that a 10m wide tree buffer would be provided in the locations identified within the assessment to mitigate the effects identified (refer to the pink lines shown on Figure 2 of Appendix 17.1 for sections of proposed screening).

17.2.7 143 residential dwellings within 1 km of the Site were assessed to understand the potential for glint and glare impacts on residential receptors. Of these 24, all located in one area to the south of the M56 (shown on Figure 3 of Appendix 17.1), were deemed to potentially experience glint and glare effects which could impact residential amenity.

17.2.8 Following the preliminary glint and glare assessment a site visit was undertaken to the residential receptor locations that would potentially experience a moderate impact. This identified that there is existing vegetation which would screen properties from views of the solar array, namely vegetation along Ship Street, Hawthorn Road and trees within the land between the receptors and the M56.

17.2.9 Figure 3 of Appendix 17.1 illustrates the location of potential receptors affected and locations where mitigation planning could be provided. With the provision of

mitigation there would be no locations which would experience significant or unacceptable Glint and Glare impacts.

17.2.10 It is proposed that as the design of the Proposed Development evolves further Glint and Glare modelling will be undertaken to ensure that the mitigation proposed effectively addresses any risk and accounts for the parameters of the design as it stands at DCO application. The results Glint and Glare modelling will be included as a Technical Appendix to the ES and would be considered in the LVIA as described in Chapter 7.0. It is considered that this will negate the need for a specific glint and glare chapter in the ES.

## 17.3 Agricultural Land

17.3.1 Paragraph 5.10.8 of NPS EN-1 requires that impacts on Best and Most Versatile (BMV) land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) are minimised and development directed towards areas of poorer quality (grades 3b, 4 and 5). This remains the position in the Draft NPS EN-1 and is also set out in the draft NPS EN-3, where both documents set out that development should preferably use land in areas of poorer quality (grades 3b, 4 and 5).

17.3.2 An Agricultural Land Classification and Soil Resources survey has been undertaken at the Site and is provided at Appendix 17.2.

17.3.3 The survey was undertaken in accordance with the Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria for grading the quality of agricultural land[142], and summarised in Natural England's Technical Information Note (TIN) 049[143].

17.3.4 In total, 79 soil profiles were examined across the Site. In summary the agricultural land quality across the Site is limited by soil wetness to Subgrade 3b and Grade 4. The ALC distribution within the Site is shown in Figure RAC/9921/2 of Appendix 17.2.

[142] MAFF (1988). *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land*. MAFF Publications.
[143] Natural England (2012). *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land*, Second Edition.

The mapped results indicate that approximately 16% of the Site is Subgrade 3b, 62% Grade 4 and 22% non-agricultural.

17.3.5 On the basis of the survey the Proposed Development would avoid impacts on BMV land and as such there would not be any significant effects on agricultural land. Impacts relating to agricultural businesses are considered in Chapter 14.0. It is therefore proposed to scope this matter out of the ES.

## 17.4 Human Health

17.4.1 The impact of energy projects on health is discussed in Section 4.13 of NPS EN-1 and Section 4.3 of the Draft NPS EN-1.

17.4.2 Paragraph 4.13.1 and 4.13.2 of NPS EN-1 sets out:

*4.13.1 Energy production has the potential to impact on the health and well-being ("health") of the population. Access to energy is clearly beneficial to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health.*

*4.13.2 The direct impacts on health may include increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests.*

17.4.3 Table 17.1 below considers the effects of the Proposed Development in relation to these matters.

**Table 17.1 – Health Effects of the Proposed Development**

| Matter | Impact |
|---|---|
| Traffic | Chapter 15.0 describes the level of traffic impact from Proposed Development. It establishes that even during the peak period of the construction phase, traffic numbers on the local highway network are below the thresholds for potential significant impacts set out within the IEMA 'Guidelines for the Assessment of Road Traffic' (January 1993).<br><br>During the operational phase it is anticipated that there will be a nominal number of staff on-site ant any one time, primarily undertaking maintenance tasks. There will also be a small number of visitor trips per week for deliveries and servicing of equipment. The levels of traffic would fall well below the IEAM guideline. |

| Matter | Impact |
|---|---|
| | During decommissioning the levels of traffic are likely to be similar to those during construction.<br><br>On the basis of the above there is unlikely to be any significant traffic related health effects from the Proposed Development. |
| Air, dust an odour | Chapter 16.0 considers impacts on air quality. The preliminary assessment considered the potential effects of the Proposed Development on air quality based on the guidance provided by the Institute of Air Quality Management in relation to air quality effects from traffic emissions, impacts which could arise from construction dust and emissions from Non-road mobile machinery (NRMM) and combustion plant exhaust emissions. The assessment concluded that the predicted levels of traffic were below the threshold values for likely significant effects and that best practice measures could be adopted to ensure that construction dust and NRMM emissions did not cause significant effects. Examples of the measures that would be adopted have been provided and it is proposed that the measures to be used would be detailed within an OCEMP to be submitted with the application.<br><br>There would be no air quality effects during the operational phase.<br><br>There would be no odorous emissions from the construction, operational or decommissioning phases.<br><br>On the basis of the above it is considered there would be no significant effects relating to air quality, dust or odour. |
| Hazardous Waste and Substances | Solar farms do not generate hazardous waste and do not require use of hazardous substances. As set out in Section 17.6 a Construction Waste Management Plan (CWMP) would be used to ensure wastes are managed sustainably during construction and the principles of the CWMP would be described in the OCEMP that would be submitted with the DCO application. |
| Noise | Chapter 13.0 describes the potential effects of noise and vibration arising from the Proposed Development. This is supported by Appendix 13.1 which provides a detailed noise impact assessment. The assessment reports the existing noise environment at nearby residential receptors and predicts the noise levels that would be generated by the Proposed Development. The assessment concludes that there would be no significant effects on residential receptors due to noise and vibration as a result of the Proposed Development. |
| Exposure to Radiation | The only likely emission of radiation from the Proposed Development is that associated with electromagnetic fields (EMFs). EMFs are produced both naturally and as a result of certain human activities. EMFs generally arise wherever electricity is produced, transmitted, distributed and used, and |

| Matter | Impact |
|---|---|
| | this includes electrical substations, powerlines, as well as domestic, office or industrial equipment that uses electricity.<br><br>The International Commission on Non – Ionizing Radiation Protection (ICNIRP) has developed guidelines on exposures to EMFs. The guidelines are designed to provide protection against all known health effects from EMFs[144].<br><br>The Draft NPS EN-5 states at paragraph 2.9.51 that "the levels of EMFs produced by power lines in normal operation are usually considerably lower than the ICNIRP 1998 reference levels. For electricity substations, the EMFs close to the sites tend to be dictated by the overhead lines and cables entering the installation, not the equipment within the site."<br><br>It goes on to state at paragraphs 2.9.56 and 2.9.58 that "The balance of scientific evidence over several decades of research has not proven a causal link between EMFs and cancer or any other disease… There is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line EMFs has any agriculturally significant consequences."<br><br>On the basis of the above, and in light of the voltages involved in transmission of electricity being a maximum of 132 kV, it is unlikely there would be any significant effects associated with EMF. |
| Increases in pests | The Proposed Development would give no reason for there to be an increase in rodents or flies, or other pests which could affect human health. |

17.4.4 Other matters relevant to human health, which have been addressed elsewhere in this Scoping Report, include human health effects of potential ground contamination and the potential for a temporary increase in the local population during construction phase, leading to pressures on local services.

17.4.5 Chapter 10.0 of this report considers impacts in relation to potential ground contamination. The chapter identifies the potential for contaminants to be present in certain areas of the Site. The ES will provide further assessment of this matter. However, it is anticipated that based on the desk study information currently available that mitigation for human health would be achieved through the adoption of standard

[144] *ICNIRP (1998).* Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz). *Health Phys, 74(4), 494-522.*

occupational hygiene measures which would be detailed in the Outline Construction Environmental Management Plan (OCEMP).

17.4.6 Chapter 14.0 of this report considers socio-economic impacts of the Proposed Development and includes consideration of the effects of the additional workforce in the area. Given the large working age population and construction workforce resident in the regional study area, and the accessibility of the Site to large centres of population it is considered that the workplace population and demand for social and community infrastructure would be a relatively limited, with the majority of the workforce travelling directly to site from their normal place of residence. In turn, this would imply no substantial increase in demand for local health and other social and community infrastructure.

17.4.7 On the basis of the above, it is considered that the effects of the Proposed Development which have the potential to affect human health would be adequately covered within the proposed scope of the ES and it is not proposed to provide a standalone human health assessment.

## 17.5 Major Accidents or Disasters

17.5.1 Schedule 4 paragraph 8 of the EIA Regulations requires that the ES includes a description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and / or disasters which are relevant to the project concerned. Further, that where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events and the approach to managing emergencies.

17.5.2 The reference to disasters is interpreted to relate to natural events, as indicated by the preamble to the 2014 Directive (2014/52/EU) which states at paragraph 15:

*"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment".*

17.5.3 Nonetheless, it is recognised that disasters can occur as a result of human intervention e.g., conflict and war, political influences etc.

17.5.4 In relation to major accidents the EIA Regulations refer to Directive 2012/18/EU (the control of major-accident hazards involving dangerous substances). This directive defines major accidents as:

*"an occurrence such as a major emission, fire, or explosion resulting from uncontrolled developments in the course of the operation of any establishment covered by this Directive, and leading to serious danger to human health or the environment, immediate or delayed, inside or outside the establishment, and involving one or more dangerous substances."*

17.5.5 The Proposed Development is located within a politically, geologically, and meteorologically stable part of Europe. Accordingly, the Proposed Development is not at material risk from, for example, civil unrest, war, earthquakes, or extreme weather conditions (hurricanes etc.).

17.5.6 In terms of any vulnerabilities specific in this location (i.e., on the Site) part of the Site lies within an area of flood risk (Flood Zone 3), albeit this is an area which is subject to flood defences. Chapter 9.0 describes how a Flood Risk Assessment will be undertaken to ensure that the Proposed Development is designed to ensure that critical components of infrastructure would not be affected by extreme flood events and that the Proposed Development will not exacerbate flood risk elsewhere.

17.5.7 The impacts from glint and glare which could potentially impact road traffic or aviation has been considered in Section 17.1. It has been established that through the implementation of mitigation that there would be no significant effects on these receptors.

17.5.8 The Site is crossed by a number of utilities, including a hydrocarbon pipeline. The design of the Proposed Development will take into account the easement and separation distances required by the owners and operators of the various utilities. These buffers are, in part, designed to safeguard the utilities from damage or disruption. Where it is necessary to cross utilities, particularly during the construction phase, it will be necessary to agree safe working practices with the utility operators prior to undertaking works. All works would be undertaken in accordance with the Health and Safety at Work Act 1974, Safety at Work Regulations 1999, CDM Regulations 2015 and the Pipelines Safety Regulations 1996. On the basis of the proposed approach to the design and the mitigation that would be implemented

during construction there would not be a significant likelihood of damage to the utilities at the Site.

17.5.9 With regard to major accidents the 2014 Directive describes that:

*"it is important to consider their [i.e., the Proposed Development] vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment."*

17.5.10 The focus here, as it is within the EIA Regulations, is on the vulnerability of the Proposed Development to major accidents and/or disasters and the likelihood of significant adverse effects occurring.

17.5.11 The solar PV panels would be inert and would not lead to any major emission, fire, or explosion. Other electrical infrastructure, in the form of inverters, transformers and cabling, would be subject to regular routine maintenance and inspection such that it will not pose a significant risk to creating an accident.

17.5.12 The Proposed Development includes a BESS. The battery units have the potential to generate heat and therefore there is a risk of a fire developing if the operator does not adopt sufficient management and control measures. The BESS would include cooling systems which are designed to regulate temperatures to within safe conditions to minimise the risk of fire. The units would also contain fire detection and suppression systems.

17.5.13 An Outline Battery Safety Management Plan (OBSMP) will be prepared and submitted with the DCO Application. The OBSMP will detail the regulatory guidance reviewed to ensure that all safety concerns around the BESS element of the Proposed Development are addressed so far as is reasonably practicable such that likely significant effects would not arise.

17.5.14 Based upon the above, we concluded that the Proposed Development would not give rise to significant adverse effects on the environment deriving from vulnerability of the development to risks of major accidents and / or disasters and propose that it is scoped out.

## 17.6 Waste

The types of wastes generated during construction are likely to comprise:

i) General waste from site offices and welfare facilities;
ii) Small quantities of waste from the maintenance of construction vehicles;
iii) Packaging waste from incoming materials; and
iv) Other waste from construction of fencing, access roads and other supporting infrastructure.

17.6.1 Many of the infrastructure elements would be prefabricated offsite i.e. PV panels, racks, inverters and transformers, BESS units, substation components. As such, the generation of waste resulting from the construction of these elements will be minimal.

17.6.2 There is likely to be a requirement for some earthworks on Site, and there would also be soil arisings resulting from the construction of underground cable trenches, piling operations or localised excavations for construction of foundations or placement of services. The CL:AIRE Code of Practice (CoP) provides a framework which allows the re-use of excavated materials on-site or their transfer between sites. If soil arisings are not used on-site then the contractor would look to reuse soils in accordance with the CoP, thereby minimising export of materials to landfill.

17.6.3 To ensure that wastes at the Site are minimised and managed in the most sustainable manner, in accordance with the Waste Hierarchy, a Construction Site Waste Management Plan (CSWMP) would be prepared prior to the commencement of construction works. The principles of the CSWMP would be described in the OCEMP that would accompany the DCO application.

17.6.4 During operation, waste arisings would be very limited. There would be some waste generated from ongoing maintenance activities, such as replacement of components and consumables associated with landscape maintenance. Any arisings would be managed in accordance with the Waste Duty of Care Code of Practice[145], which implements the duty of care set out in Section 34(1) of the Environmental Protection Act 1990. Wastes would be managed in accordance with the waste hierarchy as set

[145] *Department of Environment Food and Rural Affairs (2018) Waste Duty of Care of Practice.*

out in the Waste (England and Wales) Regulations 2011, any waste capable of being recycled would be sent to an appropriate recycling waste management facility.

17.6.5 In relation to decommissioning, waste arisings will be generated from the removal of PV panels, PV mounting structures, cabling, electrical equipment, fencing, foundations.

17.6.6 The majority of the mounting structures, cabling and fencing are comprised of metal and are readily recyclable. PV panels comprise aluminium frames, laminated glass, silicon cells and polymer sheeting. PV panels would be dismantled and the panels separated into their component parts to allow the constituent elements to be recycled. At the point of decommissioning all of the panels would be removed to a PV panel recycling facility. The resource value of the various components of the panels, along with the legislative requirements of the waste management regime, mean that the vast majority of the PV infrastructure would be recycled.

17.6.7 The Applicant would commit to a Decommissioning Resource Management Plan which would be used to ensure the types, quantities and final destination of waste generated during the decommissioning phase will be identified, measured and recorded.

17.6.8 On the basis of the above, and through the implementation of a CSWMP and the DRMP, it is not anticipated that the Proposed Development would result in any significant environmental effects associated with waste. The approach to waste management and the principles of the CSWMP and DRMP would be described in the Chapter 2.0 of the ES, the Proposed Development. However, on the basis that there are unlikely to be significant environmental effects associated with the production of waste it is proposed to scope out a detailed waste assessment from the ES.

## 18.0 STRUCTURE OF THE ENVIRONMENTAL STATEMENT

18.1.1 The ES will consist of three volumes and a Non-Technical Summary (NTS). This section provides a summary of each document that will form the ES.

18.1.2 **ES Volume 1: Main Report** – this will form the main body of the ES, detailing the results of the environmental assessment, likely significant effects arising from the Proposed Development, and the proposed mitigation measures. The ES will also identify opportunities for social and economic benefits and environmental enhancement. The ES is divided into a number of background and technical chapters, each being supported with figures and tabular information. ES Volume 1 will consider the environmental effects associated with a number of identified topics, which may receive significant environmental effects. Each topic will be assigned a separate technical chapter in the ES. Based on the conclusions of this Scoping Report the proposed structure of the ES is as follows:

i) Chapter 1: Introduction
ii) Chapter 2: The Proposed Development;
iii) Chapter 3: Alternatives and Design Evolution;
iv) Chapter 4: Consultation;
v) Chapter 5: Environmental Impact Assessment Methodology;
vi) Chapter 6: Landscape and Visual Amenity;
vii) Chapter 7: Ecology and Nature Conservation;
viii) Chapter 8: Flood Risk, Drainage and Surface Water;
ix) Chapter 9: Ground Conditions;
x) Chapter 10: Cultural Heritage and Archaeology;
xi) Chapter 11: Climate Change;
xii) Chapter 12: Cumulative and Intra-Project Effects; and
xiii) Chapter 13: Summary of Environmental Effects

18.1.3 **ES Volume 2: Technical Appendices** – A complete set of appendices will be provided for reference. These comprise of background data, technical reports, tables, figures and surveys which support the assessments in ES Volume 1.

18.1.4 **ES Volume 3**: **Figures** – A complete set of figures referenced within the ES.

18.1.5 **ES Non-Technical Summary (NTS)** – The NTS will be presented in a separate document and provides a concise description of the Proposed Development, the

considered alternatives, baseline, assessment methodology, potential environmental effects and mitigation measures. The NTS will be designed to provide information on the Proposed Development in an accessible format which can be understood by a wide audience and to assist interested parties with their familiarisation of the Proposed Development.

# FIGURES

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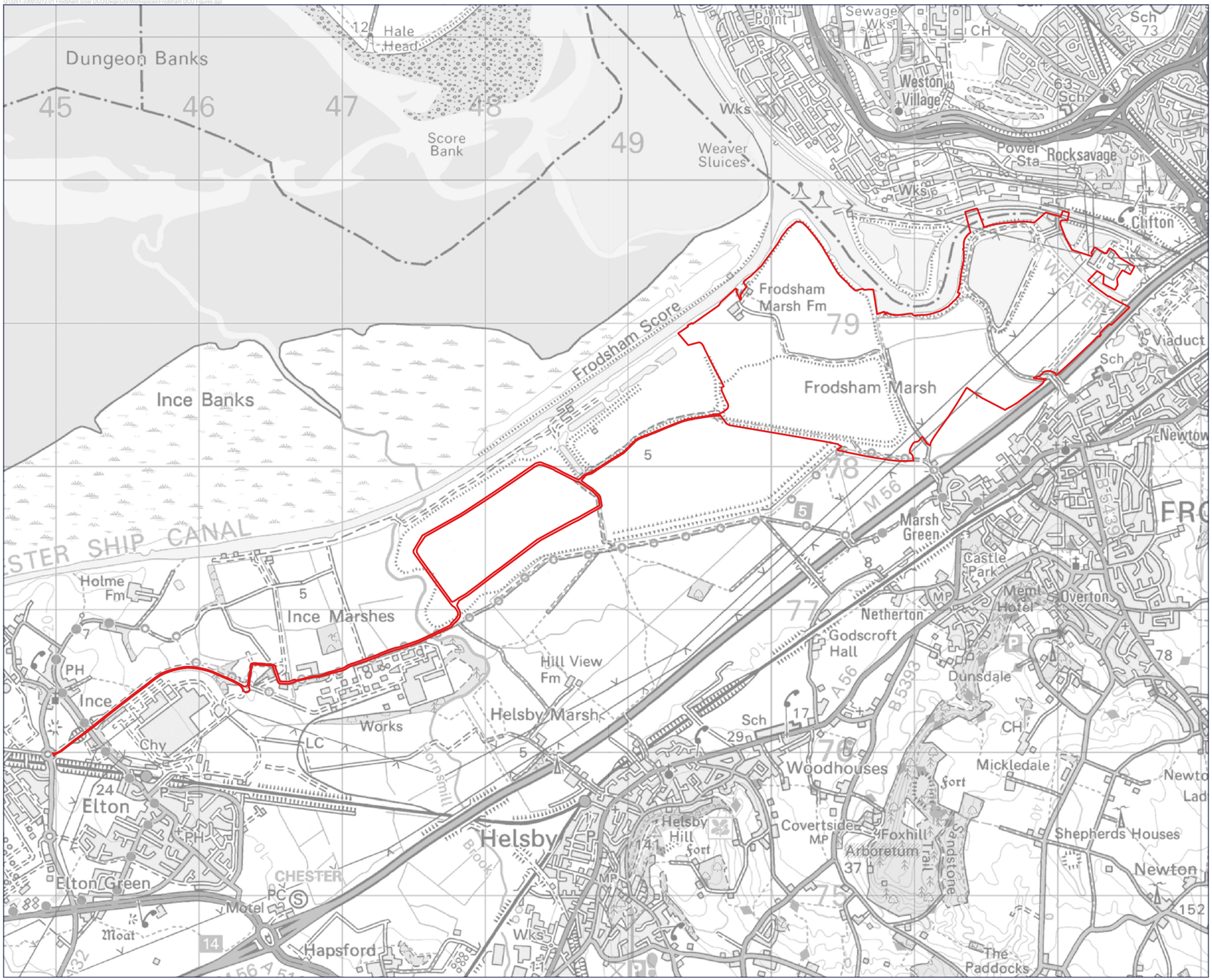
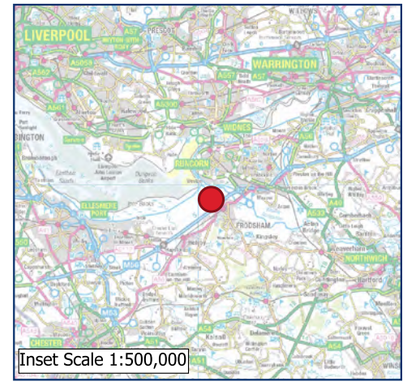
Site Boundary



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**FRODSHAM SOLAR**

Figure Number

**Figure 1.1**

Figure Title

**The Site Location**

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**1:25000@A3**

Date

**May 2023**

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Frodsham Wind Farm Access Tracks

Protos Development Area

Grinsome Road Roundabout

Marsh Lane

Former CF Fertiliser Plant

Pool Lane Roundabout

Grinsome Road

Encirc Glass Manufacturing Facility

Pool Lane

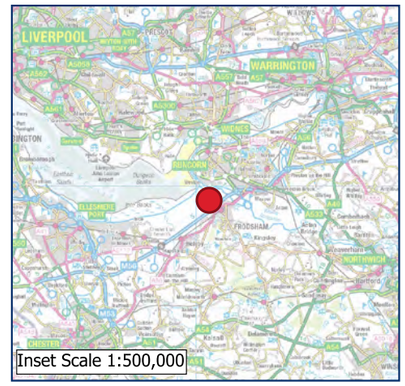
Solar Array Development Area

INEOS Inovyn Private Wire Connection

SPEN Grid Connection

Access Road with Protos Private Wire Connection

Access Road without Private Wire Connection

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**FRODSHAM SOLAR**

Figure Number

**Figure 1.2**

Figure Title

**Proposed Development Area**

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Date

**May 2023**

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Site Boundary

2.5km Buffer

Flooding and Rivers

Main Rivers

Areas Benefiting from Flood Defences

Flood Zone 2

Flood Zone 3

Listed Buildings

I

II*

II

Scheduled Monument

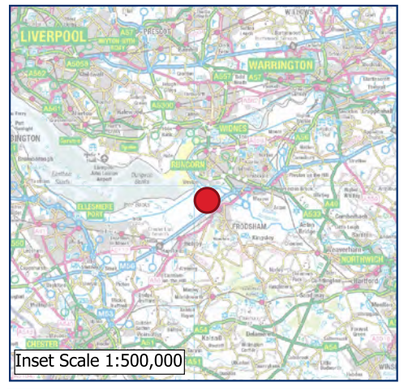
Registered Parks and Gardens

SSSI

SPA

Ramsar

Green Belt

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 1.3**

Figure Title

**Planning and Environmental Designations**

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Date

**May 2023**

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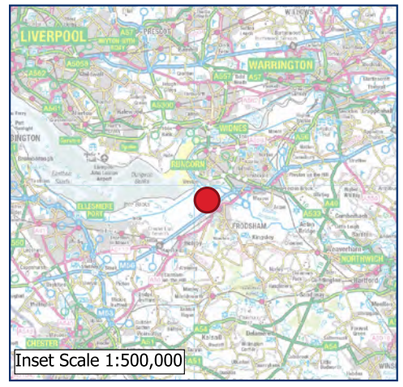
Site Boundary

Manchester Ship Canal Dredging Deposit Ground Cells

Mersey Estuary
INEOS Inovyn Runcorn Site
Private wire connection corridor to INEOS Inovyn Runcorn Site
Weaver Navigation
SPEN and National Grid Substation
INEOS Inovyn Deposit Ground
Frodsham Marsh Farm
Cell 1
T15
Frodsham Score
Manchester Ship Canal
River Weaver
Frodsham Pumping Station
T16
Land managed for Frodsham Wildflowers
Cell 2
Agricultural Land
Eastern Cluster of Frodsham Wind Farm
T18
T17
Cell 3
Cell 5
T20
T19
Access Road to the Solar Array Development Area
M56
Cell 6
Frodsham



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**FRODSHAM SOLAR**

Figure Number

**Figure 1.4**

Figure Title

**Solar Array Development Area Context Plan**

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Date

**May 2023**

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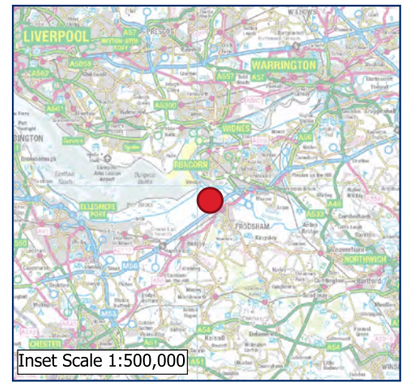
Frodsham RB102
Frodsham FP91
Frodsham FP99
Frodsham FP81
Frodsham RB108
Frodsham RB99
Frodsham RB98
Frodsham RB101
Frodsham RB103
Frodsham RB97
Fodsham RB104
Frodsham RB107
Frodsham FP95
RB40

Site Boundary

PROW in the Site Boundary

- Fodsham RB104
- Frodsham FP81
- Frodsham FP91
- Frodsham FP93
- Frodsham FP95
- Frodsham RB101
- Frodsham RB102
- Frodsham RB103
- Frodsham RB107
- Frodsham RB108
- Frodsham RB97
- Frodsham RB98
- Frodsham RB99
- RB40

National Cycle Route 5

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 1.5**

Figure Title

**Public Rights of Way**

Scale

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Date

**May 2023**

Knowsley District (B)

Liverpool District (B)

Warrington (B)

Halton (B)

Cheshire West and Chester (B)

5km

2.5km

WIDNES

HALTON

RUNCORN

FRODSHAM

Weaver Valley

Helsby & Frodsham Hills

Dungeon Banks

Ince Banks

Ince Marshes

MANCHESTER SHIP CANAL

Key

- Scoping Redline Boundary (The Site)
- Solar Array Development Area
- Local Authority Boundary
- Area of Special County Value
- Green Belt

Landscape Character Areas

- 2a: Frodsham
- 2b: Helsby Hill
- 3a: Helsby to Tarporley Sandstone Fringe
- 4a: Frodsham, Helsby and Lordship Marshes
- 5b: Frodsham to Northwich
- 5f: Helsby to Frodsham
- 8a:Aston
- 9a: Dunham to Tarvin Plain
- 15c: Lower Weaver Valley
- 16a: Stanlow and Ince Banks
- 3: Moore Village and Keckwick Brook Valley
- 4: Upper Mersey Estuary
- 5: Norton Wooded Parkland
- 6: Runcorn Hill and Heath Parkland
- 7: Hale Shore and Farmland



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Project

FRODSHAM SOLAR

Figure Number

Figure 7.1

Figure Title

Landscape Charater and Designations

Scale

1:50000@A3

Date

May 2023

VIEWPOINTS

1. Mersey Way, near Hale
2. A56, Sutton Weaver
3. Ship Street, Frodsham
4. Hawthorne Road, Frodsham
5. Langdale Way, Frodsham
6. Public footpath, near St Laurence's Church, Frodsham
7. Castle Park, Frodsham
8. A56, Chester Road, Frodsham
9. Frodsham Hill War Memorial
10. Public footpath, north of Foxhill House
11. Plovers Lane, Helsby
12. Bates Lane
13. Helsby Hill
14. M56, Weaver Lane overbridge
15. M56, Brook Furlong overbridge
16. M56, Straight Length overbridge
17. Public footpath within Site
18. Restricted byway leading to Frodsham Marsh Farm
19. Restricted byway, Lordship Lane
20. Restricted byway, Cross Lane
21. Resticted byway, Straight Length
22. Public footpath, Ince
23. Public footpath adj. to Manchester Ship Canal (northern Site boundary)
24. The Willows, Frodsham
25. Public footpath adj. to River Weaver (eastern Site boundary)

Key

- Scoping Redline Boundary (The Site)
- Solar Array Development Area
- Local Authority Boundary

Theoretical Visibility of 3.5m high solar panels

- Approx. 1%-20% of development theoretically visible
- Approx. 20%-40% of development theoreticially visible
- Approx. 40%-60% of development theoretically visible
- Approx. 60%-80% of development theoretically visible
- Approx. 80%-100% of development theoretically visible
- Proposed Viewpoint Location

NOTES

1. Zone of Theoretical Visibility (ZTV) has been generated using Environment Agency 2m LIDAR Digital Surface Model (DSM) data, which reflects the presence of vegetation, buildings and other structures
2. ZTV generation has allowed for the curvature of the earth, and for light refraction
3. ZTV has been generated based upon an observer eye height of 1.7m above ground level



N

0 1,000 2,000 3,000 4,000 5,000 m

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 7.2**

Figure Title

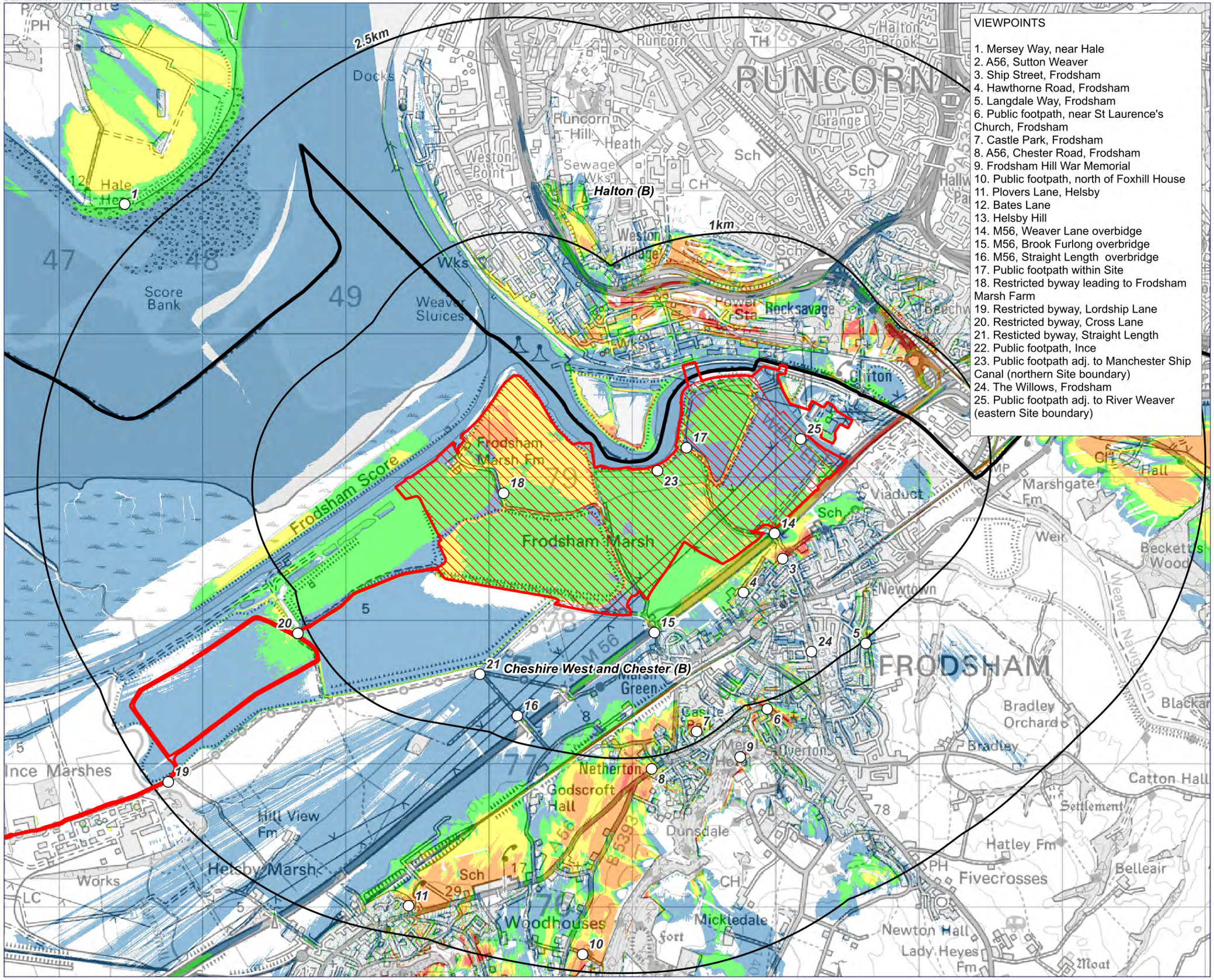
**Zone of Theoretical Visibility (5km radius)**

Scale

**1:50000@A3**

Date

**May 2023**




VIEWPOINTS

1. Mersey Way, near Hale
2. A56, Sutton Weaver
3. Ship Street, Frodsham
4. Hawthorne Road, Frodsham
5. Langdale Way, Frodsham
6. Public footpath, near St Laurence's Church, Frodsham
7. Castle Park, Frodsham
8. A56, Chester Road, Frodsham
9. Frodsham Hill War Memorial
10. Public footpath, north of Foxhill House
11. Plovers Lane, Helsby
12. Bates Lane
13. Helsby Hill
14. M56, Weaver Lane overbidge
15. M56, Brook Furlong overbridge
16. M56, Straight Length overbridge
17. Public footpath within Site
18. Restricted byway leading to Frodsham Marsh Farm
19. Restricted byway, Lordship Lane
20. Restricted byway, Cross Lane
21. Resticted byway, Straight Length
22. Public footpath, Ince
23. Public footpath adj. to Manchester Ship Canal (northern Site boundary)
24. The Willows, Frodsham
25. Public footpath adj. to River Weaver (eastern Site boundary)

Key

- Scoping Redline Boundary (The Site)
- Solar Array Development Area
- Local Authority Boundary

Theoretical Visibility of 3.5m high solar panels

- Approx. 1%-20% of development theoretically visible
- Approx. 20%-40% of development theoretically visible
- Approx. 40%-60% of development theoretically visible
- Approx. 60%-80% of development theoretically visible
- Approx. 80%-100% of development theoretically visible
- Proposed Viewpoint Location

NOTES

1. Zone of Theoretical Visibility (ZTV) has been generated using Environment Agency 2m LIDAR Digital Surface Model (DSM) data, which reflects the presence of vegetation, buildings and other structures
2. ZTV generation has allowed for the curvature of the earth, and for light refraction
3. ZTV has been generated based upon an observer eye height of 1.7m above ground level



N

0 500 1,000 1,500 2,000 2,500 m

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 7.3**

Figure Title

**Zone of Theoretical Visibility (2.5km radius)**

Scale

**1:25000@A3**

Date

**June 2023**

Q:\3251-3300\3272-01 Frodsham Solar DCO\Dwgs\GIS\Workspaces\Frodsham DCO Figures.qgz

Flood Brook Clough

Runcorn Hill

Mersey Estuary

Frodsham Railway and Road cuttings

Dunsdale Hollow

Midland Meres & Mosses - Phase 1

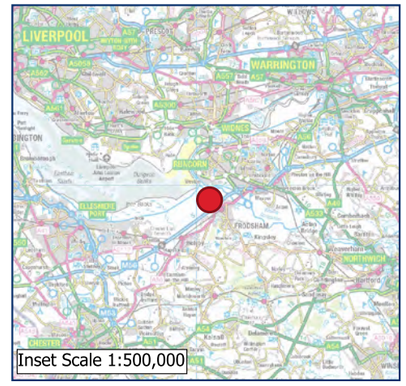
Midland Meres & Mosses - Phase 2

- Site Boundary
- Solar Array Development Area (SADA)
- 2km SADA Buffer
- 10km SADA Buffer

Designated Sites

- Local Nature Reserves
- Ramsar
- SPA
- SSSI

NOTE: In accordance with Zones of Influence only SSSI/LNRs in the 2km SADA Buffer and SPA/Ramsar sites in the 10km SADA Buffer have been named



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N

0 1,700 3,400 5,100 6,800 8,500 m

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 8.1**

Figure Title

**Statutory Designated Nature Conservation Sites**

Scale

**1:85000@A3**

Date

**May 2023**

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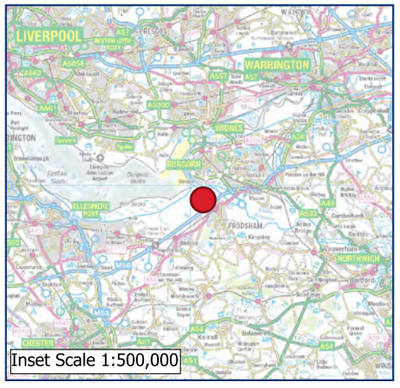
Site Boundary

Solar Array Development Area (SADA)

Wind Farm Mitigation Cell 3

600m Wind Turbine Buffer

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N

0 300 600 900 1,200 1,500 m

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 8.2**

Figure Title

**600m Buffer from Wind Turbines**

Scale

**1:15000@A3**

Date

**May 2023**

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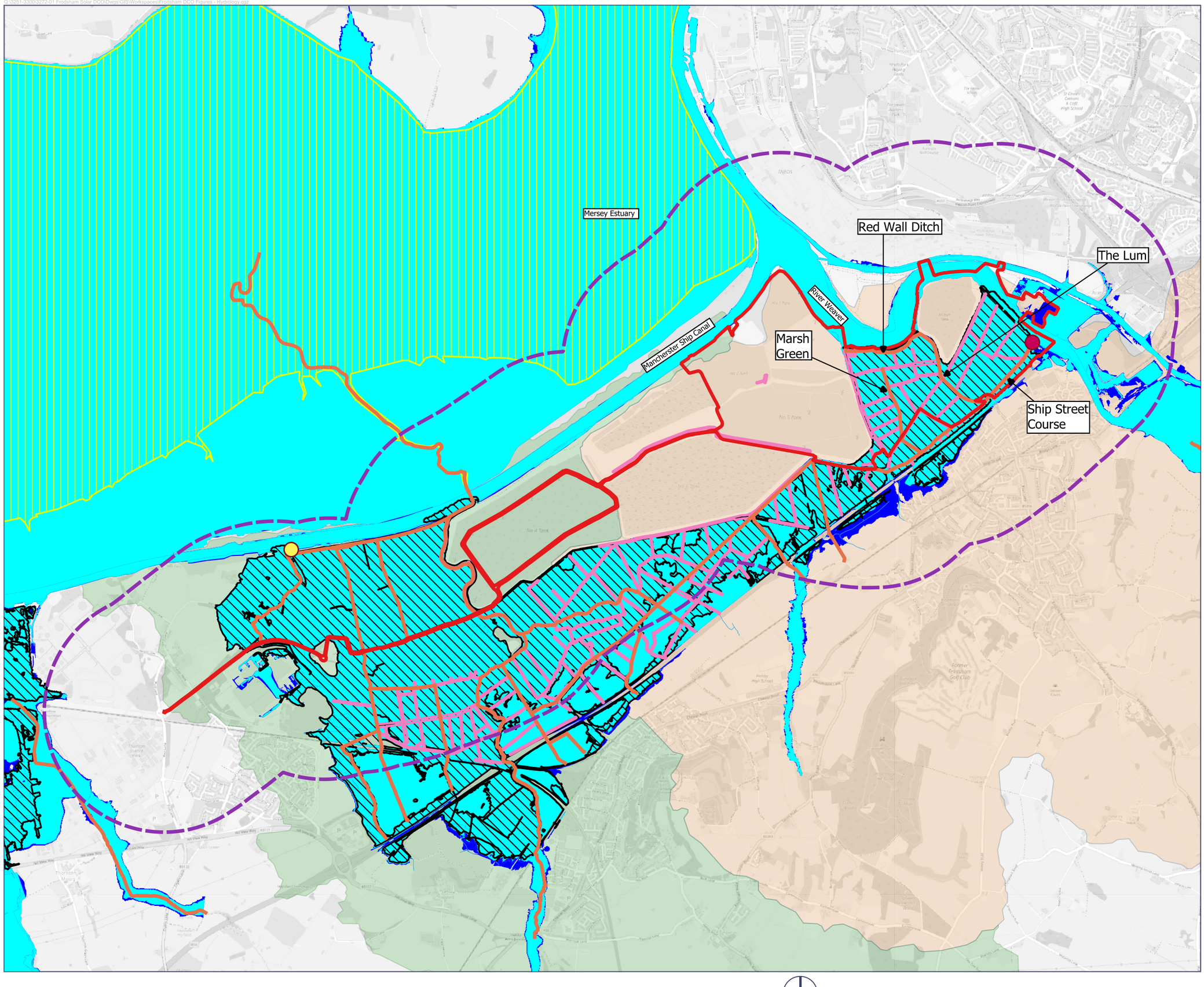


Site Boundary

1km Study Area

Statutory Main Rivers

Drainage Ditches (ordinary watercourse)

Pumping Stations

Frodsham Pumping Station

Ince Pumping Station

Water Framework Directive River Waterbody Catchment

Weaver (Dane to Frodsham) Water Body

Peckmill Brook, Hoolpool Gutter at Ince Marshes Water Body

Mersey Water Body

Flood Risk Zones

Areas Benefiting from Flood Defences

Flood Zone 2

Flood Zone 3



N

0 600 1,200 1,800 2,400 3,000 m

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 9.1**

Figure Title

**Surface Water and Flood Risk**

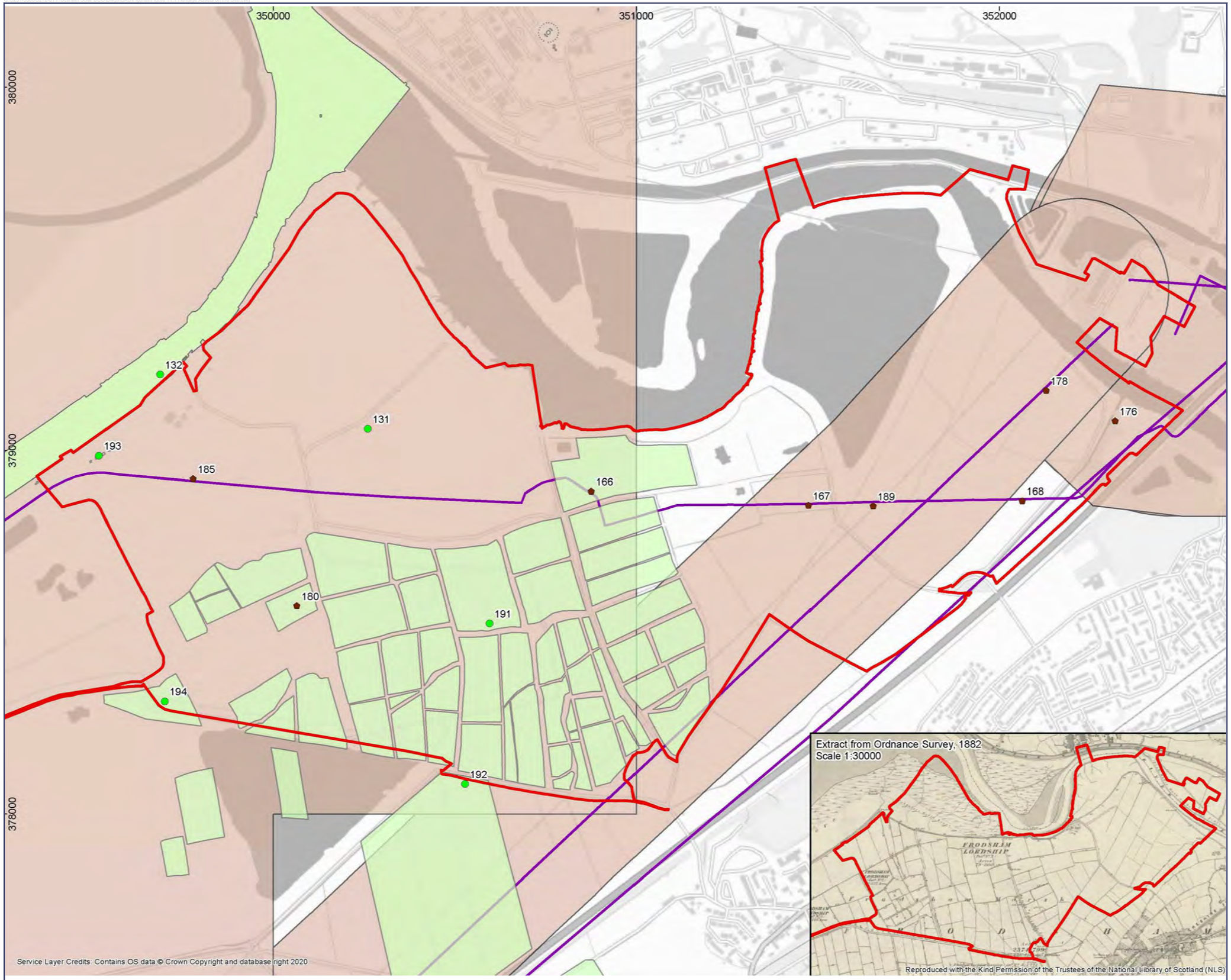
Scale

**1:30000@A3**

Date

**May 2023**

Q:\3251-33003272-01 Frodsham Solar DCO\Dwgs\CAD\Figures\Figure 11.1 Heritage Assets on the Site.dwg




Legend
- The Site
- Non-designated Heritage Asset
- Event
- HER Monument Extent
- HER Event Extent
- HER Event Linear Extent



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0 500 750 1000m

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**FRODSHAM SOLAR**

Figure Number

**Figure 11.1**

Figure Title

**Heritage Assets on the Site**

Scale

**1:10,000 @A3**

Date

**May 2023**

Q:\3251-3300\3272-01 Frodsham Solar DCO\Dwgs\CAD\Figures\Figure 11.2 Heritage Assets within the 1km Study Area.dwg

350000

352000

354000

380000

376000

Inset

Inset-Frodsham Town Conservation Area
Scale 1:10000

Service Layer Credits: Contains OS data © Crown Copyright and database right 2020

Legend

- The Site
- 1km Study Area
- Listed Building- Grade II*
- Listed Building- Grade II
- Registered Park and Garden- Grade II
- Conservation Area
- Locally Listed Building
- Non-designated Heritage Asset
- Event
- Registered Park and Garden Extent
- Conservation Area Extent
- HER Monument Extent
- HER Event Extent
- HER Event Linear Extent
- Area Of Archaeological Potential



N

0 0.5 1 1.5 2km

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 11.2**

Figure Title

**Heritage Assets within the 1km Study Area**

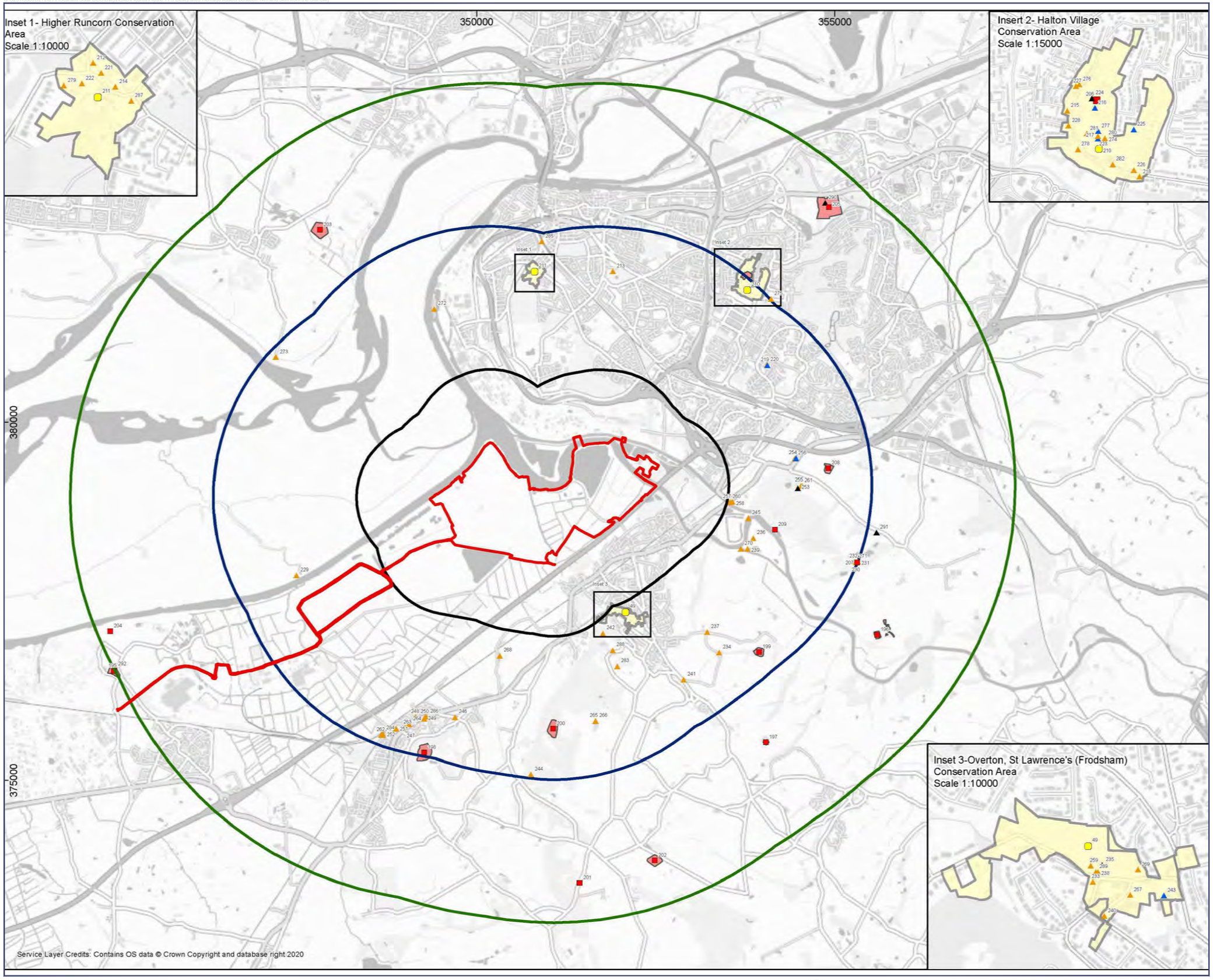
Scale

**1:20,000 @A3**

Date

**May 2023**

O:\3251-33003272-01 Frodsham Solar DCO\Dwgs\CAD\Figures\Figure 11.3 Designated Heritage Assets between 1km and 5km from the Site.dwg




Legend

- The Site
- 1km Study Area
- 3km Study Area
- 5km Study Area
- Scheduled Monument
- Listed Building- Grade I
- Listed Building- Grade II*
- Listed Building- Grade II
- Conservation Area
- Scheduled Monument Extent
- Conservation Area Extent



N

0 1 2 3 4 5km

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Project

**FRODSHAM SOLAR**

Figure Number

**Figure 11.3**

Figure Title

**Designated Heritage Assets between 1km and 5km from the Site**

Scale

**1:50,000 @A3**

Date

**May 2023**

# Appendix 7.1 – LVIA Methodology

## Appendix 7.1: Landscape and Visual Impact Assessment Methodology

### 1.0 Introduction

1.1 Landscape and Visual Impact Assessment (LVIA) is a tool used to systematically identify and assess the nature and significance of the effects of a proposed development upon the landscape and upon views and visual amenity. The purpose of the LVIA is to identify the level and nature of effect arising from a proposed development and if necessary, through an iterative design process, to inform changes to the development and evolution of mitigation strategies which minimise significant effects wherever possible.

1.2 The methodology for this LVIA is informed by guidance contained within the *Guidelines for Landscape and Visual Impact Assessment* (The Landscape Institute and Institute of Environmental Assessment, 3rd Edition, 2013), often referred to as 'the GLVIA'. The LVIA aims to establish the following:

- A clear understanding of the development site and its context, in respect of the physical and perceived landscape and of views and visual amenity;
- An understanding of the proposed development in terms of how this would relate to the existing landscape and views;
- An identification of likely significant effects of the proposed development upon the landscape and upon views, throughout the life-cycle of the development, including cumulative interactions with other developments;
- Those mitigation measures necessary to reduce or eliminate any potential adverse effect on the landscape or views arising as a result of the proposed development; and
- A conclusion as to the residual likely significant effects of the proposed development.

1.3 Professional judgement is a very important part of the LVIA process at every stage of the assessment. This judgement must be exercised within an assessment framework that transparently sets out the steps in the assessment process which have led to the overall conclusions. This is emphasised in Box 3.1 (page 37) of the GLVIA, which advocates a structured approach that considers the sensitivity of the receptor and magnitude of the effect when determining if an effect is significant or not.

1.4 To ensure the transparency of the assessment and professional judgements made, the LVIA follows a standard approach, namely:

- The establishment of the baseline conditions, against which the effects of the proposed development will be assessed;
- The determination of the nature of the receptor likely to be affected, i.e. its sensitivity;
- The prediction of the nature of the effect likely to occur, i.e. the magnitude of change; and

- An assessment of whether a likely significant effect would occur upon any receptor, by considering the predicted magnitude of change together with the sensitivity of the receptor, taking into account any proposed mitigation measures.

1.5 The GLVIA clarifies that the guidance concentrates on
[1.20] "*…principles while also seeking to steer specific approaches where there is a general consensus on methods and techniques. It is not intended to be prescriptive, in that it does not provide a detailed 'recipe' that can be followed in every situation. It is always the primary responsibility of any landscape professional carrying out an assessment to ensure that the approach and methodology adopted are appropriate to the particular circumstance*".

1.6 As set out above, use of professional judgement within a structured assessment framework is a very important element of the assessment of landscape and visual effects. As discussed in the GLVIA:
[2.23] "*…Whilst there is some scope for quantitative measurement of some relatively objective matters, …much of the assessment must rely on qualitative judgement, for example about what effect the introduction of a new development or land use change may have on visual amenity, or about the significance of change in the character of the landscape and whether it is positive or negative*".
[2.24] "*…In all cases there is a need for the judgements that are made to be reasonable and based on clear and transparent methods so that the reasoning applied at different stages can be traced and examined by others…*"
[2.26] "*…In carrying out an LVIA the landscape professional must always take an independent stance, and fully and transparently address both the negative and positive effects of a scheme in a way that is accessible and reliable for all parties concerned*".

1.7 Landscape and visual matters are separate issues, although closely related and interlinked, are dealt with as such throughout the LVIA. The methodologies for assessing both are outlined separately below.

## 2.0 Landscape Assessment

2.1 The landscape assessment considers the potential effects of the proposed development on the components of the landscape as an environmental resource. Landscape receptors which could be affected by a proposed development may include:

- Individual constituent elements and features of the landscape (sometimes referred to as landscape fabric);
- Specific aesthetic and perceptual qualities of the landscape;
- The overall character and key characteristics of the landscape as experienced in different areas (e.g. landscape character areas or types).

***Sensitivity***

2.2 The nature of a landscape receptor likely to be affected, i.e. its **sensitivity** is determined by considering two factors, namely:

- Susceptibility to change; and
- Value.

*Susceptibility to Change*

2.3 Susceptibility to change is defined in the GLVIA as follows:

[5.40] "*This means the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular landscape type or area, or an individual element and/or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning polices and strategies*"

[5.41] "*The assessment may take place in situations where there are existing landscape sensitivity and capacity studies, which have become increasingly common. They may deal with the general type of development that is proposed, in which case they may provide useful preliminary background information for assessment. But they cannot provide a substitute for the individual assessment of the susceptibility of the receptors in relation to change arising from the specific development proposal*".

2.4 To understand susceptibility to change, the various characteristics/factors that make up a particular landscape must be identified and consideration given as to how these will be affected by the proposed development. Consideration is given to physical and perceptual factors which are considered together to derive an overall susceptibility to change. Factors influencing the susceptibility of a landscape to change resulting from *a large solar farm* are set out below:

- **Scale:** A larger scale landscape (relative to the development proposed) will typically be less susceptible than a smaller scale landscape;
- **Pattern/Complexity:** The susceptibility of a receiving landscape to change will be influenced by the specific pattern of features and elements present and by the complexity of this pattern;
- **Development/Human Influence:** A landscape that includes obvious alterations to natural ground levels, contemporary development, or that is clearly functional/utilitarian in land use will typically be less susceptible than one where development is more traditional in style, or where natural influences and natural or long-established landforms are predominant;

- **Connections with adjacent areas:** A landscape which has a clear relationship with other surrounding landscapes, for example in relation to views in and out, will typically be more susceptible than one where such relationships are not present;
- **Visual Interruption:** A landscape where views are frequently interrupted by screening features, for example vegetation cover or variations in landform, will typically be less susceptible than one where there are few / no screening features.

2.5 A particular landscape may have different characteristics that are more or less susceptible to change. As such, the overall susceptibility to change is allocated using professional judgement based upon consideration of the various factors outlined above and the relative weight attached to these (which will vary from landscape to landscape). The assessment of susceptibility is expressed using a three point verbal scale of high, medium or low. Where appropriate, intermediate levels such as medium/high or low/medium are used to refine the assessment. The rationale in support of the assessment of susceptibility is set out for each receptor in the assessment, so that it is clear how each judgement has been made.

*Value*

2.6 The value of the landscape receptor is independent of any development proposal. The absence of a formal landscape designation does not necessarily imply that a landscape is of lower value. Value is defined in the GLVIA as:
[5.19] "*…the relative value that is attached to different landscapes by society, bearing in mind that a landscape may be valued by different stakeholders for a whole variety of reasons…Landscapes or their component parts may be valued at the community, local, national or international levels…*"

2.7 Factors that can help in identifying valued landscapes include:

- Presence/absence of statutory landscape designations;
- Presence/absence of local landscape designations and associated policies;
- Landscape quality/condition;
- Scenic quality;
- Rarity of particular elements/features;
- Representativeness;
- Conservation interest;
- Recreation value;
- Perceptual aspects; and
- Cultural associations.

2.8 The assessment of value is expressed on a similar basis to that described for susceptibility of change above. Table 2.1 indicates how the above factors have been used to determine landscape value.

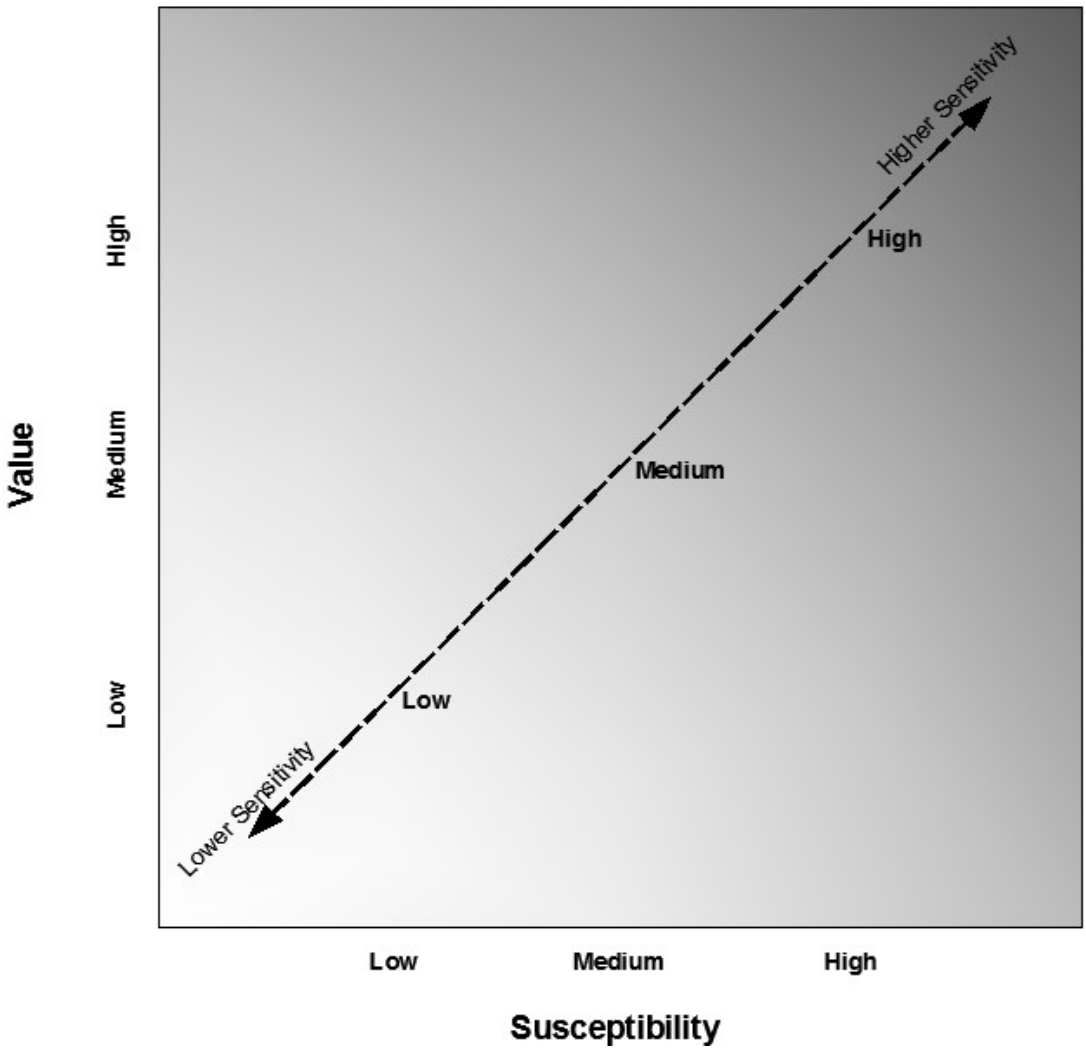
**Table 2.1: Landscape Value Criteria**

| | Criteria tending towards higher or lower value | |
|---|---|---|
| | Higher ⟷ | Lower |
| Value | Unique, and/or strongly positive landscape character, often with strong associations or (non-landscape) environmental designations.<br>Nationally designated landscape (protected by statute). | Widespread or common landscape character. Negative character. Lack of other environmental qualities<br>Landscape without formal designation and with limited positive contribution to the locality |

*Sensitivity*

2.9 Susceptibility to change and value are considered together to determine the sensitivity of the receptor. It should be noted that the relationship between susceptibility to change and value can be complex and is not linear. For example, a highly-valued landscape (such as a National Park) may have a low susceptibility to change, due both to the characteristics of the landscape and the nature of the change proposed. Figure 2.1 (below) provides a guide as to how susceptibility and value can be combined to assess sensitivity (with the grey shading indicative of the increasing sensitivity of receptors with increasing susceptibility and / or value). However, the final assessment of sensitivity is one of professional judgement based on consideration of the susceptibility and value assessments.

**Figure 2.1: Indicative Sensitivity Assessment**




***Magnitude***

2.10 The nature of the effect that is likely to occur, i.e. its **magnitude**, is determined by considering four separate factors, namely:

- Size/scale;
- Geographical extent;
- Duration;
- Reversibility.

2.11 The size and scale of an effect is determined by considering the amount of change experienced by a receptor, including:

- The extent of existing landscape elements that would be lost, the proportion of the total extent that this represents and the contribution of that element to the wider character

- The degree to which aesthetic or perceptual aspects of the landscapes are altered by the removal, or introduction of new landscape components;
- Whether change affects the key characteristics of a landscape.

2.12 The geographical extent of an effect is the area over which effects will be experienced. It is not the same as size / scale, as a small-scale change may be experienced over a wider area, or vice-versa.

2.13 The duration of an effect simply relates to the length of time for which it would be experienced, as follows:

- Long-term: 10+ years: or the change could not reasonably be considered temporary in nature;
- Medium-term: 3-10 years;
- Short-term: 0-3 years.

2.14 The reversibility of an effect relates to the prospects and practicality of an effect being able to be wholly or partially reversed, or whether the change cannot realistically be reversed, i.e. it is permanent.

2.15 These four factors are then considered together to derive an overall magnitude of change for each receptor, which is determined by use of professional judgement. The assessment of the magnitude of change is expressed using a four point verbal scale of large, medium, small or negligible. Where appropriate, intermediate levels such as medium / large or small / medium are used to refine the assessment. Table 2.2 (below) indicates how the above factors have been used to inform magnitude of change. As the circumstances of each specific receptor will vary, a reasoned narrative is set out in the LVIA in order to justify the particular magnitude of change allocated to each receptor.

**Table 2.2: Magnitude of Landscape Change Criteria (indicative)**

| Magnitude | Description |
|---|---|
| Large | A substantial change in landscape characteristics and/or over extensive geographical area and/or which may result in an irreversible landscape impact. |
| Medium | A moderate change in landscape characteristics and/or which may be over a large geographical area, and/or which may be reversible over a long duration of time. |
| Small | A small change in landscape characteristics and/or which may be over a relatively localised geographical area, and/or which may be reversible over a short duration of time. |
| Negligible | A barely perceptible change in landscape characteristics and/or which is focused on a small geographical area, and/or which is almost or completely reversible. |

## 3.0 Visual Assessment

3.1 A visual assessment is concerned with the potential effects upon the population likely to be affected (i.e. the views experienced by people). As for landscape effects (Section 2.0), the sensitivity of the receptor affected is identified, as is the magnitude of the change that would occur. These are then considered together to determine the level and significance of effect.

3.2 A key part of the visual assessment is the assessment of effects from a number of predetermined viewpoints, which reflect views available to different groups of people. The viewpoint itself is not the receptor; rather it is the people that would be experiencing the view. These people will generally have different responses to a change in view depending upon their location, their activity and other factors, including the weather and time of day or year. Viewpoints fall into three categories (as set out in the GLVIA):

- Representative viewpoints (which represent the experience of different types of receptors in the vicinity);
- Specific viewpoints (a particular view, for example a well-known beauty spot);
- Illustrative viewpoints (which illustrate a particular effect or issue, which may include limited or lack of visibility).

3.3 Private viewpoints, such as from specific residential properties are not typically included in the LVIA. It is often impractical to visit all affected properties and access to private land may not be granted. Representative or specific viewpoints from nearby publicly accessible locations can often give an impression of what effects from private land would be.

***Sensitivity***

3.4 The nature of a visual receptor likely to be affected, i.e. its **sensitivity** is determined by considering two factors, namely:

- Susceptibility to change;
- Value.

*Susceptibility to Change*

3.5 The GLVIA identifies susceptibility to change in view/visual amenity as:
[6.32] "*...mainly a function of:*

- *The occupation or activity of people experiencing the view at particular locations; and*
- *The extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations*".

3.6 Susceptibility to change is, in part, classified based upon the indicative criteria, provided in the GLVIA, as set out in Table 3.1.

**Table 3.1: Typical Visual Susceptibility to Change Criteria (indicative)**

| Criteria Level | Description |
|---|---|
| ***Susceptibility to Change*** | |
| High | Residents at home;<br>People engaged in outdoor recreation, whose attention/interest is likely to be focused on the landscape or particular views, including from public rights of way;<br>Visitors to heritage assets or other attractions, where views of the surroundings are an important contributor to the experience;<br>Communities where views contribute to the landscape setting enjoyed by residents;<br>Travellers on scenic routes. |
| Medium | Travellers on road, rail, or other transport routes. |
| Low | People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape;<br>People at their place of work whose attention may be focused on their work / activity and not their surroundings. |

3.7 It is important to note that the examples set out in GLVIA and Table 3.1 above only address the first bullet point and part of the second bullet point in paragraph 3.5 above (which are focussed on the occupation or activity of the people and the extent to which their attention is focussed on the view).

3.8 As such, the assessment of susceptibility in Table 3.1 and GLVIA (pages 113 &114) needs to be adjusted to reflect the requirements of the final part of the second bullet point, namely the visual amenity that people currently experience. GLVIA identifies clearly that the division between categories of susceptibility to change:
[6.35] "*…is not black and white and in reality there will be a gradation in susceptibility to change. Each project needs to consider the nature of the groups of people who will be affected and the extent to which their attention is likely to be focused on views and visual amenity…*"

3.9 For example, the presence of existing detracting features in any given view may reduce the visual amenity of those experiencing the view. This may therefore reduce their susceptibility to certain types of change and ultimately their sensitivity.

3.10 The assessment of susceptibility to change is made on the same basis as for landscape effects (Section 2.0 above). A three-point scale (with intermediate levels where appropriate) is used, supported by a reasoned narrative that explains the judgement made.

*Value*

3.11 In accordance with paragraph 6.37 of the GLVIA when considering the value of a view experienced, this should take account of:

- Recognition of the value attached to particular views, for example in relation to heritage assets or through planning designations;
- Indicators of the value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision of facilities for their enjoyment and references to them in literature or art.

3.12 For this reason, whilst not specifically referenced in the current edition of GLVIA, the number of people likely to be affected can influence the value assigned to a particular view.

3.13 The assessment of value is made on the same basis as the assessment of susceptibility to change.

*Sensitivity*

3.14 Susceptibility to change and value are considered together as discussed above for landscape sensitivity and illustrated above in Figure 2.1. Again, professional judgement determines the final judgement of sensitivity, due to the non-linear and complex relationship between susceptibility and value. A reasoned narrative is set out in the LVIA in order to justify the particular sensitivity assessed for each receptor, so that it is clear how each judgement has been made.

***Magnitude***

3.15 The nature of the visual effect that is likely to occur, i.e. its **magnitude**, is determined by considering four separate factors, namely:

- Size/scale;
- Geographical extent;
- Duration;
- Reversibility.

3.16 The size and scale of an effect is determined by considering the following:

- The scale of change in view, in respect of the loss of or addition of features, and change in composition, including the proportion of the view occupied by the development;
- The degree of contrast or integration of new features or other changes;
- The nature of the view, namely the relative amount of time it would be experienced for and whether the views would be full, partial or glimpsed.

3.17 The geographical extent of an effect will vary from viewpoint to viewpoint and will reflect the following:

- The angle of view in relation to the main activity of the receptor;
- The distance from the proposed development;
- The extent over which change in view would be visible.

3.18 The duration of an effect simply relates to the length of time for which it would be experienced, as follows:

- Long-term: 10+ years; or the change could not reasonably be considered temporary in nature;
- Medium-term: 3-10 years;
- Short-term: 0-3 years.

3.19 The reversibility of an effect relates to the prospects and practicality of an effect being able to be wholly or partially reversed, or whether the change cannot realistically be reversed, i.e. it is permanent.

3.20 These four factors are then considered together to derive an overall magnitude of change for each receptor, which is determined by use of professional judgement. The assessment of the magnitude of change is expressed using a four point verbal scale of large, medium, small or negligible. Where appropriate, intermediate levels such as medium/large or small/medium are used to refine the assessment. Table 3.2 indicates how the above factors have been used to inform magnitude of change. As the circumstances of each specific receptor will vary, a reasoned narrative is set out in the LVIA in order to justify the particular magnitude of change allocated to each receptor.

**Table 3.2: Magnitude of Visual Change Criteria (indicative)**

| Magnitude | Description |
|---|---|
| Large | A change affecting a large proportion of a view, which may be seen across an extensive area or experienced from a long section of a route, and/or a longer-term effect, and/or contrasting with the existing view. |
| Medium | A change affecting a moderate proportion of a view, which may be seen across a wider area or experienced from a section of a route, and/or a medium-term effect, and/or broadly compatible with the existing view. |
| Small | A change affecting a smaller proportion of a view, which may be seen from a limited area or experienced from a short section of a route, and/or a shorter-term effect, and/or compatible with the existing view. |
| Negligible | A change which is barely perceptible in the view, and/or which is only glimpsed from a route. |

## 4.0 Level and Significance of Effect

4.1 The purpose of Environmental Impact Assessment (EIA) is to determine the likely significant effects of a development proposal. Not all landscape and visual effects arising as a result of a particular proposal will be significant. Furthermore, a significant effect does not necessarily mean that such an effect is unacceptable to decision-makers. This is a matter to be weighed in the planning balance alongside other factors. What is important is that the likely effects of any proposal are transparently assessed and described in order that the relevant determining authority can bring a balanced and well-informed judgement to bear as part of the decision-making process.

4.2 *The State of Environmental Impact Assessment Practice in the UK* (Institute for Environmental Management and Assessment 2011) identifies a range of different factors that should be considered when evaluating the significance of an effect, including:

- Knowledge and experience of significance from previous assessments;
- Details of the development proposal, such as construction and operational activities, and the nature of the effect associated with such activity;
- Details about the environmental sensitivity of the area that will be affected;
- Feedback from scoping and consultation;
- The wider legal and policy context, which offers protection to the environment and community.

4.3 The level of effect can only be defined in relation to each particular development and its specific location. It is for each LVIA to determine how judgements about receptor sensitivity and the magnitude of change should be combined to derive the level of effect and to clearly explain how this assessment has been made, and if the level of effect is considered significant.

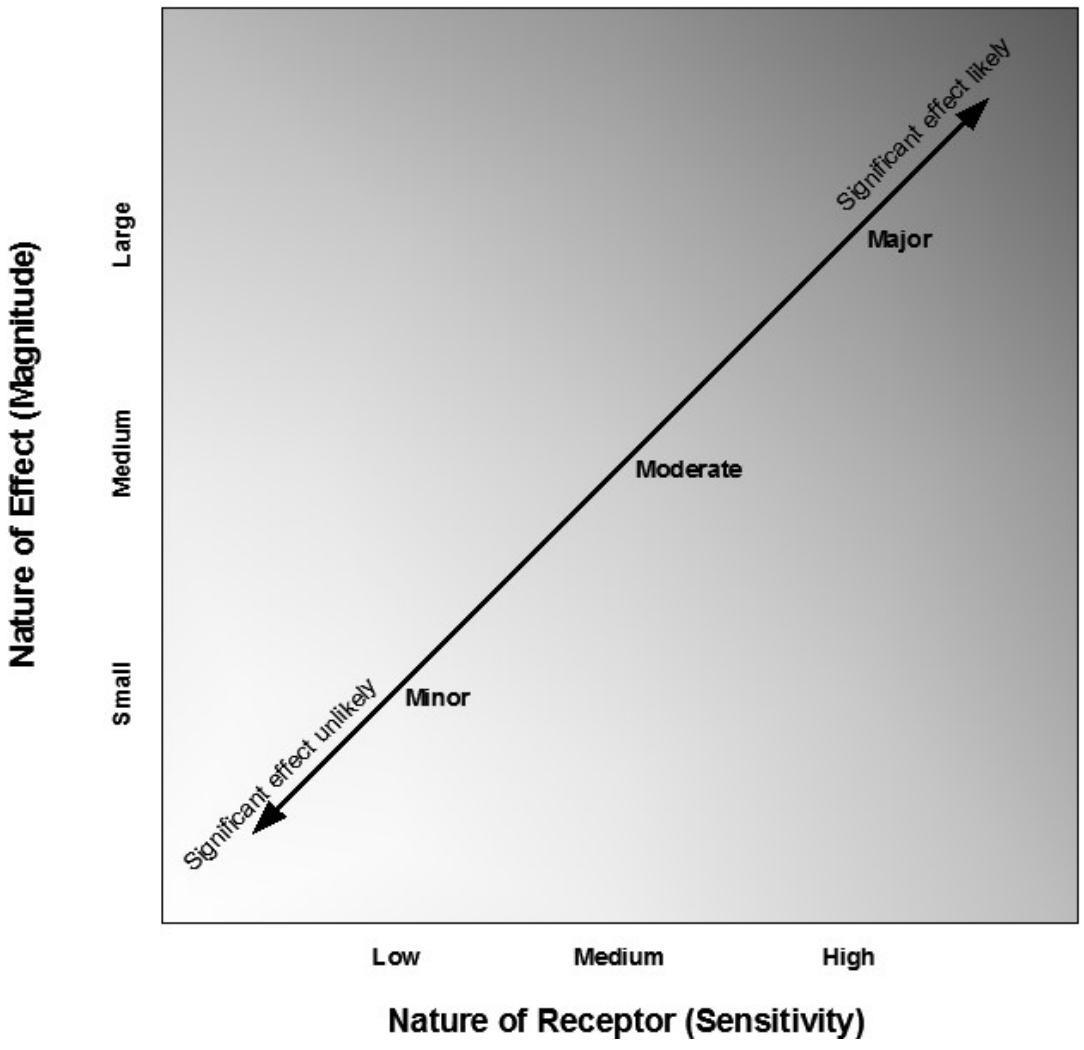
4.4 Figure 4.1 (below) provides a guide as to how sensitivity and magnitude can be combined to identify the level of effect upon a receptor (with the grey shading indicative of the increasing

level of effect with increasing sensitivity and/or magnitude). However, the final assessment of the level of effect and whether this is significant for decision makers is one of professional judgement.

4.5 Where magnitude of change is identified as 'negligible', then effects are automatically considered not to be significant due to the minimal level of change from baseline (which would often not be perceptible).

4.6 The judgement for this particular assessment is that greater than 'moderate' effects are more likely to be significant. This is because they would generally result from larger magnitudes of change on higher sensitivity receptors**.** This does not preclude a 'moderate' effect or lower being significant or a greater than 'moderate' effect not being significant. This judgement will depend on the specific circumstances being considered.

**Figure 4.1: Level of Effect Matrix (indicative)**



4.7 The GLVIA identifies that:

[3.32] "*The Regulations require that a final judgement is made about whether or not each effect is likely to be significant. There are no hard and fast rules about what effects should be deemed 'significant' but LVIAs should always distinguish clearly between what are considered to be significant and non-significant effects…*

[3.33] *It is not essential to establish a series of thresholds for different levels of significance of landscape and visual effects, provided that it is made clear whether or not they are considered significant. The final overall judgement of the likely significance of the predicted landscape and visual effects is however, often summarised in a series of categories of significance reflecting combinations of sensitivity and magnitude. These tend to vary from project to project but they should be appropriate to the nature, size and location of the proposed development and should as far as possible be consistent across the different topic areas of the EIA*".

[5.56] & [6.44] "*There are no hard and fast rules about what makes a significant effect, and there cannot be a standard approach since circumstances vary with the location and [landscape][1] context and with the type of proposal*".

4.8 It should be noted that effects may be either adverse (negative) or beneficial (positive). An effect can be significant and adverse, or significant and beneficial. If change occurs, with no obvious deterioration or improvement resulting, this can be said to be neutral.

## 5.0 Cumulative Effects

5.1 An assessment of cumulative effects is concerned with the additional effects of a proposed development in conjunction with other development(s) that do not already form part of the existing baseline.

5.2 The GLVIA identifies that cumulative landscape and visual effects are those that:

[7.2] "…*result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other development (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future*".

5.3 The GLVIA goes on to identify that:

[7.5] "*The challenge is to keep the task reasonable and in proportion to the nature of the project under consideration. Common sense has an important part to play in reaching agreement about the scope of the assessment. Where the competent authority and other stakeholders are uncertain about the preferred approach the landscape professional may have to exercise judgement about what is appropriate and be able to justify the approach taken. It is always*

[1] The word landscape is present in paragraph 5.56 of the 3rd edition of GLVIA only. Otherwise, the sentence quoted from paragraphs 5.56 and 6.44 is identical.

*important to remember that the emphasis in EIA is on likely significant effects rather than on comprehensive cataloguing of every conceivable effect that might occur…*"

5.4 The (non-cumulative) LVIA will address the effects of introducing the proposed development into a context where other existing development is present. The presence of this other existing development forms part of the assessment baseline. Where there is complete certainty that development which is consented or under construction will be implemented within the near future, then these developments are also considered as part of the future baseline.

5.5 The cumulative LVIA is concerned with the effects of the proposed development based upon two further cumulative baseline scenarios:

- Other existing development that has planning consent but for which the development timescale is unknown;
- The first scenario, plus other development that is the subject of a formal planning application.

5.6 It is not typical to include development that is at the pre-planning application stage as there is generally a lack of information about such development, and as such the implications of these types of development upon the landscape and visual resource are not 'reasonably foreseeable'. However, where a scheme at this stage is of particular relevance to the assessment, it may be included, but should be given limited weight in the decision making process as the proposals may be subject to significant change prior to submission.

5.7 Cumulative effects can include:

- An intensification of the effects of one development resulting from an extension to it, or the introduction of another development;
- The 'filling' of an area with development over time, such that it may substantially alter the landscape and/or views;
- The interaction between different developments, which may lead to a greater total effect than the sum of the effects of each development individually;
- Temporal effects of simultaneous or successive developments over a period of time;
- Indirect effects of development, such as enabling or disabling other development, which may lead to landscape and visual effects;
- The effects of a future action that may have consequences for other existing/proposed development.

5.8 Cumulative landscape effects may be either:

- Physical effects on the landscape fabric, resulting from changes to landscape elements/feature, or the introduction of new elements/features;
- Effects on aesthetic/perceptual attributes of the landscape;

- Effects on the overall character of the landscape.

5.9 Cumulative visual effects may be either:

- In combination - where two or more features are seen together at the same time from the same place, in the same arc of view, with their visual effects being combined;
- In succession - where two or more features are present in views from the same place, but cannot be seen at the together because they are not in the same arc of view. As the arc of view experienced by the observer changes, the features become visible in succession;
- Sequential - where two or more features are not present in views from the same point on a route and cannot therefore, ever be seen at the same time even if the arc of view experienced by the observer changes. The observer must move to another point on the same route to see the second or more of them, so they will then appear in sequence. These sequential views may occur frequently along the route, or more occasionally.

# Appendix 8.1 – Natural England DAS Response

Date: 24 March 2023
Our ref: DAS/412803
Your ref: Frodsham Marsh Energy Park

Howard Fearn
Avian Ecology Ltd

**BY EMAIL ONLY**

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire
CW1 6GJ

T 0300 060 3900

Dear Howard

**Discretionary Advice Service (Charged Advice)**
**DAS** 24554/412803
**Development proposal and location:** Energy Park (Solar and Battery) at Frodsham Marsh, Marsh Lane, Frodsham, Cheshire, WA6 7BT.

Thank you for your consultation on the above dated and received on 16 November 2022.

This advice is being provided as part of Natural England's Discretionary Advice Service and is in accordance with the Quotation and Agreement dated 12 January 2023. The advice within this letter is based upon our review of the Request for Discretionary Advice letter dated 16 November 2022, Frodsham Solar Wintering Bird Report by RSK Biocensus dated March 2022 and the Frodsham Wind Farm Post-Construction Ecological Monitoring Report for Year Three 2019 dated June 2020.

Natural England welcomes the early engagement on this development as it provides us an opportunity to highlight important considerations required early on, therefore potentially reducing issues during the statutory planning stages.

**Proposed Development**
From our review of the scoping documents we understand that this request relates to the proposed submission of a Development Consent Order (DCO) application for an energy park including the installation of a solar farm, a battery energy storage facility and supporting infrastructure at Land off Frodsham Marsh.

**Internationally and Nationally Designated Sites**
The proposals have the potential to impact on the Mersey Estuary Special Protection Area (SPA), Mersey Estuary Ramsar and Mersey Estuary Site of Special Scientific Interest (SSSI) which lie within 100m of the proposed development site.

All designated site citations and further information on the sites can be found on Natural England's designated sites view system.

Natural England has also published Conservation Advice Packages which may provide useful information to aid the assessment for the Mersey Estuary SPA.

**Habitats Regulations Assessment (HRA)**
On the basis of the proximity of internationally designated sites to the proposed development a HRA will be required.

In considering the European site interest, Natural England advises that you should have regard for any potential impacts that a plan or project may have. The Conservation Objectives for each European site explain how the site should be restored and/or maintained and may be helpful in assessing what, if any, potential impacts a plan or project may have.

Our main concerns regarding the proposals relate to impacts on SPA birds, particularly the displacement of species using the site for the overwintering and passage periods. We advise that the HRA will need to assess these impacts. Natural England would be happy to provide further advice on a draft HRA in due course.

**In-combination Assessment**
An in-combination assessment needs to assess whether there are any other plans and projects in the vicinity which have the same effect as this development. This could include plans or projects from neighbouring Local Planning Authorities.

Plans or projects comprise the following;
a) The incomplete or non-implemented parts of plans or projects that have already commenced;
b) Plans or projects given consent or given effect but not yet started.
c) Plans or projects currently subject to an application for consent or proposed to be given effect;
d) Projects that are the subject of an outstanding appeal;
e) Ongoing plans or projects that are the subject of regular review.
f) Any draft plans being prepared by any public body;
g) Any proposed plans or projects published for consultation prior to the application

**Natural England response to initial questions**
Natural England provides the below comments in answer to the questions posed in the Request for Discretionary Advice document dated 16 November 2022.

**Q1. Does NE agree with the survey effort and methodology outlined within this letter (including Appendix 1)?**

Yes, we agree with the survey effort and methodology provided. The survey effort including number of surveys carried out and timing of surveys is in line with Natural England's advice for non-breeding bird surveys and suitable survey methodology has been presented.

**Q2. Does NE agree that the scope of baseline data summarised in this letter is adequate to inform EIA and HRA? If not then please fully detail any further requirements.**

Yes, we consider the baseline data is adequate. However, depending on the timescales of the proposed development, the data may need to be updated to align with latest and emerging bird records.

**Q3. Does NE agree that, with regards to non-breeding birds, the potential for impacts on the Mersey Estuary SSSI are the same as for the European sites, and therefore additional survey data or assessment is not required to assess SSSI impacts?**

Yes, the protected bird features for the Mersey Estuary SSSI are all covered by the SPA/Ramsar designations. Therefore, it is reasonable to conclude there will be no requirement for additional survey data or further assessments to determine any impacts to the Mersey Estuary SSSI with regards to non-breeding birds.

**Q4. Can NE identify any additional data sources relevant to the Proposed Development which are not detailed in this letter?**

We are aware of a more recent "Post-Construction Ecological Monitoring Report" (Atmos Consulting, 2021). This is more up-to-date than the report provided for review, dated June 2020.

The proposal is in close proximity to the proposed HyNet North West hydrogen pipeline route based on our current understanding of the proposals, therefore there may be potential to access additional supporting data which has been included as part of the pre-application public consultation carried out last year for the project.

**Q5. Does NE agree that Vantage Point (VP) surveys are of limited value in determining impacts arising from solar farms, and that bird usage of land within the Proposed Development Site (and associated potential for displacement) is the primary consideration for assessment?**

We agree that bird usage of the proposed development site is the primary consideration for the assessment and we would expect detailed information to be provided within a HRA in order for a robust assessment of any potential impacts to protected bird features to be carried out.

Although, we do consider that VP surveys are useful indicators in identifying which bird species are present, their numbers and how they are using the site so advise VP surveys are used only to supplement further bird survey evidence and WeBS data.

**Q6. Does NE agree that the operational wind turbines displace wetland birds up to 600m from each turbine and therefore impacts on already addressed through the wind farm commitments?**

Natural England advise that any assessment with regards to displacement of birds from wind turbines is undertaken on a case by case basis. It would need to be clear within any assessment that the proposed development doesn't add to any displacement effects and that the alternative habitat provided under the wind farm commitments is adequate for all the displaced birds, thereby maintaining the nearby SPA population. Data on the success of the wind farm mitigation would therefore need to be considered in order to agree with this statement.

This concludes Natural England's advice under this particular request however we welcome further discussion on any of the above points as required, and would be happy to review any further documents including draft HRA in due course.

Yours sincerely

Isaac Lees
Sustainable Development Adviser
Cheshire, Greater Manchester, Merseyside & Lancashire

The advice provided in this letter has been through Natural England's Quality Assurance process.

The advice provided within the Discretionary Advice Service is the professional advice of the Natural England adviser named below. It is the best advice that can be given based on the information provided so far. Its quality and detail is dependent upon the quality and depth of the information which has been provided. It does not constitute a statutory response or decision, which will be made by Natural England acting corporately in its role as statutory consultee to the competent authority after an application has been submitted. The advice given is therefore not binding in any way and is provided without prejudice to the consideration of any statutory consultation response or decision which may be made by Natural England in due course. The final judgement on any proposals by Natural England is reserved until an application is made and will be made on the information then available, including any modifications to the proposal made after receipt of discretionary advice. All pre-application advice is subject to review and revision in the light of changes in relevant considerations, including changes in relation to the facts, scientific knowledge/evidence, policy, guidance or law. Natural England will not accept any liability for the accuracy, adequacy or completeness of, nor will any express or implied warranty be given for, the advice. This exclusion does not extend to any fraudulent misrepresentation made by or on behalf of Natural England.

# Appendix 8.2 – Preliminary Ecological Assessment

**Peel Cubico Renewables Limited**

# Frodsham Renewable Energy Development

Preliminary Ecological Appraisal Report

2483418

**JANUARY 2023**

RSK biocensus
EXPERTS IN ECOLOGY

# RSK GENERAL NOTES

**Project No.:** 2483418

**Title:** Frodsham renewable energy development – Preliminary Ecological Appraisal Report

**Client:** Peel Cubico Renewables Limited

**Date:** January 2023

**Office:** Helsby

**Status:** Rev01

| | | | |
|---|---|---|---|
| **Author** | Emily Clark | **Technical & quality reviewer** | Will Holden |
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| Date: | 30 January 2023 | Date: | 30 January 2023 |

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# EXECUTIVE SUMMARY

This report presents the results of a preliminary ecological appraisal (PEA), comprising a background data search (BDS) and a Phase 1 habitat survey with assessment for protected species at the Frodsham renewable energy development site in Frodsham, Cheshire.

The report identifies ecological constraints on the project, specifies any further survey or mitigation requirements, gives recommendations for avoidance and protection through design changes, and suggests opportunities for ecological enhancement. The appraisal was carried out for Peel Cubico Renewables Limited on behalf of any future project specific Special Purpose Vehicle (SPV) company.

The site is *c*.285 ha and contains predominantly marshy grassland (grazed by sheep and cattle), agricultural grassland fields and arable land with a grid of interconnected ditches forming the field boundaries. A large portion of the western section of the site is also utilized as a wind farm. The development area is to the north-west of the M56 motorway and 200m north-west of the town of Frodsham. The site is bordered by the Manchester Ship Canal and River Weaver to the north and east, and the M56 motorway and Frodsham to the south.

The results of the survey and desk study have highlighted the requirement for further work in relation to the following habitats and species, however some surveys may not be necessary if impacts can be avoided by development design:

- Amphibians and reptiles – reasonable avoidance measures (RAMs) to be implemented during the construction phase of the development.
- Badger – There are two main setts and five outlier setts present on the site. Appropriate development design may avoid impacts, but if the construction works are within 30m of the setts, further surveys are required to assess the usage of the setts.
- Bats (roosting) –. If the building on the site is to be impacted or if any trees are to be removed, further surveys will be required to assess the building / trees potential to support roosting bats on stie. There are a number of brick-built structures present within the western section of site that have been assessed as having low potential to support roosting bats. If the brick-built structures are impacted, further presence / absence surveys are required to assess whether bats are using the site for roosting purposes.
- Bats (foraging and commuting) – The quality of foraging and commuting habitat on the site is low. Further activity and static bat detector surveys are required to determine the species assemblage present on the site and identify any important foraging and commuting habitat on the site.
- Birds (breeding and wintering) – The site supports important breeding and wintering bird assemblages. Due to the importance of the bird populations recorded within the site, both in the context of the adjacent Mersey Estuary SPA/Ramsar site, and at a geographical level, a detailed Ecological Impact

Assessment of the potential effects of the proposed development on birds will be required. In addition, an HRA will be required to identify any potential adverse effects on the integrity of Mersey Estuary SPA/Ramsar site. Any future development will need to be designed carefully with proportionate mitigation to provide the range of habitat types required to support the current breeding bird assemblage.

- Designated sites – A habitat regulations assessment (HRA) should be undertaken to fully assess the impacts on designated sites as a result of the proposed development. The proposed development site also lies within a SSSI Impact Risk Zone (IRZ) within which Natural England request that they are consulted on all types of planning applications. Therefore, it is recommended that the local planning authority (LPA) consult with Natural England for any proposals.
- Habitats – Hedgerows, trees, ponds and areas of reedbed should be retained where possible or replaced as part of a detailed landscaping scheme. Root protection areas (RPAs) for trees and hedgerows should be maintained. Specific procedures and control measures to be implemented to ensure that there is no risk of pollution into watercourses, ponds or ditches on the site, including the retention of a buffer zone. The measures should be set out by the contractors prior to commencement of any works and agreed with the LPA and other statutory consultees.
- Invasive species – Cotoneaster (*Cotoneaster* sp), Variegated Yellow Archangel (*Lamium galeobdolon*) and New Zealand Pigmyweed (*Crassula helmsii*) should be subject to control measures prior to the commencement of works and are to be eradicated as part of the development.
- Otters – Appropriate development design may avoid impacts, but if large waterbodies or ditches are directly or indirectly impacted, RAMs will need to be implemented, which will include a pre-commencement inspection to assess whether any holts are present on the site.
- Water vole – If any ditches are impacted by the proposed development, further surveys are required to establish presence or likely absence of water vole.

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## TABLES



## FIGURES

## PLATES

# 1.0 INTRODUCTION

## 1.1 Purpose of this report

1.1.1 This report presents the results of a preliminary ecological appraisal (PEA), comprising a background data search (BDS) and a Phase 1 habitat survey with assessment for the potential presence of protected species at the Frodsham renewable energy development site in Frodsham, Cheshire (OS grid reference: SJ 510 786). The survey area included the land within the red-line boundary (called 'the site' from this point forward – as shown in *Figure 1*), plus adjacent land up to 30 m where access allowed. Due to the size and scale of the development, the site has been split into ten monad 1km 'Plots', as shown in *Figure* . Plots 1 - 10 are referenced throughout the report for ease of reference.

1.1.2 The report identifies ecological constraints on the project and specifies any further surveys which may be required. The appraisal was carried out for Peel Cubico Renewables Limited on behalf of any future project specific Special Purpose Vehicle (SPV) company.

## 1.2 Landscape context

1.2.1 The site is *c.*285 ha and contains predominantly marshy grassland (grazed by sheep and cattle), agricultural grassland fields and arable land with a grid of interconnected ditches forming the field boundaries. A large portion of the western section of the site is also utilized as a wind farm. The development area is to the north-west of the M56 motorway and 200m north-west of the town of Frodsham. The site is bordered by the Manchester Ship Canal and River Weaver to the north and east, and the M56 motorway and Frodsham to the south.

## 1.3 Validity of data

1.3.1 According to Chartered Institute of Ecology and Environmental Management (CIEEM) advice (CIEEM 2019), survey data are valid for a period of 12 to 18 months from the date of the survey. The report highlights any circumstances where data may be valid for less than 18 months. Between 18 months and 3 years a professional ecologist will need to undertake a site visit and may also need to update desk study information (effectively updating the PEA) and then review the validity of the report.

# 2.0 METHODS

## 2.1 Overview

2.1.1 The preliminary ecological appraisal (PEA) was undertaken in line with guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM, 2017), and it therefore included:

- a desk study (including records of designated sites, protected and notable species; a review of aerial photographs; obtaining information from the DEFRA and JNCC websites, and the local authority website; and requesting data from the local records centre) here called a background data search (BDS); and
- a field survey that informed phase 1 habitat mapping, an assessment of the possible presence of protected or priority species, and the likely importance of habitat features.

2.1.2 The PEA report includes an ecological description of the site and information about species that may occur there. Notes and mapping of any incidental sightings of invasive non-native plant species and protected or priority species are also provided.

2.1.3 The survey was carried out between 22 and 24 March 2022 by Emily Clark and Shona Redman of RSK Biocensus. Emily is a senior ecological consultant with over six years' experience in ecological consultancy. She is an associate member of CIEEM and has botanical skills rated at Field Identification Skills Certificate (FISC) level 4.

## 2.2 Background data search

2.2.1 A search was made in March 2022 for reference materials relating to the ecology of the Frodsham renewable energy development site, and a list of sources is given in *Table 1*.

Table 1: Data sources.

| Information Obtained | Available From |
|---|---|
| Protected and noteworthy species-records | Record – The Biodiversity Information System for Cheshire, Halton, Warrington and Wirral |
| Designated site locations and citations | Natural England website<br>Record – The Biodiversity Information System for Cheshire, Halton, Warrington and Wirral |
| Designations and legal protection of noteworthy species | Joint Nature Conservation Committee (JNCC) website |
| Details of species and habitats listed on the LBAP | Local BAP website<br>https://www.cheshirewildlifetrust.org.uk/wildlife/priority-species-and-habitats |

2.2.2 A search was made for information on statutory designated sites (often internationally and nationally important sites for ecology) within 2 km and non-statutory designated

sites (often important in a local context) within 1 km of the site boundary. The search was extended to 10 km for Ramsar sites, special areas of conservation (SACs) and special protection areas (SPAs). A search was also made for records of noteworthy species within 1 km of the site boundary.

2.2.3 Species included in the search parameters were:

- European protected species (listed on Schedules 2 and 5 of The Conservation of Habitats and Species Regulations 2017);
- nationally protected species under Schedules 1, 5 and 8 of The Wildlife & Countryside Act 1981 and The Protection of Badgers Act 1992;
- species listed as critically endangered, endangered or vulnerable based on the IUCN Red List Categories and Criteria 2001;
- all species listed on the RSPB Birds of Conservation Concern 5 as red or amber;
- nationally rare or nationally scarce species;
- notable invertebrates; and
- species of principal importance under The Natural Environment and Rural Communities (NERC) Act (2006) or are priority species under the local biodiversity action plan.

## 2.3 Plants and habitats

*Phase 1 habitat survey*

2.3.1 The field survey was based on the phase 1 habitat survey approach (Joint Nature Conservation Committee 2010) as extended for use in environmental impact assessment (Institute of Environmental Assessment, 1995). This field survey was undertaken in line with CIEEM (2017) and involved the following elements:

- habitat mapping using a set of standard colour codes to indicate habitat types on a phase 1 habitat map (*Figure 1*); and
- a description of features of possible ecological or nature conservation interest in notes relating to numbered locations on the habitat map, called 'target notes'.

2.3.2 Phase 1 habitat survey methods are described in Joint Nature Conservation Committee (JNCC 2010). There are no firm guidelines to specify what extended phase 1 habitat survey involves, but the Institute of Environmental Assessment (1995) suggests that it simply involves more extensive and detailed target notes.

2.3.3 Vascular plant species were recorded during the survey, although no attempt was made to produce an exhaustive species list (additional species would almost certainly be found during more detailed surveys or repeat surveys at various times of the year).

2.3.4 Plant nomenclature in this report follows Stace (2019) for native and naturalised species of vascular plant, and mosses and liverworts follow Hill *et al*. (2008). Introduced species and garden varieties were identified using relevant Floras. Plant names in the text are given with common names with the scientific name (in italics) immediately following the first time it is mentioned. Doubtful identifications are preceded by 'cf.' placed before

the specific epithet where the plant is very probably the species indicated, but it could not be distinguished from similar members of the genus with certainty.

*Invasive non-native species (INNS)*

2.3.5 The survey did not involve exhaustive surveying for individual plant species, and various invasive species may be little in evidence at various times of year (depending on the species). A survey seeking to identify habitat types cannot therefore be relied upon to provide firm information about the presence or extent of any invasive non-native species (even though some things may be evident). However, we have noted any such species seen during the course of the survey, e.g. Giant Hogweed (*Heracleum mantegazzianum*), Himalayan Balsam (*Impatiens glandulifera*) or Japanese Knotweed (*Reynoutria japonica*) among others, as well as any invasive non-native species of animals recorded during the survey.

## 2.4 Protected and notable animals

*General*

2.4.1 The site was assessed for its suitability for the protected animals that are likely to occur in the area. Taking into account the results of the BDS, the geographic location, connectivity to natural habitats in the wider landscape, and the nature and extent of habitats at the site, specific assessment was also carried out for the species/species groups outlined below.

*Invertebrates*

2.4.2 The site was assessed for its suitability to support notable species and/or assemblage of invertebrates, but no specific surveys were undertaken. The habitat requirements of invertebrates are often species-specific. The assessment focused on the presence of features or habitats suitable for the notable species identified in the BDS.

*Great crested newt*

2.4.3 The suitability of aquatic and terrestrial habitat on the site and in the immediate vicinity to support great crested newts (*Triturus cristatus*) was considered, taking into consideration habitat connectivity between suitable habitat areas. Aerial photography and Ordnance Survey maps were examined for ponds or other suitable breeding habitat within 500 m of the site.

*Reptiles*

2.4.4 The site was assessed for its suitability for the four most widespread reptile species, with particular attention given to those features that provide suitable basking areas (e.g. south-facing slopes), hibernation sites (e.g. banks, walls, piles of rotting vegetation) and opportunities for foraging (e.g. rough grassland and scrub).

2.4.5 Specific habitat requirements differ between species. Common lizards (*Zootoca vivipara*) and slow-worms (*Anguis fragilis*) favour rough grassland. Grass snakes (*Natrix*

*helvetica*) have broadly similar requirements with a greater reliance on ponds and wetlands. Adders (*Vipera berus*) use a range of fairly open habitats with some cover but are most often found in dry heath (Beebee & Griffiths, 2000).

*Birds*

2.4.6 Birds nest and forage in a wide variety of habitats including scrub, woodland, hedges and trees, open ground and man-made structures. The site was assessed for its suitability to support nesting and foraging birds, with an emphasis on the Schedule 1 and notable species recorded in the BDS. This included any nests or incidental signs of nesting such as feathers or pellets in locations suitable for nests.

*Bats*

2.4.7 Habitats were assessed in respect of their suitability for foraging and commuting bats according to Collins (2016). Areas of particular interest vary between species, but generally include sheltered areas and habitats with good numbers of insects, such as woodland, scrub, rivers and species-rich or rough grassland.

2.4.8 A full preliminary roost assessment (PRA) was not undertaken during the survey but any trees or structures that may contain potential roosting features for bats were noted along with any incidental signs of bats or other evidence found (such as droppings, urine stains, odour, grease stains or feeding remains).

*Water vole and otter*

2.4.9 Watercourses on and/or adjacent to site and their surrounding habitats were assessed to determine whether they were suitable for water voles (*Arvicola amphibius*). Suitable habitats include vegetated earth banks, reed beds, flowing water and wet ditches. Incidental signs of water vole activity, including burrows, feeding platforms, food remains and latrines, were recorded if they were encountered.

2.4.10 Watercourses on and/or adjacent to site were also assessed for their suitability for otters (*Lutra lutra*). Otters require clean rivers and associated waterbodies with an abundant, varied supply of food and plenty of bank-side vegetation, offering secluded sites for their holts. Other suitable habitats include reed beds and interconnected ditches and streams. Incidental signs of otter activity, including holts, foraging signs, paths (runs), footprints and spraints, were recorded if they were encountered.

*Badger*

2.4.11 An initial assessment was carried out to identify areas that might be used by badgers (*Meles meles*) for commuting, foraging or setts within 30 m of all areas potentially affected by works (where access was possible). The area was systematically searched for signs of badgers including setts, foraging signs, paths (runs) and latrines where possible, and the category of sett and levels of recent activity visible at each sett recorded.

*Other species of principal importance*

2.4.12 The UK countries of England, Wales, Scotland and Northern Ireland are obliged by their individual laws to maintain lists of species and habitats of principal importance for biodiversity conservation. In England, this obligation derives from Section 41 of the NERC Act 2006. An assessment of the suitability and likelihood of the site supporting such species was made (for example, hedgehog (*Erinaceus europaeus*)).

## 2.5 Constraints and limitations

2.5.1 This preliminary appraisal as to whether protected species might occur on the site is based on the suitability of habitat, the known distribution of relevant species in the local area (from on-line sources and desk study), and any signs of the relevant species. It does not constitute a full and definitive survey of any protected species group.

2.5.2 Field signs for protected and valuable species are often difficult to find or absent from a site. The survey conducted was not intended to be a comprehensive presence/absence survey for all species, but rather to provide an indication of the likely presence of such species based on the field signs found, and the nature of the habitats present.

# 3.0 RESULTS

## 3.1 Background data search

*Biodiversity action plans*

3.1.1 Habitats classified as swamp on the site qualify as the priority habitat 'reedbeds' under Section 41 of the NERC Act 2006.

3.1.2 The latest Cheshire local biodiversity action plan (LBAP) lists 5 habitat action plans (HAPs) and 25 species and species group action plans (SAPs). None of the local HAPs are relevant to the proposed development. The local SAPs that are relevant to the proposed development are;

- Black-necked grebe (*Podiceps nigricollis)*
- Barn owl (*Tyto alba)*
- Club tailed dragonfly (*Gomphus vulgatissimus)*
- Cuckoo bee (*Bombus campestris)*
- Downy emerald (*Cordulia aenea)*
- Lesser silver water beetle (*Hydrochara caraboides)*
- Mining bee (*Andrena fulva)*
- Ringlet (*Aphantopus hyperantus)*
- Variable damselfly (*Coenagrion pulchellum)*
- Common pipistrelle (*Pipistrellus pipistrellus)*
- Whiskered bat (*Myotis mystacinus)*
- Brandt's bat *Myotis brandti)*
- Daubenton's bat (*Myotis daubentonii*
- Leisler's bat (*Nyctalus leisleri)*
- Natterer's bat (*Myotis nattereri)*
- Serotine (*Eptesicus serotinus)*

*Designated sites*

3.1.3 There are four statutory designated sites (designated for biological reasons) and two internationally designated sites within 2 km of the site boundary: Mersey Estuary Ramsar, Mersey Estuary special protection area (SPA), Mersey Estuary site of special scientific interest (SSSI), Flood Brook Clough SSSI, Runcorn Hill local nature reserve (LNR) and Dunsdale Hollow SSSI. Frodsham Railway and Road Cuttings SSSI is also present but it is designated for geological reasons and not ecological reasons.

3.1.4 The search was extended to 10 km for Ramsar sites, SACs and SPAs; with two additional sites identified; Midland Meres & Mosses - Phase 1 Ramsar and Midland Meres & Mosses - Phase 2 Ramsar. All sites are listed in Table 2 with their reasons for designation and distance from the site. See Figure 2 for plot reference.

**Table 2: Statutory designated sites within 2 and 10 km of the site boundary.**

| Site Name | Designation | Approximate distance and direction |
|---|---|---|
| Mersey Estuary | SSSI | 60m north-west of Plot 5 |
| The Mersey Estuary is an internationally important site for wildfowl and consists of large areas of intertidal sand and mudflats. The site also includes an area of reclaimed marshland, salt-marshes, brackish marshes and boulder clay cliffs with freshwater seepages. The Manchester Ship Canal forms part of the southern boundary of the site and separates a series of pools from the main estuary. These pools together with Hale Marsh are important roosting sites for wildfowl and waders at high tide. | | |
| Mersey Estuary | Ramsar | 100m north-west of Plot 1 |
| The estuary includes large areas of saltmarsh, and intertidal sand and mudflats, with limited areas of brackish marsh, boulder clay cliffs and rocky shore. Internationally important numbers of waterfowl feed and roost on the site in winter and nationally important numbers occur during passage periods. The latter include common ringed plover (*Charadrius hiaticula*), redshank (*Tringa totanus*), dunlin (*Calidris alpina*). The Mersey Estuary also regularly supports over 20,000 waterfowl in winter. The site also supports nationally important wintering numbers of wigeon (*Anas penelope*), grey plover (*Pluvialus squatarola*), black-tailed godwit (*Limosa limosa*), and curlew (Numenius *arquata*). | | |
| Mersey Estuary | SPA | 100m north-west of Plot 1 |
| The special protection area (SPA) covers an estuarine area of 50.23 km² including large areas of saltmarsh and extensive intertidal sand and mudflats, with limited areas of brackish marsh, rocky shoreline and boulder clay cliffs, within a rural and industrial environment. The intertidal flats and saltmarshes provide feeding and roosting sites for large populations of waterbirds. During the winter, the site is of major importance for ducks and waders. The site is also important during the spring and autumn migration periods, particularly for wader populations moving along the west coast of Britain. | | |
| Flood Brook Clough | SSSI | 1km north-east of Plot 4 |
| Flood Brook Clough is a deep wooded valley cutting through Keuper Marl with an Ash (*Fraximus excelsior*) and Wych Elm (*Ulmus glabra*) woodland. Many of the plants present are characteristic of ancient woodland on base-rich soils, and are comparatively rare in Cheshire. | | |
| Dunsdale Hollow | SSSI | 1.5km south of Plot 7 |
| Dunsdale Hollow occurs on a steep north-west facing escarpment of Upper Mottled and | | |

| Site Name | Designation | Approximate distance and direction |
|---|---|---|
| Keuper Sandstone. It is an acidic lowland Birch (*Betula spp*). and Sessile Oak (*Quercus petraea*) woodland. This type of woodland is often found in the uplands but its occurrence in a lowland landscape is very unusual and it is found on only one other site in Cheshire on the Peckforton Hills. | | |
| Runcorn Hill | LNR | 1.7km north of Plot 3 |
| Runcorn Hill LNR includes the largest area of lowland heath in North Cheshire. The woodlands, ponds and scrub along with its geological structure complete a unique mosaic of habitats. | | |
| Midland Meres & Mosses – Phase 1 | Ramsar | 6.7km south-east of Plot 8 |
| The Meres and Mosses form a geographically diverse series of lowland open water and peatland sites in the north-west Midlands of England and north-east Wales. These have developed in natural depressions in the glacial drift left by receding ice sheets which formerly covered Cheshire/Shropshire Plain. The 18 component sites include open water bodies, the majority of which are nutrient rich with associated fringing habitats, reed swamp, fen, carr and damp pasture. The wide range of habitats support national important flora and fauna. | | |
| Midland Meres & Mosses – Phase 2 | Ramsar | 7km south-east of Plot 8 |
| As above. | | |

### *SSSI Impact Risk Zones*

3.1.5 The proposed development site lies within a SSSI Impact Risk Zone (IRZ) within which Natural England request that they are consulted on all types of planning applications. Therefore, it is recommended that the planning authority consult with Natural England for this development.

### *Non-statutory sites*

3.1.6 There are 10 non-statutory designated sites within 1 km of the site boundary, which are both local wildlife sites (LWSs). These sites are listed in *Table 3* along with their proximity to the site.

Table 3: Non-statutory designated sites within 1 km of the site boundary.

| Site Name | Designation | Approximate Distance and direction |
|---|---|---|
| Frodsham, Helsby and Ince Marshes | LWS | 0m, immediately adjacent to the boundary of Plot 5 |
| Frodsham Field Studies centre | LWS | 30m north-east of Plot 4 |

| Site Name | Designation | Approximate Distance and direction |
|---|---|---|
| Easton Clifton Tip | LWS | 80m south-east of Plot 4 |
| Weston Marsh Lagoon | LWS | 114m east of Plot 3 |
| Upper Mersey Estuary | LWS | 297m north of Plot 2 |
| Clifton Lagoon | LWS | 484m east of Plot 4 |
| Clifton Cloughs_B | LWS | 528m north of Plot 4 |
| Clifton Cloughs_A | LWS | 692m north of Plot 4 |
| Sutton Bridge Unused Lagoon | LWS | 877m south-east of Plot 4 |
| Frodsham and Overton Woods | LWS | 981m south of Plot 7 |

***Habitats***

3.1.7 On the UK Government Magic Maps website, there are two areas which are mapped as good quality semi-improved grassland on the site, located within the central section of the site, one area which is mapped as reedbed in the northern section of the site and one area is mapped as deciduous woodland, in the south-eastern corner of the site.

3.1.8 There are several areas of 'coastal saltmarsh', mudflats, good quality semi-improved grassland, lowland calcareous grassland, lowland fens, reedbeds and deciduous woodland, which are all listed under Section 42 of the NERC Act 2006 within 1 km of the site. The closest of which is the areas of coastal saltmarsh *c.* 100m north-west of the site.

*Protected and noteworthy species*

3.1.9 At least 241 protected and noteworthy species are recorded from places within 1 km of the site boundary. Noteworthy species include species of principal importance that are listed under Section 41 of the NERC Act 2006.

3.1.10 Of these, 15 are plants, 4 are lichens, 5 are amphibians, 4 are reptiles, 46 are invertebrates, 146 are birds and 21 are mammals. Species that are protected by law under Schedules 2 and 5 of The Conservation of Habitats and Species Regulations 2017 (as amended), Schedules 1, 2, 5 and 8 of The Wildlife and Countryside Act 1981 (as amended) or The Protection of Badgers Act 1992 that have been recorded in the search area are highlighted in the full species list given in *Appendix B.* Those of relevance to the site and the current proposals are discussed in *Section 3.3.*

## 3.2 Plants and habitats

3.2.1 The Phase 1 Habitat map is provided as *Figure 1* and shows the location of the target notes referred to in the text below. A full description for each of the target notes is given in *Appendix A*. Due to the size and scale of the site, it has been split into 10 1km monad 'plots' which are referenced throughout the below subsections, see Figure 2 for Plot locations. The following habitat types (with Phase 1 habitat codes in brackets) are present on and around the site:

- Broadleaved woodland, plantation (A1.1.2)
- Scrub, dense / continuous (A2.1)
- Scrub, scattered (A2.2)
- Broadleaved scattered trees (A3.1)
- Semi-improved neutral grassland (B2.2)
- Improved grassland (B4)
- Marsh / marshy grassland (B5)
- Poor semi-improved grassland (B6)
- Tall ruderal (C3.1)
- Swamp (F1)
- Marginal vegetation (F2.1)
- Standing water (G1)
- Arable (J1.1)
- Introduced shrub (J1.4)
- Intact hedge, species poor (J1.1.2)
- Fence (J2.4)
- Dry ditch (J2.6)
- Buildings (J3.6)
- Bare ground (J4)
- Hardstanding (J5)

*Broadleaved woodland, plantation (A1.1.2)*

3.2.2 There is a small area of plantation woodland in the north-eastern section of Plot 6 (see Figure 2 for Plot locations) (TN 1, see Page 1 on Figure 1), adjacent to a footpath. All trees are young – semi-mature and comprise Silver Birch (*Betula pendula)*, Black Pine (*Pinus nigra)*, Grey Willow (*Salis cinerea),* and Horse-chestnut (*Aesculus hippocastanum).* The ground flora comprise Ivy (*Hedera helix)*, Herb-Robert (*Geranium robertianum),* Cleavers (*Galium aparine)*, Cock's-foot (*Dactylis glomerata)* and Yorkshire-fog (*Holcus lanatus)*. A small number of introduced shrubs were also noted within the area of

woodland, including Flowering Currant (*Ribes sanguineum*) and Variegated Yellow Archangel (*Lamiastrum galeobdolon subsp. argentatum*)

*Scrub, dense / continuous (A2.1)*

3.2.3 There are a number of areas of dense, mixed scrub scattered across the site. The largest area is in Plot 3 while most of the other areas are along field boundaries or along the edges of pathways.

3.2.4 The area of scrub within Plot 3 (TN2, see Page 4 of 4 on Figure 1) is a large area containing a mixture of semi-improved neutral grassland and scrub habitat. The area also has areas of bare earth where motorbikes have illegally accessed the site and small patches of tall ruderal and swamp scattered throughout. The patches of scrub are a mixture of young – semi-mature trees with a height of *c.* 2 – 7m and as such have been mapped as dense scrub. Tree species present include Goat Willow (*Salix caprea*), Grey Willow, Ash (*Fraxinus excelsior*), Elder (*Sambucus nigra*), Aspen (*Populus tremula*), Dogwood (*Cornus sanguinea*) and Silver Birch (*Betula pendula*), but Goat and Grey Willow are the most frequent species present. There are also small areas with Bramble (*Rubus fruticosus*), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Dog-rose (*Rosa canina*) and Field-rose (*Rosa arvensis*) are also present.

Plate 1 - Example of dense scrub in the north-eastern corner of the site.

3.2.5 The other areas of scrub are predominantly along field boundary edges within Plots 3, 4, 7 and 8. The most frequent species present are Bramble, Hawthorn and Blackthorn, but other species present include Broad-leaved Dock (*Rumex obtusifolius*), Common Nettle (*Urtica dioica*) and Creeping Thistle (*Cirsium arvense*), Gorse (*Ulex europaeus*), Willowherb (*Epilobium sp.*), Rosebay Willowherb (*Chamaenerion angustifolium*), Crack-willow (*Salix euxina*), Elder, Yorkshire-fog, Cleavers, Field-rose, Dog-rose, Poplar species (*Populus sp.*), Ash, Cock's-foot, Hogweed (*Heracleum sphondylium*), Cow Parsley (*Anthriscus sylvestris*) and Colt's-foot (*Tussilago farfara*).

Plate 2 – Example of dense scrub along field boundary edges.

*Scrub, scattered (A2.2)*

3.2.6 There are several areas of scattered scrub across the site, particularly within the areas of swamp or marginal vegetation. Species are similar to those described above, and the most frequent species present are Bramble, Hawthorn and Blackthorn, Grey Willow, Ash, Wild Cherry (*Prunus avium*), Elder and Field-rose.

3.2.7 However, the area of scattered scrub within Plot 6 (TN3, see Page 2 of 4 on Figure 1) contains scattered young – semi-mature trees, which are all below a height of 5m and as such have been mapped as scrub. Species present within the south-western section of site include Willow species (*Salix sp.)*, Grey Willow and Elder.

Plate 3 – View of scattered scrub within south-western section of the site.

*Broadleaved scattered trees (A3.1)*

3.2.8 There are a small number of broadleaved scattered trees present within Plot 6 (TN4 and TN5, see Page 1 and 2 on Figure 1), all trees are semi-mature and are in good condition. Species include Silver Birch, Hawthorn and Sycamore (*Acer pseudoplatanus*) and Crack-willow.

Plate 4 - View of scattered trees (TN12).

*Semi-improved neutral grassland (B2.2)*

3.2.9 There are two areas of semi-improved neutral grassland present on the site, the first is in Plot 3 (TN6) while the second is in the southern section of the site (TN7), within Plot 6, see Pages 3 and 4 Figure 2.

3.2.10 The area within Plot 3 of the site (TN6) has been mapped as semi-improved neutral, but a number of species present indicate the grassland is slightly calcareous, including Yellow-wort *(Blackstonia perfoliata* ) and Fairy Flax (*Linum catharticum).* However, the majority of species present indicate neutral grassland, as the most frequent grass species present are Common Bent (*Agrostis capillaris*), Perennial Rye-grass (*Lolium perenne*), Red Fescue (*Festuca rubra*), False Oat-grass (*Arrhenatherum elatius*) and Rough Meadow-grass (*Poa trivialis*). Other species include Southern Marsh Orchid (*Dactylorhiza praetermissa*), Black Medick (*Medicago lupulina*), White Clover (*Trifolium repens*), Red Clover (*Trifolium pratense*), Common Vetch (*Vicia sativa*), Meadow Buttercup (*Ranunculus acris*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Common Figwort (*Scrophularia nodosa*) and Self-heal (*Prunella vulgaris*). Furthermore, the area has previously been used to store material which was dredged from the Manchester Ship Canal and River Weaver, which may have influenced the soil and as such the species composition. The area is currently unmanaged, but the rabbits are present which graze a large proportion of the site. The area is occasionally illegally accessed by motorbikes which create areas of bare earth and small microhabitats, adding to the diversity of the area.

Plate 5 – View of grassland within north-eastern corner of the site.

3.2.11 The second area of semi-improved neutral grassland is in the south-eastern corner section of Plot 6and is subject to low density, occasional grazing from sheep and cattle, as such the grass and rushes are still relatively tall and there is a variety of species present. Some sections are dominated by sedges and rushes, where the water table is higher, but most of the area is dominated by grasses and as such has been mapped as semi-improved neutral grassland. Species include Perennial Rye-grass, Hard Rush (*Juncus inflexus*), Red Fescue, Creeping Thistle, Common Vetch, Meadow Foxtail (*Alopecurus pratensis*), Yorkshire-fog, False Fox-sedge (*Carex otrubae*) , Common Sorrel (*Rumex acetosa*), Hairy Sedge (*Carex hirta*), Marsh Thistle (*Cirsium palustre*), Yellow Vetchling (*Lathyrus aphaca*), Thyme-leaved Speedwell (*Veronica serpyllifolia*), Rosebay Willowheb, Oval Sedge (*Carex leporine*), Tufted Hair-grass (*Deschampsia cespitosa*), Sharp-flowered Rush (*Juncus acutiflorus*), Soft-rush (*Juncus effusus*), Common Sedge (*Carex nigra*), Crested Dog's-tail (*Cynosurus cristatus*), Carnation Sedge (*Carex panicea*), Marsh Bedstraw (*Galium palustre*), Lesser Stitchwort (*Stellaria graminea*), Greater Bird's-foot-trefoil (*Lotus pedunculatus*), Field Horsetail (*Equisetum arvense*) and Common Knapweed (*Centaurea nigra*).

Plate 6 – View of grassland withing southern section of the site.

*Improved grassland (B4)*

3.2.12 A large proportion of the western section of the site (Plot 1, 2, 5 and 6) is currently a windfarm with improved grassland below the turbines (TN8, see Page 2 on Figure 1). The grassland is subject to high intensity grazing from both sheep and cattle. Due to the intensive grazing regime, only a small number of species were identifiable, these include Annual Meadow-grass (*Poa annua*), Perennial Rye-grass, Red Fescue, Common Nettle, Creeping Thistle and White Clover.

Plate 7 – Looking across the western section of the site.

3.2.13 Two fields within the north-eastern section of the site (within north-eastern corner of Plot 7 and eastern section of Plot 3) are also considered to be improved grassland. Some sections of the field are heavily poached, indicating that it is grazed by cattle for a proportion of the year. Species present include Perennial Rye-grass, Spear Thistle (*Cirsium vulgare*), Creeping Thistle, White Clover, Creeping Buttercup (*Ranunculus repens*), Broad-leaved Dock, Common Mouse-ear (*Cerastium fontanum*). Soft-rush and Hard Rush are also scattered throughout the fields.

3.2.14 Finally, access was not permitted to one field in the southern section of Plot 7 (TN10, see Page 3 of Figure 1). As such, it has been assessed from a distance and a precautionary approach taken when determining the likely habitat present.

*Marsh / marshy grassland (B5)*

3.2.15 A large proportion of Plot 7 and the eastern section of Plot 6 is species poor, marshy grassland. The sward is dominated by Soft-rush but other frequent species include; Compact Rush (*Juncus conglomeratus*), Perennial Rye-grass, Rough Meadow-grass, Smooth Meadow-grass (*Poa pratensis*), Cock's-foot, False Oat-grass, Yorkshire-fog, Crested Dog's-tail, Meadow Foxtail, White Clover, Creeping Buttercup, Creeping Thistle and Spear Thistle. Furthermore, two fields in the central, southern-western section of the site are also considered to be marshy grassland, due to the dominance of Soft-rush.

3.2.16 All the fields are also subject to low-intensity grazing, indicated by presence of cow pats and poaching.

Plate 8 – View of marshy grassland within the central, northern section of the site.

3.2.17 Two fields, within the western section of Plot 7 and eastern section of Plot 6 (TN9, located on Page 3 on Figure 1) appears to have been managed for wildfowl purposes and it is owned by Frodsham & District Wildfowlers Club Ltd The fields include areas of poor, semi-improved grassland with distinct lines of Soft and Compact Rush. The lines of rush are in shallow, man-made ditches to provide additional shelter for wildfowl species.

Plate 9 – View of fields with marshy grassland lines.

*Poor semi-improved grassland (B6)*

3.2.18 There are four fields within Plot 6 and 7 which have experienced a lower intensity of grazing and have a longer sward. As such, these areas have been classified as semi-improved grassland.

3.2.19 Furthermore, there are small sections of grassland at the boundaries of the improved fields within Plots 5 and 6 which have experienced a lower intensity of grazing and have a longer sward. As such, these areas are also considered to be semi-improved grassland.

Plate 10 – Poor semi-improved field in the central, southern section of the site (TN32)

3.2.20 The species in these areas are similar to those found in the improved grassland areas, but there is a greater diversity of species here and there are more patches which are succeeding into ruderal and scrub habitats. Species include Meadow Foxtail, Crested Dog's-tail, False Oat-grass, Red Fescue, Tufted Hair-grass, Cock's-foot, Common Nettle, Perennial Rye-grass, Hogweed, Common Sorrel, Creeping Buttercup, Broad-leaved Dock, Lesser Burdock (*Arctium minus*), Creeping Thistle, Teasel (*Dipsacus fullonum*), Primrose (*Primula vulgaris*), Spear Thistle, Common Ragwort (*Jacobaea vulgaris*), Daisy (*Bellis perennis*), Dandelion (*Taraxacum officinale agg.*), Yarrow (*Achillea millefolium*), Cleavers, Ribwort Plantain (*Plantago lanceolata*), Common Mouse-ear, Groundsel (*Senecio vulgaris*), Greater Plantain (*Plantago major*), Germander Speedwell (*Veronica chamaedrys*), Cow Parsley, Hairy Bittercress (*Cardamine hirsuta*), Dove's-foot Cranesbill (*Geranium mole*), Common Vetch, White Clover and Yorkshire-fog.

*Tall ruderal (C3.1)*

3.2.21 There are several small areas of tall ruderal vegetation in Plots 4 and 8. Species include Common Nettle, Red Dead-nettle (*Lamium purpureum*), Cleavers, Ground-ivy (*Glechoma hederacea*), Groundsel, False Oat-grass, Cow Parsley, Hogweed, Cock's-foot, Willowherb species, Rosebay Willowherb, young Hawthorn trees, Spear Thistle and Creeping Thistle.

Plate 11 – Area of tall ruderal within the north-eastern section of the site (TN15)

*Swamp (F1)*

3.2.22 There are a number of areas across the site which have been mapped as swamp habitat as they are 5m or wider and are dominated by Common Reed (*Phragmites australis*). Any areas less than 5m wide have been mapped as marginal vegetation. Other species recorded occasionally throughout the areas of swamp include Reed Canary-grass (*Phalaris arundinacea*), Common Nettle, Broad-leaved Dock, Creeping Thistle, Spear Thistle, Great Willowherb (*Epilobium hirsutum*) and Meadow Buttercup.

Plate 12 – View of area of swamp in the northern, central section of the site.

*Marginal vegetation (F2.1)*

3.2.23 There are several areas of marginal vegetation present throughout the site, particularly demarcating field boundaries within Plot 7 and surrounding the network of ditches. The areas of marginal vegetation are dominated by Common Reed and other species recorded are similar to those found within the areas of swamp.

Plate 13 – Example of marginal vegetation around one of the drainage ditches within the central section of the site.

*Standing water (G1)*

3.2.24 There are nine ponds and 36 ditches which hold water across the site, see Figure 3 – Pond and Ditch Plan. Most ponds are in the central section of the site while the ditches are spread across the site as field and drainage ditches creating a network between the fields. A detailed description and photographs for the ponds and ditches surveyed is provided within *RSK (2023) Frodsham renewable energy development - GCN Survey Report, REV02* and *RSK (2023) Frodsham renewable energy development – Water Vole Habitat Assessment Report, REV01*.

*Arable (J1.1)*

3.2.25 Several fields within the central southern section of Plot 7 and north-eastern section of Plot 7 are arable, utilised for growing crops. At the time of the survey the fields had either been recently ploughed or had seedlings growing.

Plate 14 – Example of ploughed arable field within the southern, central section of the site.

*Introduced shrub (J1.4)*

3.2.26 There are occasional areas across the site with scattered introduced shrub, including Cotoneaster (*Cotoneaster* sp)., Flowering Currant and Variegated Yellow Archangel. These areas tend to be near public footpaths. New Zealand Pigmyweed (*Crassula helmsii*) was also recorded within one waterbody on the site, located within eastern section of Plot 6 (TN11, see Page 3 on Figure 1).

*Intact hedge, species poor (J1.1.2)*

3.2.27 There are four hedges present across the site, see Figure 1 – Phase 1 Habitat Plan, located within Plot 6 and 7.

3.2.28 Hedge 1 is to the south of the central section of the site (within Plot 7, see TN12, Page 3 of 4 on Figure 1). It appears to have been recently planted and is *c.* 1m high and 0.5m wide. Hawthorn is dominant but other species include Blackthorn, Hazel (*Corylus avellana*), Wild Cherry and Holly (*Ilex aquifolium*).

Plate 15 – View of Hedge 1.

3.2.29 Hedge 2 is in between two fields of marshy grassland in the central section of the site (within Plot 7, see TN13 on Page 3 of 4 on Figure 1). The hedge is adjacent to a dry ditch and is *c.* 1m wide 4m high. Some sections of the hedge relatively young and may have been planted in last 5 years, evidenced by presence of tree guards. Hawthorn is the most frequent species, but other species include Blackthorn, Rose species (*Rosa* sp), Willow species and Holly.

Plate 16 – View of Hedge 2.

3.2.30 Hedge 3 is in between two fields of marshy grassland in the central section of the site (within Plot 7, see TN14 on Page 3 of 4 on Figure 1). The hedge is immediately adjacent to a wet ditch and is *c.* 1m wide and 4m high. Hawthorn is the dominant species but Rose, Blackthorn, Apple (*Malus sp.)* and Holly are also present. The hedge appears to have been planted or 'gapped up' recently as there are several trees with tree guards present.

Plate 17 – View of Hedge 3

3.2.31 Hedge 4 is in between two fields of marshy grassland in the central section of the site (across Plot 6 and 7, see TN 15 on Page 3 on Figure 1). The hedge is *c.* 1m wide and 4 - 5m high. Hawthorn is the dominant species but Rose, Blackthorn, Apple species and Holly are also present.

Plate 18 – View of Hedge 4

*Fence (J2.4)*

3.2.32 A mixture of wooden picket and barbed wire fences are present across the site. The barbed wire fences are present to demarcate the field boundaries, in between ditches and lines of scrub.

*Dry ditch (J2.6)*

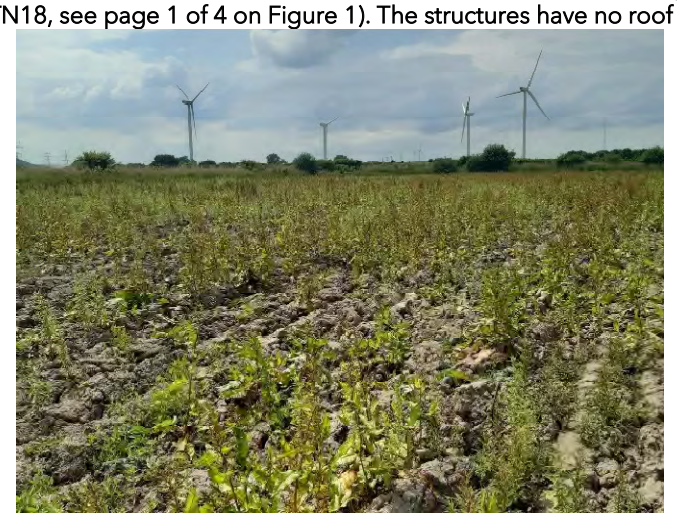
3.2.33 There are three dry ditches present across the site, all within Plot 7, see TN16 on Page 3 on Figure 1 – Phase 1 Habitat Plan for locations. All ditches are *c.* 2m wide and are filled with marginal vegetation.

*Buildings (J3.6)*

3.2.34 There is one building in Plot 6 (TN17, on page 2 of Figure 1), within the windfarm. The building is a substation for the windfarm. It was not accessed during the initial PEA survey but is considered unlikely to be impacted as part of the proposed works and will be buffered from the works via the surrounding fence and hardstanding.

Plate 19 – View of Building 1 in western section of the site.

There are also a number of brick-built structures located around the boundary of the improved fields within Plots 2, 5 and 6 (TN18, see page 1 of 4 on Figure 1). The structures have no roof and are three sided, see



3.2.35 Plate 22 below.

Plate 20 – Example brick-built structure within the western section of the site.

*Bare ground (J4)*

3.2.36 There are two fields of bare ground in the eastern section of the site (Plots 4 and 8), both of which had been recently ploughed.

Plate 21 – Area of bare ground within the eastern section of the site.

3.2.37 Additionally, there is one small field in the central section of the site (within Plot 7) which has been mapped as bare ground (TN19, see Page 1 of Figure 1). As such, there are ephemeral / short perennial species and tall ruderal plants scattered throughout but are too small to map. Species include Broad-leaved Dock, Rosebay Willowherb, Square-stalked Willowherb (*Epilobium tetragonum*), Curled Dock (*Rumex crispus*), Creeping Thistle, Spear Thistle, Perennial Sow-thistle (*Sonchus arvensis*), Scented Mayweed (*Matricaria chamomilla*), Common Field-speedwell (*Veronica persica*), Cleavers and Scarlet Pimpernel (*Anagallis arvensis* ssp. *arvensis*).

Plate 22 – Area of bare ground within the central section of the site.

*Invasive non-native plant species*

3.2.38 Variegated Yellow Archangel (TN1, see Page 3 on Figure 1), New Zealand Pigmyweed (TN11 see Page 3 on Figure 1) and Cotoneaster species (TN20*)* have been recorded on the site, see eastern section of Plot 6. These species are non-native invasive, listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). No other invasive non-native species were observed during the survey.

## 3.3 Protected and notable species

*Invertebrates*

3.3.1 The BDS returned hundreds of records for 59 notable invertebrate species within 1km of the site, including four species of beetles, two species of butterflies, 9 species of dragonflies, 35 species of moth and two species of true fly. Furthermore, 16 records for notable invertebrates were recorded on the site, including 10 records of dragonflies, 5 records of moths and one butterfly.

3.3.2 A large proportion of the site is Bramble, species poor marshy grassland, improved grassland and arable fields, which are considered likely to support a common assemblage of invertebrate species, typical of Bramble and grassland habitats.

3.3.3 However, the ponds, ditches and areas of semi-improved neutral grassland and swamp may support a more diverse assemblage of invertebrate species.

3.3.4 No records for white-clawed crayfish (WCC) (*Austropotamobius pallipes*) were returned from within 1km of the proposed site boundary. The ditches on the site are generally considered unsuitably for WCC as they are stagnant, relatively shallow and lack any refugia, such as large rocks or boulders. As such WCC are not discussed further within this report.

*Great crested newt and other amphibians*

3.3.5 The BDS returned 71 amphibian records within 1km of the site boundary including:

- 20 records for common frog (*Rana temporaria*), with the closest record from 2008 and located 25m south,
- 17 records for common toad (*Bufo bufo*), with the closest record from 2008 and for 8 individuals, located 25m south,
- 12 records for GCNs, with the closest record from 2017 for a negative eDNA result 450m south-east of the proposed site boundary. The closet record of a GCN is from 2003 and is 450m north of the site, but the River Weaver will act as a barrier to movement between this record and the site.
- 22 records for smooth newt (*Lissotriton vulgaris*), with five records from 2002 and within the proposed site boundary. Two records are in a pond in the north-eastern corner of the site (TN21) and three records are near a ditch on the site (TN22), see Figure 1 – Phase 1 Habitat Plan

3.3.6 The 36 ditches and 9 waterbodies on the site provide potential suitable breeding habitat for GCNs and other common amphibians. Furthermore, there are an additional 14 waterbodies were identified within 500m of the proposed site boundary.

3.3.7 The site provides suitable terrestrial habitat for GCNs and common amphibians as it contains predominantly marshy grassland (grazed by sheep and cattle), rough grassland, agricultural grassland fields and arable land with a grid of interconnected ditches forming the field boundaries. The areas of scrub, rough grassland, marshy grassland, emergent and swamp and rough grassland will provide foraging and

commuting opportunities for GCNs while the areas of scrub and scattered trees will also provide refuge opportunities. A large portion of the western section of the site is utilised as a wind farm and is intensively grazed by sheep and cattle, providing limited opportunities for GCNs within this section of the site. The development area is to the north-west of the M56 motorway and 200m north-west of the town of Frodsham. The site is bordered by the Manchester Ship Canal and River Weaver to the north and east, and the M56 motorway and Frodsham to the south and as such the site is relatively isolated.

3.3.8 All ditches and waterbodies on the site and within 500m were subject to a habitat suitability index (HSI) survey and water samples were collected from 21 of the most suitable and safely accessible waterbodies and analysed for the presence of GCN environmental DNA (eDNA), see RSK Biocensus (2023) *Frodsham renewable energy development Reptile Survey Report REV01*.

3.3.9 No positive eDNA results were recorded and the vast majority of the results returned were negative. Furthermore, reptile surveys were undertaken on the site between March and June 2022 and no GCNs were recorded using the refugia traps. Therefore, it is considered that GCNs are reasonably unlikely to be present on the site. However, common toads were identified on the site during the initial walkover survey and two toadlets were recorded during the reptile surveys, indicating that the site is used by common amphibians for foraging and commuting. No evidence of toads breeding within the on-site waterbodies was recorded but they were identified breeding within one off-site pond, 165m north-west of the site. Further information and detailed results can be found in *RSK Biocensus (2023) – Frodsham renewable energy development GCN Survey Report, REV02*.

*Reptiles*

3.3.10 The BDS returned two records for reptiles within 1km of the proposed site boundary, both of which are for common lizard from 2008 and both immediately adjacent to the to the M56 motorway, 40m south of site. Habitat suitability is similar to that described above for amphibians and the site is considered to be particularly suitable for grass snake due to the areas of ditches, swamp, marshy grassland and emergent vegetation. However, no reptiles were identified on the site during the suite of reptile surveys undertaken by RSK between March – July 2022, therefore reptiles are considered reasonably likely to be absent from the site or present in very low numbers. Further information and detailed results can be found in *RSK Biocensus (2023) – Frodsham renewable energy development Reptile Survey Report, REV01*.

*Birds*

3.3.11 The BDS returned numerous records for protected bird species within 1km of the site, including avocet (*Recurvirostra avosetta*), barn owl, Bewick's swan (*Cygnus columbianus bewickii*), black-necked grebe, black-tailed godwit (*Limosa limosa*), brambling (*Fringilla montifringilla*), Cetti's warbler (*Cettia cetti*), fieldfare (*Turdus pilaris*), garganey (*Anas querquedula*), goldeneye (*Bucephala clangula*), goshawk (*Accipiter gentili*), green sandpiper (*Tringa ochropus*), hobby (*Falco subbuteo*), kingfisher (*Alcedo atthis*), little

ringed plover (*Charadrius dubius*), long-tailed duck (*Clangula hyemalis*), marsh harrier (*Circus aeruginosus*), merlin (*Falco columbarius*), Mediterranean gull (*Larus melanocephalus*), peregrine (*Falco peregrinus*), pintail (*Anas acuta*), red kite (*Milvus milvus*), redwing (*Turdus iliacus*), ruff (*Calidris pugnax*), scaup (*Aythya marila*), Temminck's stint (*Calidris temminckii*) and whooper swan (*Cygnus cygnus*). Hundreds of species of conservation concern were also returned within 1km of the site.

3.3.12 The site is considered to provide suitable nesting habitat for a variety of common bird species such as song thrush (*Turdus philomelos*), robin (*Erithacus rubecula*) and woodpigeon (*Columba palumbus*), including hedgerows, scattered trees and scrub. In addition the areas of swamp, marginal vegetation and marshy grassland will provide nesting opportunities for a variety of wildfowl species.

3.3.13 Finally, the habitats on the site are broadly suitable for overwintering waders, particularly the northern central section with the areas of marshy grassland and larger areas of standing water.

3.3.14 A suite of wintering bird surveys and breeding bird were undertaken by RSK between November 2021 and June 2022. For further information and detailed results see *RSK Biocensus (2022) – Frodsham renewable energy development – Wintering Bird Survey Report* and *RSK Biocensus (2022) Frodsham renewable energy development – Breeding Bird Survey Report*.

3.3.15 The wintering bird surveys recorded a total of 84 species, including 54 specially protected and/or notable species. A diverse waterbird assemblage recorded included all seven species for which the adjacent Mersey Estuary SPA/Ramsar site is designated, with significant proportions (i.e. >1%) of the SPA and Ramsar site populations recorded for six species; notably Black-tailed Godwit (29.7% of the SPA population) and Golden Plover (19.7% of the SPA population). Thirteen wintering bird species were potentially recorded in numbers of county importance.

3.3.16 The breeding bird surveys identified that the site supports a regionally important population of breeding birds including 5 species receiving protection under the Wildlife and Countryside Act and a diverse assemblage of scarce species listed as either red or amber species of conservation concern including species such as lapwing which have suffered a drastic decline in recent decades.

3.3.17 The Frodsham section supported the greatest diversity of breeding birds, probably due to the greater habitat diversity, more scrub, and hedgerows than the Helsby section which is given over to intensive farming. However, lapwing, a bird that requires large open fields in which to breed, was present within the Helsby section and not the Frodsham section.

3.3.18 The area around the River Weaver, the flat fields adjacent to the Manchester Ship Canal and the mitigation area located between the two sections of wind turbines supports aggregations of wader and wildfowl species, many listed as interest features of the Mersey estuary. These areas therefore are functionally linked to the Mersey estuary as they provide a function (mainly high tide roosts) for these species. This usage was greatest in April as waders and wildfowl species prepare to head north for their

breeding grounds and will likely increase again over the autumn and winter months as birds head south to overwinter.

*Bats*

3.3.19 The BDS returned 43 records for bats within 2km of the site, including:

- Brown long-eared (*Plecotus auritus*) bat - Four field records were returned, the closest of which is *c.* 840m north-east of the site.
- Common pipistrelle (*Pipistrellus pipistrellus*) - 16 records were returned, one of which is a roost *c.* 1.9km south-west of the site. The closest field record is *c.* 350m south of the site.
- Daubenton's bat (*Myotis daubentonii*) - Two field records were returned, the closest of which is *c.* 1.3km east of the site.
- Noctule (*Nyctalus noctula*) - Five field records were returned, the closest of which is *c.* 465m north of the site.
- Pipistrelle species (*Pipistrellus sp.*) - 10 records were returned, one of which was for a roost *c.* 1.5km south of the site. The closest field record is *c.* 405m south of the site.
- Soprano pipistrelle (*Pipistrellus pygmaeus*) - Five field records were returned, two of which are in the western section of the site, west of the wind turbines.
- Whiskered bat (*Myotis mystacinus*) - One field record was returned, *c.* 2km east of the site.

3.3.20 The building (TN17 on Page 1 of Figure 1 – Plate 19) in Plot 6, within windfarm is unlikely to be impacted as part of the proposed works and will be buffered from the works via the surrounding fence and hardstanding. The habitats surrounding the building are of poor quality for foraging and commuting bats and there is no tree or hedge-line to the building, reducing its suitability for roosting bats.

3.3.21 The brick-built structures around the boundary of the improved fields within the western section of the site (Plots 2, 5 and 6 (TN18, see page 1 on Figure 1, Pate 20)) have no roof and are three sided. The structures are in poor condition, with several bricks missing or gaps in the mortar. However, on closer inspection most of the gaps are superficial. A small number of gaps are present, but these were fully inspected using a high-powered torch and no evidence of roosting bats was recorded. However, the gaps are considered suitable to support a single bat occasionally as a day roost.

3.3.22 No trees with features suitable to support roosting bats were recorded during the PEA. However, a detailed ground level tree assessment (GLTA) was not undertaken so if any trees are to be removed as part of the proposed development, it is recommended a survey of those trees is undertaken to confirm their potential to support roosting bats.

3.3.23 The development area is to the north-west of the M56 motorway and 200m north-west of the town of Frodsham. The site is bordered by the Manchester Ship Canal and River Weaver to the north and east, M56 motorway and Frodsham to the south. The areas of neutral semi-improved grassland, marshy grassland, swamp, emergent vegetation,

scrub and ponds and ditches on the site provide suitable habitat for foraging bats. Furthermore, the linear features such as areas of scrub, emergent vegetation and ditches along the field boundaries provide suitable habitat for commuting bats and connect the site to suitable habitat in the wider landscape. However, a large proportion of the site contains areas of low-quality habitat for foraging and commuting bats, with large areas of improved grassland, species poor marshy grassland, arable fields and bare ground, which provide limited opportunities for foraging and commuting bats. Therefore, site was assessed as having low suitability for foraging and commuting bats.

3.3.24 In the wider surrounding area, the habitats are similar in composition to the south, with the urban areas of Frodsham and Helsby bounded by hedge-lined fields and watercourses, however connectivity to these habitats from the site is limited by the M56 which will act as a barrier to movement. To the north and west the habitats are lower in quality with the town of Runcorn to the north and mixture of an industrial estate and agricultural fields to the west. The River Mersey to the north will provide a large area of foraging and commuting opportunities for bats.

3.3.25 At least five different species of bat were recorded during the seasonal transect surveys, in addition to Myotis species and Nyctalus species which have been taken to genus only. Recorded calls include the following species; common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule and serotine.

3.3.26 Across the activity surveys bat activity was most concentrated along the Manchester Ship Canal and River Weaver and associated scrub and swamp habitats to the north and north-east of the site. Activity was also concentrated near the small portion of plantation woodland within the central-western section of site. Therefore, it is a reasonable assumption that these areas are of most value to bats using the site. Further information is provided within *RSK Biocensus (2023) Frodsham renewable energy development – Bat Activity Survey Report, REV01*.

*Water vole*

3.3.27 The BDS returned 32 records of water vole within 1 km of the site, including 15 records from within or immediately adjacent to the proposed site boundary, the most recent of which is from 2015. It should also be noted that three records of American mink (*Neovison vison*) were returned, including one record from within the proposed site boundary from 2009. American mink is known to predate on water voles (Dean et al 2021).

3.3.28 The central and south-eastern sections of the site (Plots 3, 4, 7 and 8 and eastern sections of Plots 2 and 6) are particularly suitable for water vole, with the network drainage ditches, ponds and areas of marshy grassland, swamp and emergent vegetation providing burrowing, foraging and commuting opportunities. However, the large areas of improved grassland and shallow ditches in the western section of the site provide limited opportunities for water vole.

*Otter*

3.3.29 The BDS returned two records for otter within 1 km of the site, the closest of which is *c.* 90m south-east, within Frodsham playing field ponds. The majority of the ditches and waterbodies on the site are generally considered unsuitable for otter as they do not support fish, are shallow and densely shaded. However, a number of the larger ditches (such as TN23 (within Plot 4 and 8, see page 4 on Figure 1), TN24 (within Plot 7, see Page 3 on Figure 1) and TN25 (Within Plot 10, see Page 2 of Figure 1)), have the potential to support foraging and commuting otter as they contain larger amounts of water and may support fish. No evidence of otter holts or resting places was recorded during the PEA walkover or subsequent habitat suitability surveys for both GCN and water vole.

*Badger*

3.3.30 The BDS returned 42 records of badger within 1 km of the site, including records for a sett adjacent the site boundary. The site contains areas of scrub and a variety of grassland habitats, which provide suitable foraging and commuting habitats for badger, as-well as sett building opportunities. [redacted]:

- [redacted] – A large main sett comprising 12 entrance holes, 7 of which are active, evidenced by presence of hairs, spoil piles, prints and well-used mammal paths. [redacted]

Plate 23 – View of main sett 1.

Plate 24 – View of main sett 1.

Plate 25 – Example badger hairs identified outside an entrance of Sett 1.

- [redacted]. This is evidenced by presence of hairs at each entrance, spoil piles, two prints at one entrance and well-used mammal paths. [redacted].

Plate 26 – Example badger hairs identified outside an entrance of Sett 1.

Plate 27 – View of Sett 2 and well-used mammal paths

Plate 28 – View of hair identified within entrance at Sett 2.

- [redacted] – An outlier sett with one entrance hole. Sett is active as claw marks were recorded at the entrance and a fresh latrine was recorded adjacent to the entrance hole. The sett is immediately north of an access track in the north-western section of the site, leading to an area of swamp.

Plate 29 – View of Sett 2 and well-used mammal paths

Plate 30 - View of latrine.

- [redacted] An [redacted] Old bedding and spoil were recorded at the sett entrance but there is a well-used mammal path leading from hole, as such is currently considered to be partially active.
- [redacted] – [redacted] No recent evidence was recorded within the entrance hole, but a well-used mammal path was noted outside the entrance hole heading both north and south. As such, the sett is currently considered to be partially active.
- [redacted]. The mammal hole had a narrow entrance (c. 10cm wide) and was filled with leaves and surrounded by dense scrub. As such, the mammal hole is considered unlikely to be used by badger and is currently disused.
- [redacted] No recent evidence was recorded within the entrance hole, but a well-used mammal path was noted outside the entrance hole. As such, the sett is currently considered to be partially active.

***Other notable species***

3.3.31 Records for both hedgehog (*Erinaceus europaeus*) and polecats (*Mustela putorius*) were returned from within 1km of the proposed site boundary. The closest record for hedgehog is *c.* 520m north of the site while the closest record for polecat is 160m west of the site.

3.3.32 Hedgehogs and polecats occupy a range of lowland habitat which enough cover to allow nesting. Hedgehogs are particularly common in parks in urban and suburban

environments, farmland and gardens. The areas of grassland, swamp and scrub offers foraging opportunities for hedgehog and will support a range of small mammals, a key food source for polecats. The areas of scrub, scattered trees and woodland provide refuge and hibernation opportunities for both species. The site is relatively isolated due to the surrounding watercourses to the north and east and M56 motorway to the south, but the site is connected to suitable habitat to the west so hedgehogs and polecats may therefore be present on the site.

# 4.0 EVALUATION AND RECOMENDATIONS

## 4.1 Statutory designated sites

4.1.1 There are four statutory designated sites and two internationally designated sites within 2km of the site boundary, including Mersey Estuary Ramsar, Mersey Estuary special protection area (SPA), Mersey Estuary site of special scientific interest (SSSI), Flood Brook Clough SSSI, Runcorn Hill local nature reserve (LNR), Dunsdale Hollow SSSI. Many of these sites are designated for their wetland habitats and/or species including wintering birds. Any future development proposals are unlikely to directly impact habitats associated with the designated sites, however the construction phase of any future development may result in indirect impacts. Furthermore, the habitats within the site may be used as functional land for the wintering bird assemblage associated with the designated sites.

4.1.2 However, it should be noted that any future development may result in an indirect positive impact on the habitats and species associated with the designated sites via reduced recreational pressure. The site is currently illegally accessed by members of the public and dog walkers by a network of paths across the site. Any future proposed development should seek to retain the public rights of way, but other pathways should be removed to reduce recreational pressure on the designated sites. Furthermore, information boards could be situated along public rights of way to inform residents of the nearby protected sites and the recreational pressure affecting them, to educate the residents and help to alleviate these pressures.

4.1.3 Therefore, a habitat regulations assessment (HRA) should be undertaken to fully assess the impacts (both negative and positive) on designated sites as a result of any future proposed development. Furthermore, the survey information gathered for breeding and wintering birds should be used to inform the HRA.

4.1.4 Additionally, the site lies within a SSSI Impact Risk Zone (IRZ) within which Natural England request that they are consulted on all types of planning applications. Therefore, it is recommended that the planning authority consult with Natural England.

## 4.2 Non-statutory designated sites

4.2.1 There are 10 non-statutory designated sites within 1 km of the site boundary, which are all local wildlife sites (LWSs). Two sites (Frodsham, Helsby and Ince Marshes and Frodsham Field Studies centre) are within 30m of the proposed site boundary.

4.2.2 The sites are designated for similar reasons to the statutory designated sites, including wintering birds. As such, wintering bird surveys should be undertaken to inform the impact assessment on non-statutory designated sites. However, it is anticipated that any mitigation measures required to protect statutory sites would also serve to protect the non-statutory sites.

## 4.3 Habitats

4.3.1 Habitats on the site qualify as the priority habitat 'reedbeds' and 'ponds' under Section 41 of the NERC Act 2006. However, the reedbed and pond habitats on the site are in generally poor condition with minimal plant species diversity, but they do provide a valuable resource for a variety of wildlife in the local area. There are a number of species-poor hedgerows and scattered trees present on the site and watercourses nearby.

4.3.2 Site clearance and setting out may involve the direct loss of trees, hedgerows, ponds and reedbeds on the site as an ecological resource. Furthermore, construction activities could cause indirect impacts on ponds, reedbeds and nearby watercourses via pollution and dust or indirect damage to root protection areas (RPA) of hedgerows and trees.

## 4.4 Plants

4.4.1 Variegated Yellow Archangel, New Zealand Pigmyweed and Cotoneaster were recorded on the site. These species are non-native invasive species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

4.4.2 Site clearance and setting out could result in the disturbance and dispersal of invasive species on and off the site.

4.4.3 Although not a legal requirement, it is recommended that these species are treated and/or removed by a specialist contractor to eradicate them from site and prevent their spread. As a minimum, precautions should be taken to ensure these species are not spread during the works, or into the neighbouring natural habitats.

## 4.5 Protected and other notable species

*Amphibians*

4.5.1 Following the suite of eDNA surveys for GCN, which all returned negative or inconclusive results, GCN are not considered to be present on the site. However, common toads were identified on the site during the initial walkover survey and two toadlets were recorded during the reptile surveys and records for smooth newts on the site were returned, indicating that the site is used by low numbers of common amphibians for foraging and commuting. No evidence of breeding within the on-site waterbodies was recorded but toads were identified breeding within one off site pond, 165m north-west of the site. Therefore, the works should still be completed under a suite of reasonable avoidance measures (RAMs) to ensure that other common amphibian species are not affected by the works.

*Reptiles*

4.5.2 No reptiles were identified on the site during the suite of reptile surveys undertaken by RSK between March – July 2022, therefore reptiles are considered reasonably likely to be absent from the site or present in very low numbers.

4.5.3 It is anticipated that the mitigation measures set out for amphibians will also serve to protect any reptiles in the unlikely event they are found on the site.

*Birds*

4.5.4 The field surveys for wintering birds recorded a total of 84 bird species within the site, including 54 specially protected and/or notable species. All seven species for which the adjacent Mersey Estuary SPA/Ramsar site is designated were recorded during these field surveys. Significant proportions (i.e. >1%) of the SPA and/or Ramsar site populations were recorded within the development site for six species, including particularly significant populations of Black-tailed Godwit and Golden Plover. While during the breeding season, the site supports a regionally important population of breeding birds including 5 species receiving protection under the Wildlife and Countryside Act and a diverse assemblage of scarce species listed as either red or amber species of conservation concern including species such as lapwing.

4.5.5 Development of the site could potentially result in significant negative impacts on these populations and, therefore, on the integrity of Mersey Estuary SPA/Ramsar site

4.5.6 Furthermore, the loss of habitats could potentially result in a loss of resource for both breeding and wintering birds.

*Bats*

4.5.7 There are a number of brick-built structures which were assessed as having low suitability to support roosting bats. However, no trees with features suitable to support roosting bats were recorded during the PEA, but a detailed GLTA was not undertaken. Furthermore, one building could not be accessed to complete a detailed assessment.

4.5.8 The areas of neutral semi-improved grassland, marshy grassland, swamp, emergent vegetation, scrub and ponds and ditches on the site provide suitable habitat for foraging bats. Furthermore, the linear features such as areas of scrub, emergent vegetation and ditches along the field boundaries provide suitable habitat for commuting bats and connect the site to suitable habitat in the wider landscape. However, a large proportion of the site contains areas of low-quality habitat for foraging and commuting bats, with large areas of improved grassland, species poor marshy grassland, arable fields and bare ground, which provide limited opportunities for foraging and commuting bats. Therefore, site was assessed as having low suitability for foraging and commuting bats.

4.5.9 If bats are roosting within the building, brick-built structures or trees, they are at risk of direct harm and disturbance and the roosts will be lost permanently during construction of a development. Any future development may also result in loss of foraging habitat for bats and inappropriate design could result in the severing of commuting corridors used by bats.

4.5.10 If the building is to be impacted as part of any future development, a detailed external and internal inspection should be undertaken by a suitably licensed ecologist to determine the buildings suitability to support roosting bats, with further presence / absence surveys undertaken if necessary.

4.5.11 If the brick-built structures are to be impacted, one bat presence / absence survey per structure should be undertaken by a suitably experienced ecologist during the peak bat survey season, May to August inclusive.

4.5.12 If any trees are to be removed, it is recommended a GLTA and tree climbing survey (where required) of those trees is undertaken by a suitably licensed ecologist to confirm their potential to support roosting bats. If the trees are identified as having moderate or high potential to support roosting bats, further presence / absence surveys will be required.

4.5.13 The need for surveys can be avoided through development design, but if required the survey results will need to be submitted as part of the planning application, and will inform further mitigation or compensation measures, if required. It should be noted that these further measures may include an application for a European protected species (EPS) mitigation licence or bat mitigation class licence (BMCL) from Natural England (NE).

4.5.14 At least five different species of bat were recorded during the seasonal transect surveys undertaken in 2022, in addition to Myotis species and Nyctalus species which have been taken to genus only. Recorded calls include the following species; common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule and serotine. Spatially, the highest levels of bat activity on the walked transects were recorded along linear features such as Manchester Ship Canal, River Weaver, ditches with marginal vegetation and lines of scrub, which provide a sheltered buffer for foraging. Where possible, these features should be retained as part of any future development.

*Water vole*

4.5.15 The central and south-eastern sections of the site are particularly suitable for water vole, with the network drainage ditches, ponds and areas of marshy grassland, swamp and emergent vegetation providing burrowing, foraging and commuting opportunities.

4.5.16 Any future development could potentially cause direct harm, injury and / or death to individuals. It could also cause disturbance and the direct loss of suitable habitat, as well as indirect habitat degradation through changes in the water quality.

4.5.17 If construction activities go within 10m of the ditches or cross any ditches, a suite of water vole surveys should be undertaken within the ditches which will be impacted by a suitably experienced ecologist to identify any burrows, latrines or other field signs indicating water vole presence. Surveys can be conducted mid-April to mid-September, but the optimal time to carry out surveys is in May and June during the peak breeding season. The results of this survey will then inform any further mitigation or compensation that may be required.

*Otter*

4.5.18 The majority of the ditches and waterbodies on the site are generally considered unsuitable for otter as they do not support fish, are shallow and densely shaded. No otter holts or evidence of otter was recorded during the PEA survey, but the larger ditches and waterbodies have the potential to support otter.

4.5.19 If any future development is undertaken within 10m of the larger waterbodies and ditches, the development could potentially cause direct harm, injury and / or death to individuals. It could also cause disturbance and the direct loss of suitable habitat, as well as indirect habitat degradation through changes in the water quality.

4.5.20 If the works are going to be within 10m of the larger waterbodies, an otter survey should be undertaken by a suitably experienced ecologist to identify any holts or other signs of how otters may be using the site. The results of this survey will then inform any further mitigation or compensation that may be required.

4.5.21 For works over 10m from the larger waterbodies, reasonable avoidance measures should be implemented to protect otters during the construction phase of the development.

*Badgers*

4.5.22 The site contains areas of scrub and a variety of grassland habitats, which provide suitable foraging and commuting habitats for badger, as-well as sett building opportunities. Furthermore, [redacted] see Section 3.3.28 for further information.

4.5.23 Construction activities without mitigation could result in direct harm to badgers, disturbance, sett collapse, sett abandonment and loss of foraging habitats.

4.5.24 If the construction activities associated with any future development go within 30m of the setts, further badger activity surveys are required for each sett, The surveys should monitor the setts to determine the level of activity, the number of badgers using the setts and confirm the type of sett present (main, annexe, subsidiary or outlier). The surveys will also monitor how badgers are using the site to inform any necessary mitigation or compensation measures.

4.5.25 Furthermore, if the any future development design results in the loss of the setts, connectivity between setts, particularly the two main setts, and significant loss of habitat, badger bait marking surveys may be necessary to provide further information on the badger group(s) territory(ies) and how badgers are using the site to inform further mitigation or compensation measures.

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# FIGURES

Figure 1 - Phase 1 Habitat Plan

Figure 2 – Site reference plan

Figure 3 - Pond and Ditch Plan

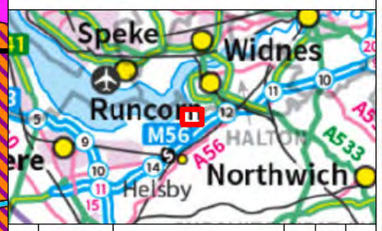
Figure 1 - Phase 1 Habitat Plan


Legend:

- Site boundary
- OSGR 1km grid squares - Plots

Phase 1 Habitat Types

- Broad-leaved Plantation Woodland
- Dense / Continuous Scrub
- Hardstanding
- Improved Grassland
- Introduced Shrub
- Marginal Vegetation
- Marshy Grassland
- Poor Semi-Improved Grassland
- Standing Water
- Swamp
- Intact Hedge - Species-Poor
- Standing Water
- Broadleaved Trees
- Target Notes

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**Solis Ortis PEA**

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Phase 1 Map
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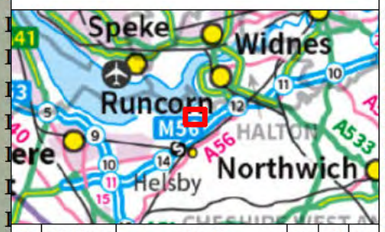
Legend:

- Site boundary
- OSGR 1km grid squares - Plots

Phase 1 Habitat Types

- Hardstanding
- Improved Grassland
- Marginal Vegetation
- Poor Semi-Improved Grassland
- Scattered Scrub
- Swamp
- Dry Ditch
- Standing Water
- Broadleaved Trees
- Target Notes

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**Solis Ortis PEA**

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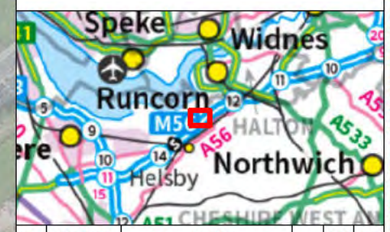
Legend:

- Site boundary
- OSGR 1km grid squares - Plots

Phase 1 Habitat Types

- Arable
- Broad-leaved Plantation Woodland
- Buildings
- Dense / Continuous Scrub
- Hardstanding
- Improved Grassland
- Marginal Vegetation
- Marshy Grassland
- Neutral Grassland - Semi-Improved
- Poor Semi-Improved Grassland
- Scattered Scrub
- Standing Water
- Swamp
- Dry Ditch
- Fence
- Intact Hedge - Species-Poor
- Standing Water
- Broadleaved Trees
- Target Notes

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**Solis Ortis PEA**

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Legend:

- Site boundary
- OSGR 1km grid squares - Plots

Phase 1 Habitat Types

- Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Dense / Continuous Scrub
- Hardstanding
- Improved Grassland
- Introduced Shrub
- Marginal Vegetation
- Marshy Grassland
- Neutral Grassland - Semi-Improved
- Poor Semi-Improved Grassland
- Scattered Scrub
- Semi-improved Neutral Grassland
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- Tall Ruderal
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- Fence
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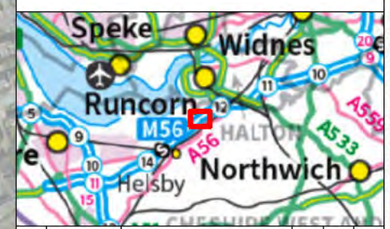
- Standing Water
- Broadleaved Trees
- Target Notes

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Phase 1 Map
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TN6 TN2 TN16 TN19 TN21 TN22 TN23

Legend:

- Site boundary
- OSGR 1km grid squares - Plots

Phase 1 Habitat Types

- Arable
- Bare Ground
- Dense / Continuous Scrub
- Hardstanding
- Improved Grassland
- Marginal Vegetation
- Marshy Grassland
- Poor Semi-Improved Grassland
- Scattered Scrub
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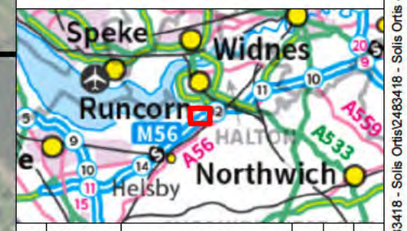
- Broadleaved Trees
- Target Notes

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Phase 1 Map
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Figure 2 – Site reference plan

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Legend:

- Site Boundary
- OSGR 1km grid squares - Plots

Phase 1 Habitat Types

- Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Buildings
- Dense / Continuous Scrub
- Hardstanding
- Improved Grassland
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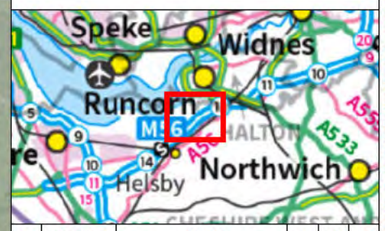


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Figure 3 - Pond and Ditch Plan

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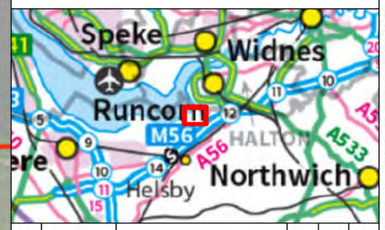
- Ditches for GCN Survey

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Legend:
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- 250m Site Boundary Buffer
- Ponds for GCN Survey
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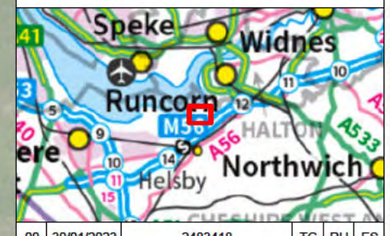


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Legend:

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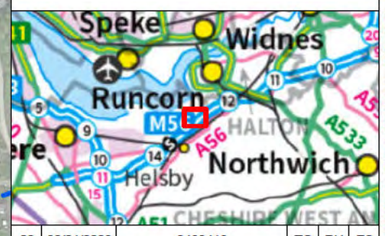


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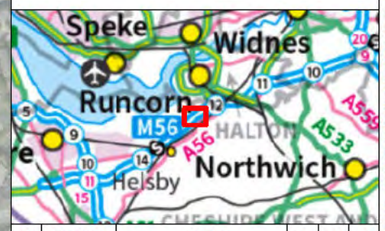


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**Frodsham Renewable Energy Development**

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W1 W2 W3 W4 W5 W6 W8 W9

D1 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20 D22 D23 D24 D25 D26 D28 D30 D35

Legend:

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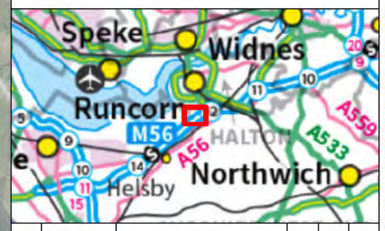
- Ponds for GCN Survey
- Ditches for GCN Survey

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**Frodsham Renewable Energy Development**

RSK biocensus EXPERTS IN ECOLOGY

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Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2483418 - Solis Ortis\2483418 - Solis Ortis - PEA - Figure 3 - Pond and Ditch Plan.aprx

# APPENDIX A – TARGET NOTES

The locations of the following target notes are shown in *Figure 1*.

TN1 – Area of plantation woodland in the central section of the site (TN1), adjacent to a footpath. All trees are young – semi-mature and comprise Silver Birch (Betula pendula), Black Pine (Pinus nigra), Grey Willow (Salis cinerea), and Horse-chestnut (Aesculus hippocastanum). The ground flora comprise Ivy (Hedera helix), Herb-Robert (Geranium robertianum), Cleavers (Galium aparine), Cock's-foot (Dactylis glomerata) and Yorkshire-fog (Holcus lanatus). A small number of introduced shrubs were also noted within the area of woodland, including Flowering Currant (Ribes sanguineum) and Variegated Yellow Archangel (Lamiastrum galeobdolon subsp. argentatum)

TN2 – Scrub within the north-eastern corner of the site.. The patches of scrub are a mixture of young – semi-mature trees with a height of c. 2 – 7m and as such have been mapped as dense scrub. Tree species present include Goat Willow (Salix caprea), Grey Willow, Ash (Fraxinus excelsior), Elder (Sambucus nigra), Aspen (Populus tremula), Dogwood (Cornus sanguinea) and Silver Birch (Betula pendula), but Goat and Grey Willow are the most frequent species present. There are also small areas with Bramble (Rubus fruticosus), Hawthorn (Crataegus monogyna), Blackthorn (Prunus spinosa), Dog-rose (Rosa canina) and Field-rose (Rosa arvensis) are also present.

TN3 - Area of scattered scrub within the south-western section of the site contains scattered young – semi-mature trees, which are all below a height of 5m and as such have been mapped as scrub. Species present within the south-western section of site include Willow species (Salix sp.), Grey Willow and Elder.

TN4 – Area of broadleaved scattered trees

TN5 – Area of broadleaved scattered trees

TN6 – Area of semi-improved neutral grassland. However, a number of species present indicate the grassland is slightly calcareous, including Yellow-wort (Blackstonia perfoliata ) and Fairy Flax (Linum catharticum). However, the majority of species present indicate neutral grassland, as the most frequent grass species present are Common Bent (Agrostis capillaris), Perennial Rye-grass (Lolium perenne), Red Fescue (Festuca rubra), False Oat-grass (Arrhenatherum elatius) and Rough Meadow-grass (Poa trivialis). Other species include Southern Marsh Orchid (Dactylorhiza praetermissa), Black Medick (Medicago lupulina), White Clover (Trifolium repens), Red Clover (Trifolium pratense), Common Vetch (Vicia sativa), Meadow Buttercup (Ranunculus acris), Common Bird's-foot-trefoil (Lotus corniculatus), Common Figwort (Scrophularia nodosa) and Self-heal (Prunella vulgaris).

TN7 – Area of damp semi-improved grassland. Species: Perennial Rye-grass, Hard Rush (Juncus inflexus), Red Fescue, Creeping Thistle, Common Vetch, Meadow Foxtail (Alopecurus pratensis), Yorkshire-fog, False Fox-sedge (Carex otrubae) , Common Sorrel (Rumex acetosa), Hairy Sedge (Carex hirta), Marsh Thistle (Cirsium palustre), Yellow Vetchling (Lathyrus aphaca), Thyme-leaved Speedwell (Veronica serpyllifolia), Rosebay Willowheb, Oval Sedge (Carex leporine), Tufted Hair-grass (Deschampsia

cespitosa), Sharp-flowered Rush (Juncus acutiflorus), Soft-rush (Juncus effusus), Common Sedge (Carex nigra), Crested Dog's-tail (Cynosurus cristatus), Carnation Sedge (Carex panicea), Marsh Bedstraw (Galium palustre), Lesser Stitchwort (Stellaria graminea), Greater Bird's-foot-trefoil (Lotus pedunculatus), Field Horsetail (Equisetum arvense) and Common Knapweed (Centaurea nigra).

TN8 – Windfarm.

TN9 – Fields managed for wildfowl purposes. The fields include areas of poor, semi-improved grassland with distinct lines of soft and compact rush present. The lines of rush are in shallow, man-made ditches to provide additional shelter for wildfowl species.

TN10 – Field where access was not permitted.

TN11 – Pond with New Zealand Pigmyweed (*Crassula helmsii)*

TN12 – Hedge 1, 1m high and 0.5m wide. Hawthorn is dominant but other species include Blackthorn, Hazel (*Corylus avellana*), Wild Cherry and Holly (*Ilex aquifolium*).

TN13 – Hedge 2, planted in last 5 years, evidenced by presence of tree guards. Hawthorn is the most frequent species, but other species include Blackthorn, Rose species (*Rosa* sp), Willow species and Holly.

TN14 – Hedge 3, in between two fields of marshy grassland in the central section of the site. The hedge is immediately adjacent to a wet ditch and is *c.* 1m wide and 4m high. Hawthorn is the dominant species but Rose, Blackthorn, Apple (*Malus sp.)* and Holly are also present. The hedge appears to have been planted or 'gapped up' recently as there are several trees with tree guards present.

TN15 – Hedge 4 - in between two fields of marshy grassland in the central section of the site. The hedge is *c.* 1m wide and 4 - 5m high. Hawthorn is the dominant species but Rose, Blackthorn, Apple species and Holly are also present.

TN16 – Dry ditch.

TN17 – Building within windfarm. It was not accessed during the initial PEA survey but is considered unlikely to be impacted as part of the proposed works and will be buffered from the works via the surrounding fence and hardstanding.

TN18 – Brick built structures.

TN19 – Area of bare ground with scattered ephemeral / short perennial plants.

TN20 – Location of cotoneaster plant.

TN21 – Pond with records of smooth newts.

TN22 – Ditch with records of smooth newts.

TN23 – Watercourse suitable for otters.

TN24 – Watercourse suitable for otters.

TN25 – Watercourse suitable for otters.

[redacted]

[redacted]

[redacted] An outlier sett with one entrance hole. Sett is considered to be active as claw marks were recorded at the entrance and a fresh latrine was recorded adjacent to the entrance hole.

[redacted]

[redacted]

[redacted]

[redacted]

# APPENDIX B – PROTECTED AND NOTEWORTHY SPECIES RECORDS

Species that are protected by law under Schedules 2 and 5 of The Conservation of Habitats and Species Regulations 2017, Schedules 2, 5 and 8 of The Wildlife and Countryside Act 1981 or The Protection of Badgers Act 1992 and have been recorded in the search area are listed in *Table 4* (excluding species protected only against collection for sale). These species records were obtained from Record – The Biodiversity Information System for Cheshire, Halton, Warrington and Wirral. The Latin and common names for species are given, along with the year of the most recent record and their level of designation.

Table 4: Protected species records within 1 km of the site boundary.Table 5 displays all noteworthy species that were returned within the search area. A glossary defining abbreviations used in the table is given in *Table 6, Appendix C*. If a species is not included in the tables below it does not necessarily mean the species is absent from the search area, but rather that data-holding organizations do not have records of it in these locations.

Table 4: Protected species records within 1 km of the site boundary.

| Scientific name | Common name | Designation | Year |
|---|---|---|---|
| **Amphibians** | | | |
| Triturus cristatus | Great Crested Newt | EPS(Sch2), WCA5, S41 | 2003 |
| **Birds** | | | |
| Accipiter gentilis | Goshawk | WCA1.1 | 2001 |
| Alcedo atthis | Kingfisher | WCA1.1, Amber | 2010 |
| Anas acuta | Pintail | WCA1.2, Amber, GB RDB(CR) | 2018 |
| Anas querquedula | Garganey | WCA1.1, Amber, GB RDB(CR) | 2004 |
| Anser anser | Greylag Goose | WCA1.2, Amber | 2018 |
| Aythya marila | Scaup | WCA1.1, S41, Red, GB RDB(EN) | 2004 |
| Botaurus stellaris | Bittern | WCA1.1, S41, Amber, GB RDB(VU) | 2002 |
| Bucephala clangula | Goldeneye | WCA1.2, Amber, GB RDB(VU) | 2017 |
| Calidris pugnax | Ruff | WCA1.1, Red, GB RDB(CR) | 2018 |
| Calidris temminckii | Temminck's Stint | WCA1.1 | 2008 |
| Cettia cetti | Cetti's Warbler | WCA1.1 | 2020 |
| Charadrius dubius | Little Ringed Plover | WCA1.1 | 2001 |
| Circus aeruginosus | Marsh Harrier | WCA1.1, Amber | 2010 |
| Circus cyaneus | Hen Harrier | WCA1.1, S41, Red, GB RDB(VU) | 2018 |
| Clangula hyemalis | Long-tailed Duck | WCA1.1, Red | 2003 |
| Cygnus columbianus | Bewick's Swan | WCA1.1, S41, Red, GB RDB(CR) | 2018 |
| Cygnus cygnus | Whooper Swan | WCA1.1, Amber, GB RDB(EN) | 2018 |
| Falco columbarius | Merlin | WCA1.1, Red, GB RDB(EN) | 2013 |

| Scientific name | Common name | Designation | Year |
|---|---|---|---|
| Falco peregrinus | Peregrine | WCA1.1 | 2004 |
| Falco subbuteo | Hobby | WCA1.1 | 2017 |
| Fringilla montifringilla | Brambling | WCA1.1 | 2002 |
| Hydrocoloeus minutus | Little Gull | WCA1.1 | 2017 |
| Larus melanocephalus | Mediterranean Gull | WCA1.1, Amber | 2018 |
| Limosa limosa | Black-tailed Godwit | WCA1.1, S41, Red, GB RDB(EN) | 2018 |
| Milvus milvus | Red Kite | WCA1.1 | 2011 |
| Numenius phaeopus | Whimbrel | WCA1.1, Red, GB RDB(CR) | 2004 |
| Pandion haliaetus | Osprey | WCA1.1, Amber | 2018 |
| Podiceps nigricollis | Black-necked Grebe | WCA1.1, Amber, GB RDB(EN) | 2019 |
| Recurvirostra avosetta | Avocet | WCA1.1, Amber | 2018 |
| Tringa nebularia | Greenshank | WCA1.1, Amber | 2017 |
| Tringa ochropus | Green Sandpiper | WCA1.1, Amber, GB RDB(EN) | 2018 |
| Turdus iliacus | Redwing | WCA1.1, Amber, GB RDB(CR) | 2003 |
| Turdus pilaris | Fieldfare | WCA1.1, Red, GB RDB(CR) | 2018 |
| Tyto alba | Barn Owl | WCA1.1 | 2001 |
| **Mammals** | | | |
| Arvicola amphibius | European Water Vole | WCA5, S41, GB RDB(EN) | 2001 |
| Lutra lutra | European Otter | EPS(Sch2), WCA5, S41 | 2009 |
| Meles meles | Eurasian Badger | BA | 2003 |
| Myotis daubentonii | Daubenton's Bat | EPS(Sch2), WCA5 | 2007 |
| Myotis mystacinus | Whiskered Bat | EPS(Sch2), WCA5 | 2012 |
| Nyctalus noctula | Noctule Bat | EPS(Sch2), WCA5, S41 | 2012 |
| Pipistrellus pipistrellus | Common Pipistrelle | EPS(Sch2), WCA5 | 2013 |
| Pipistrellus pygmaeus | Soprano Pipistrelle | EPS(Sch2), WCA5, S41 | 2014 |
| **Reptile** | | | |
| Anguis fragilis | Slow-worm | WCA5, S41 | 2001 |
| Zootoca vivipara | Common Lizard | WCA5, S41 | 2008 |

Table 5: Noteworthy species records within 1 km of the site boundary.

| Scientific name | Common name | Designation |
|---|---|---|
| **Plants** | | |
| Bromus secalinus | Rye Brome | NS |
| Calystegia sepium subsp. roseata | Bindweed | NS |
| Catabrosa aquatica | Whorl-grass | GB RDB(VU), ENG BSBI RDB(VU) |
| Centaurium littorale | Seaside Centaury | NS |
| Eriophorum angustifolium | Common Cottongrass | GB RDB(VU), ENG BSBI RDB(VU) |
| Fritillaria meleagris | Fritillary | NS |
| Hottonia palustris | Water-violet | GB RDB(VU), ENG BSBI RDB(VU) |

| Scientific name | Common name | Designation |
|---|---|---|
| Hyacinthoides non-scripta | Bluebell | WCA8 – only inc in Appendix |
| Juncus filiformis | Thread Rush | NS |
| Lathyrus aphaca | Yellow Vetchling | GB RDB(VU), ENG BSBI RDB(VU), NS |
| Meconopsis cambrica | Welsh Poppy | NS |
| Pinus sylvestris | Scots Pine | NS |
| Ranunculus flammula | Lesser Spearwort | GB RDB(VU), ENG BSBI RDB(VU) |
| Trichomanes speciosum | Killarney Fern | EPS(Sch5), WCA8, NR |
| **Amphibians** | | |
| Bufo bufo | Common Toad | WCA5 |
| Lissotriton vulgaris | Smooth Newt | WCA5 |
| Rana temporaria | Common Frog | WCA5 |
| **Birds** | | |
| Acanthis flammea | Common (Mealy) Redpoll | Amber, GB RDB(CR) |
| Accipiter nisus | Sparrowhawk | Amber |
| Acrocephalus schoenobaenus | Sedge Warbler | Amber |
| Actitis hypoleucos | Common Sandpiper | Amber, GB RDB(VU) |
| Alauda arvensis | Skylark | S41, Red |
| Anas clypeata | Shoveler | Amber |
| Anas crecca | Teal | Amber |
| Anas penelope | Wigeon | Amber |
| Anas platyrhynchos | Mallard | Amber |
| Anas strepera | Gadwall | Amber |
| Anser brachyrhynchus | Pink-footed Goose | Amber |
| Anthus pratensis | Meadow Pipit | Amber |
| Anthus spinoletta | Water Pipit | Amber, GB RDB(VU) |
| Apus apus | Swift | Red, GB RDB(EN) |
| Arenaria interpres | Turnstone | Amber, GB RDB(VU) |
| Asio flammeus | Short-eared Owl | Amber, GB RDB(EN) |
| Aythya ferina | Pochard | Red, GB RDB(EN) |
| Branta leucopsis | Barnacle Goose | Amber |
| Calidris alba | Sanderling | Amber |
| Calidris alpina | Dunlin | Red, GB RDB(EN) |
| Calidris canutus | Knot | Amber |
| Calidris ferruginea | Curlew Sandpiper | Amber |
| Charadrius hiaticula | Ringed Plover | Red, GB RDB(VU) |
| Chloris chloris | Greenfinch | Red, GB RDB(EN) |
| Chroicocephalus ridibundus | Black-headed Gull | Amber, GB RDB(VU) |
| Columba oenas | Stock Dove | Amber |
| Columba palumbus | Woodpigeon | Amber |
| Corvus frugilegus | Rook | Amber |
| Cuculus canorus | Cuckoo | S41, Red, GB RDB(VU) |
| Cygnus olor | Mute Swan | Amber |

| Scientific name | Common name | Designation |
|---|---|---|
| Delichon urbicum | House Martin | Red, GB RDB(VU) |
| Emberiza calandra | Corn Bunting | S41, Red |
| Emberiza citrinella | Yellowhammer | S41, Red |
| Emberiza schoeniclus | Reed Bunting | S41, Amber |
| Falco tinnunculus | Kestrel | Amber, GB RDB(VU) |
| Gallinago gallinago | Snipe | Amber |
| Gallinula chloropus | Moorhen | Amber, GB RDB(VU) |
| Haematopus ostralegus | Oystercatcher | Amber |
| Larus argentatus | Herring Gull | S41, Red, GB RDB(EN) |
| Larus canus | Common Gull | Amber |
| Larus fuscus | Lesser Black-backed Gull | Amber |
| Larus fuscus subsp. graellsii | British Lesser Black-Backed Gull | Amber |
| Larus hyperboreus | Glaucous Gull | Amber, GB RDB(VU) |
| Larus marinus | Great Black-backed Gull | Amber, GB RDB(EN) |
| Larus michahellis | Yellow-legged Gull | Amber, GB RDB(EN) |
| Limosa lapponica | Bar-tailed Godwit | Amber |
| Linaria cannabina | Linnet | S41, Red |
| Linaria flavirostris | Twite | S41, Red, GB RDB(VU) |
| Locustella naevia | Grasshopper Warbler | S41, Red |
| Mergellus albellus | Smew | Amber, GB RDB(CR) |
| Mergus serrator | Red-breasted Merganser | GB RDB(VU) |
| Motacilla cinerea | Grey Wagtail | Amber |
| Motacilla flava | Yellow Wagtail | S41, Red |
| Numenius arquata | Curlew | S41, Red, GB RDB(EN) |
| Oenanthe oenanthe | Wheatear | Amber |
| Passer domesticus | House Sparrow | S41, Red |
| Passer montanus | Tree Sparrow | S41, Red, GB RDB(VU) |
| Perdix perdix | Grey Partridge | S41, Red, GB RDB(VU) |
| Phylloscopus trochilus | Willow Warbler | Amber |
| Pluvialis squatarola | Grey Plover | Amber, GB RDB(VU) |
| Podiceps cristatus | Great Crested Grebe | GB RDB(VU) |
| Podiceps grisegena | Red-necked Grebe | Red, GB RDB(CR) |
| Prunella modularis | Dunnock | S41, Amber |
| Pyrrhula pyrrhula | Bullfinch | S41, Amber |
| Saxicola rubetra | Whinchat | Red |
| Scolopax rusticola | Woodcock | Red, GB RDB(VU) |
| Sterna hirundo | Common Tern | Amber |
| Strix aluco | Tawny Owl | Amber |
| Sturnus vulgaris | Starling | S41, Red, GB RDB(VU) |
| Sylvia communis | Whitethroat | Amber |
| Tadorna tadorna | Shelduck | Amber, GB RDB(EN) |
| Tringa erythropus | Spotted Redshank | Amber, GB RDB(EN) |
| Tringa totanus | Redshank | Amber, GB RDB(VU) |
| Troglodytes troglodytes | Wren | Amber |

| Scientific name | Common name | Designation |
|---|---|---|
| Turdus philomelos | Song Thrush | S41, Amber |
| Turdus torquatus | Ring Ouzel | S41, Red, GB RDB(VU) |
| Turdus viscivorus | Mistle Thrush | Red, GB RDB(VU) |
| Vanellus vanellus | Lapwing | S41, Red, GB RDB(EN) |
| **Invertebrates** | | |
| Agelastica alni | Alder Leaf Beetle | NR |
| Agrochola litura | Brown-spot Pinion | S41 |
| Agrochola lychnidis | Beaded Chestnut | S41 |
| Allophyes oxyacanthae | Green-brindled Crescent | S41 |
| Amphipyra tragopoginis | Mouse Moth | S41 |
| Apamea remissa | Dusky Brocade | S41 |
| Arctia caja | Garden Tiger | S41 |
| Atethmia centrago | Centre-barred Sallow | S41 |
| Beris clavipes | Scarce Orange Legionnaire | NS, Notable |
| Caradrina morpheus | Mottled Rustic | S41 |
| Ceramica pisi | Broom Moth | S41 |
| Chesias legatella | Streak | S41 |
| Chiasmia clathrata | Latticed Heath | S41 |
| Cirrhia gilvago | Dusky-lemon Sallow | S41 |
| Cirrhia icteritia | Sallow | S41 |
| Conisternum decipiens | Conisternum decipiens | Notable |
| Diarsia rubi | Small Square-spot | S41 |
| Ecliptopera silaceata | Small Phoenix | S41 |
| Ennomos erosaria | September Thorn | S41 |
| Ennomos fuscantaria | Dusky Thorn | S41 |
| Eulithis mellinata | Spinach | S41 |
| Euxoa nigricans | Garden Dart | S41 |
| Graphiphora augur | Double Dart | S41 |
| Gyrinus paykulli | Gyrinus paykulli | NS |
| Helophorus (Helophorus) granularis | Helophorus (Helophorus) granularis | NS |
| Helotropha leucostigma | Crescent | S41 |
| Hepialus humuli | Ghost Moth | S41 |
| Hydaticus seminiger | Hydaticus seminiger | NS |
| Hydraecia micacea | Rosy Rustic | S41 |
| Lasiommata megera | Wall | S41 |
| Leucania comma | Shoulder-striped Wainscot | S41 |
| Litoligia literosa | Rosy Minor | S41 |
| Melanchra persicariae | Dot Moth | S41 |
| Orthosia gracilis | Powdered Quaker | S41 |
| Pelurga comitata | Dark Spinach | S41 |
| Polydrusus (Chrysophis) formosus | Polydrusus (Chrysophis) formosus | Notable:A |
| Rhizedra lutosa | Large Wainscot | S41 |

| Scientific name | Common name | Designation |
|---|---|---|
| Satyrium w-album | White-letter Hairstreak | WCA5, S41, GB RDB(EN) – only inc in Appendix |
| Scotopteryx chenopodiata | Shaded Broad-bar | S41 |
| Spilosoma lubricipeda | White Ermine | S41 |
| Spilosoma lutea | Buff Ermine | S41 |
| Stratiomys singularior | Flecked General | Notable |
| Timandra comae | Blood-vein | S41 |
| Tyria jacobaeae | Cinnabar | S41 |
| Watsonalla binaria | Oak Hook-tip | S41 |
| Xanthorhoe ferrugata | Dark-barred Twin-spot Carpet | S41 |
| **Mammals** | | |
| Erinaceus europaeus | West European Hedgehog | S41, GB RDB(VU) |
| Lepus europaeus | Brown Hare | S41 |
| Meles meles | Eurasian Badger | BA |
| Mustela putorius | Polecat | S41 |

# APPENDIX C - ABBREVIATIONS

*Table 6* displays abbreviations of protected species legislation.

Table 6: Glossary of abbreviations used in this report.

| Code | Full Title | Explanation |
|---|---|---|
| Amber | Amber list | Amber listed species have a population status in the UK of medium conservation concern. |
| BA | The Protection of Badgers Act 1992 | Legislation making it an offence to kill, injure or take a badger, or to damage or interfere with a sett unless a licence is obtained from a statutory authority. |
| BAP | Biodiversity Action Plan | A plan that identifies threats to significantly important species and habitats, and sets out targets and actions to enhance or maintain biodiversity. |
| DA | The Deer Act 1991 | All wild deer with the exception of muntjac (*Muntiacus reevesi*) and Chinese water deer (*Hydropotes inermis*) are protected by a closed season. |
| ENG BSBI RDB | A Vascular Plant Red List for England | A list published in 2014 by the Botanical Society of Britain and Ireland of the red list status of plants in England. Measured against standardised IUCN criteria. |
| ENG BSBI RDB(CR) | Critically Endangered | A BSBI Red List designation for species at an extremely high risk of extinction. |
| ENG BSBI RDB(EN) | Endangered | A BSBI Red List designation for species at a very high risk of extinction. |
| ENG BSBI RDB(VU) | Vulnerable | A BSBI Red List designation for species at high risk of extinction. |
| EPS (Sch 2) | European Protected Species (Schedule 2) | European protected species (listed on Schedules 2 of The Conservation of Habitats and Species Regulations 2017) |
| EPS (Sch 5) | European Protected Species (Schedule 5) | European protected species (listed on Schedules 5 of The Conservation of Habitats and Species Regulations 2017) |
| GB RDB | Red Data Book Species | Species identified in one of the UK Red Data 2001. |
| GB RDB(CR) | Critically Endangered | An IUCN Red List designation for species at an extremely high risk of extinction. |
| GB RDB(EN) | Endangered | An IUCN Red List designation for species at a very high risk of extinction. |
| GB RDB(VU) | Vulnerable | An IUCN Red List designation for species at high risk of extinction. |

| Code | Full Title | Explanation |
|---|---|---|
| HAP | Habitat Action Plan | A plan that identifies threats to a priority habitat and sets out targets and actions to enhance or maintain that habitat. |
| IUCN | International Union for Conservation of Nature and Natural Resources (also known as The World Conservation Union) | A worldwide partnership and conservation network to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. |
| LBAP | Local Biodiversity Action Plan | A plan that identifies threats to locally important species and habitats, and sets out targets and actions in species action plans and habitat action plans to enhance or maintain biodiversity at the county or regional level. |
| LHAP | Local Habitat Action Plan | A plan that identifies threats to a locally important priority habitat and sets out targets and actions to enhance or maintain that habitat. |
| LSAP | Local Species Action Plan | A plan that identifies threats to locally important species, and sets out targets and actions to prevent losing that species from the local area. |
| Notable | Scarce and threatened invertebrates | Invertebrate species which are estimated to occur within the range of 16 to 100 10km squares but subdivision into Notable A and Notable B categories is not possible as there is insufficient information available). |
| Notable:A | Scarce and threatened invertebrates | Taxa which do not fall within Red Data Book categories but which are none-the-less uncommon in Great Britain and thought to occur in 30 or fewer 10km squares of the National Grid or, for less well-recorded groups, within seven or fewer vice-counties. |
| Notable: B | Scarce and threatened invertebrates | Taxa which do not fall within Red Data Book categories but which are none-the-less uncommon in Great Britain and thought to occur in between 31 and 100 10km squares of the National Grid or, for less-well recorded groups between eight and twenty vice-counties. |
| NN | Nationally Notable | Designation for invertebrate taxa that are thought to be notably important in the UK. |
| NR | Nationally Rare | Species in 15 or fewer hectads in Great Britain. |
| NS | National Scarce | Species in 16-100 hectads in Great Britain. |
| OSPAR | OSPAR | Species listed on The Convention for the Protection of the Marine Environment of the North-East Atlantic |

| Code | Full Title | Explanation |
|---|---|---|
| Red | Red List | Red listed species have a population status in the UK with high conservation concern. |
| SAP | Species Action Plan | A plan that identifies threats to significantly important species, and sets out targets and actions to prevent losing that species to extinction. |
| S41 | Species of Principal Importance | Species of Principal Importance in England under The Natural Environment and Rural Communities (NERC) Act (2006) |
| UKBAP | UK Biodiversity Action Plan | A plan that identifies threats to locally important species and habitats, and sets out targets and actions in species action plans and habitat action plans to enhance or maintain biodiversity in the UK. |
| WCA | *The Wildlife and Countryside Act 1981* (as amended) | Containing 4 Parts and 17 Schedules, the Act covers protection of wildlife (birds, and some animals and plants), the countryside, National Parks, and the designation of protected areas, and public rights of way. All wild plants in Britain are protected from intentional uprooting by an unauthorized person, but land owners, land occupiers, persons authorized by either of these or persons authorized in writing by the Local Authority for the area are exempt. Protection for some species may be limited to certain Sections of the Act (*e.g.* S13(2). |
| WCA1 | Schedule 1 of *The Wildlife and Countryside Act 1981* (as amended) | This Schedule lists birds protected by special penalties at all times, but virtually all wild birds have some protection in law.<br>Acts which are prohibited for all wild birds (except derogated 'pest' species) include intentional killing, injuring or taking; taking, damaging or destroying nests in use or being built; taking or destroying eggs; possessing or having control of (with certain exceptions but including live for dead birds, parts or derivative); setting or permitting certain traps, weapons, decoys or poisons. Selling, offering or exposing for sale, possessing or transporting for sale any live wild bird, egg or part of an egg or advertising any of these for sale, or dead wild bird including parts or derivatives are also prohibited. Many birds must be formally registered and ringed if kept in captivity.<br>Schedule I WCA birds are additionally protected from intentional or reckless disturbance while building a nest, or when such a bird is in, on or near a |

| Code | Full Title | Explanation |
|---|---|---|
| | | nest containing eggs or young, or intentional or reckless disturbance of dependent young. |
| WCA5 | Schedule 5 of *The Wildlife and Countryside Act 1981* (as amended) | Schedule 5 animals are protected from intentional killing, injuring or taking; possessing (including parts or derivatives); intentional or reckless damage, destruction or obstruction of any structure or place used for shelter or protection; selling, offering or exposing for sale, possessing or transporting for the purpose of sale (alive or dead, including parts or derivatives). Protection of some species is limited to certain Sections of the Act (*e.g.* S9(1), S9(4a), S9(4b), S9(5)). |
| WCA8 | Schedule 8 of *The Wildlife and Countryside Act 1981* (as amended) | Plants and fungi protected from intentional picking, uprooting, destroying, trading (including parts or derivatives), *etc.* |

# APPENDIX D – NATURE CONSERVATION LEGISLATION AND POLICY

## International Legislation

The following international conventions and directives apply to biodiversity protection in the UK. Post-'Brexit', even though European Union (EU) directives no longer directly apply to the UK, the provisions therein are enshrined in both domestic legislation and international agreements. Legislation has been enacted to ensure the regulations derived from these remain in force[1].

### The Convention on Biological Diversity 1992 *et seq.*

This multilateral treaty (https://www.cbd.int/doc/legal/cbd-en.pdf), signed by 150 government leaders at the 1992 Rio Earth Summit, has three main goals, of which one is the conservation of biological diversity. Article 6 requires countries to develop national biodiversity strategies, plans or programmes. In response, the UK developed the UK Biodiversity Action Plan (BAP) 1994 (https://jncc.gov.uk/our-work/uk-bap/) as well as county-specific BAPs. Subsequent to this, parties of the convention agreed the supplementary Nagoya Protocol 2010 (available at https://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf), adopting the Strategic Plan for Biodiversity 2011-2020. The purpose of this Strategic Plan was to provide a framework for establishing national and regional biodiversity targets (https://www.cbd.int/doc/strategic-plan/2011-2020/Aichi-Targets-EN.pdf).

### Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (Birds Directive) 2009

https://www.legislation.gov.uk/eudr/2009/147

The Birds Directive 2009 relates to the conservation of all species of naturally occurring birds in their wild state in the territory of the EU Member States (MSs) to which the treaty applies. Under the Birds Directive, the most suitable areas of conservation of the Annex I species are to be designated as Special Protection Areas (SPAs), as part of the European Natura 2000 network. Post Brexit, SPAs are no longer considered part of Natura 2000 and are instead components of the UK's 'national site network', but their highly protected status is unchanged. Maintaining a coherent network of protected sites with overarching conservation objectives is still required in order to fulfil the commitment made by government to maintain environmental protections and continue to meet the UK's international legal obligations.

### Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) 1992

https://www.legislation.gov.uk/eudr/1992/43

The Habitats Directive 1992 requires EU MSs to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of community interest, which are listed under Annex I, II, IV and/or V. Species listed under Annex IV are known as 'European

[1] Further information relating to England and Wales can be found here: https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017. A similar exercise has been undertaken in Scotland and Northern Ireland.

Protected Species' (EPS), and have retained their protected status in UK domestic legislation post-Brexit.

Under the Habitats Directive, EU Member States are required to contribute to the Natura 2000 network through the designation of Special Areas of Conservation (SACs) for natural habitat types listed in Annex I and habitats of species listed in Annex II. Post Brexit, SACs are no longer considered part of the European Natura 2000 network and are instead components of the UK's 'national site network', but their highly protected status is unchanged.

**The Convention on Wetlands of International Importance Especially as Waterfowl Habitat 1971: the Ramsar Convention**

Accessible via https://jncc.gov.uk/our-work/ramsar-convention/

The Ramsar Convention is an intergovernmental treaty focused on the conservation and sustainable use of wetland, primarily as habitats for water birds. Under the convention, each ratified country is required to identify and designate sites (Ramsar sites) that meet the criteria for identifying a wetland of international importance, i.e. containing representative, rare or unique wetland types. In addition, the convention promotes international co-operation to promote the wise use of all wetlands and their resources.

**Habitats Regulations Assessment (HRA): a note**

There is a requirement under the EU nature directives, and enshrined in country-specific domestic legislation[2] (see below), to undertake a screening exercise to determine whether any sites that form part of the 'national site network' (formerly Natura 2000) are likely to be significantly affected by any proposal (project or plan). The assessment must consider the proposals alone and also in combination with other plans and projects, if they result from activities that are not directly connected with, or necessary to, the management of the designated sites. If significant effects are likely, an Appropriate Assessment (AA) will need to be carried out. The screening, any AA, and any subsequent assessment, are collectively known as a Habitats Regulations Assessment (HRA). The HRA needs to take into account each of the 'Qualifying Features' (habitats or species) that justified the site being designated. Ramsar sites are treated in the same way as SACs and SPAs in HRAs, as are sites which have not been fully adopted i.e. candidate SACs (cSACs) and potential SPAs (pSPAs).

**The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979**

Accessible via: https://jncc.gov.uk/our-work/the-convention-on-the-conservation-of-migratory-species-of-wild-animals/#convention-summary

The Bonn Convention was adopted in 1979 and came into force in 1985. Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix I of the Convention), concluding multilateral agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix II), and by

[2] In England and Wales: the Conservation of Habitats and Species Regulations 2017 (as amended).
In Scotland: the Conservation (Natural Habitats &c.) Regulations 1994 (as amended).
In Northern Ireland: the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended). .
In the UK offshore area: the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended).

undertaking cooperative research activities. The UK Government ratified the Bonn Convention in 1985. The current legally-binding Agreements under the Convention include EUROBATS[3].

**The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1979**
https://www.coe.int/en/web/bern-convention

The principal aims of the Bern Convention 1979 are to ensure the conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix III. To this end, the Bern Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1,000 wild animal species. The UK Government ratified the Bern Convention in 1982.

## National Legislation

The following pieces of domestic legislation apply to biodiversity protection in the UK.

**The Wildlife and Countryside Act (WCA) 1981**
https://www.legislation.gov.uk/ukpga/1981/69

The Wildlife and Countryside Act 1981 (as amended) is the primary piece of legislation relating to nature conservation in the UK, though it has been adapted in different ways in the devolved administrations. It was initially enacted to implement the Bern Convention, Bonn Convention and the Birds Directive (described above).

The act is supplemented by provisions in the Countryside and Rights of Way (CRoW) Act 2000 and the Natural Environment and Rural Communities (NERC) Act 2006, and extended in Scotland by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2011). Its equivalent in Northern Ireland is the Wildlife (Northern Ireland) Order 1985 (as amended and similarly extended). In addition to the Habitat Regulations (described below), the WCA provides protection for species listed in Schedules 1 (birds), 5 (other animals) and 8 (plants) of the Act. It provides for the notification and confirmation of Sites of Special Scientific Interest (SSSIs) in England and Wales[4]. It also sets out, in other schedules, important and invasive species which are legally protected or require management.

All species of bird are protected under the WCA. The legislation makes it an offence to intentionally:

a) kill, injure or take any wild bird;
b) take, damage, or destroy the nest of any wild bird while that nest is in use or being built; or
c) take or destroy an egg of any wild bird.

Those species of birds listed on Schedule 1 of the WCA are afforded additional protection, which deems it an offence to intentionally or recklessly:

[3] More information available at https://jncc.gov.uk/our-work/agreement-on-the-conservation-of-populations-of-european-bats-eurobats

[4] Duty replaced by the Nature Conservation (Scotland) Act 2004 (as amended) and the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 (as amended) in those countries.

a) disturb any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or
b) disturb dependent young of such a bird.

Under Section 9 of the WCA, for animals listed on Schedule 5, it is an offence in England and Wales to intentionally or recklessly:

kill, injure or take any wild animal listed on Schedule 5;
possess or control any live or dead those wild animals or anything derived from it;
damage or destroy any structure or place which wild animals listed on Schedule 5 uses for shelter or protection;
disturb any such animal while it is occupying a structure or place of shelter or protection;
obstruct access to any structure or place used by any such animal for shelter or protection; and
sell, offer or expose for sale, or have in their possession or transports for the purpose of sale, any live or dead wild animal listed on Schedule 5 or any part of, or anything derived from such an animal.

In addition to EPS, species commonly found on development sites include water voles (*Arvicola amphibius*) and widespread species of reptiles: common lizard (*Zootoca vivipara*); slow-worm (*Anguis fragilis*); grass snake (*Natrix helvetica*); and adder (*Vipera berus*). These four reptile species receive partial protection, which prevents the intentional or deliberate killing and injuring of reptiles or offering them for sale.

Section 14(2)[5] states that it is an offence to plant or otherwise cause to grow any plant in the wild at a place outside its native range.

There is no provision within the Act for derogation licences to be issued for the purposes of development, although Section 10 provides a defence in cases that may be considered to be: *"the incidental result of a lawful operation and could not reasonably have been avoided"* if certain conditions are met.

Section 16(i) of the Act does make provision for derogation licences to be issued *"for the purposes of preserving public health or public … safety"*. For confirmation of this, it would be appropriate to consult the relevant statutory nature conservation body (SNCB)[6].

**The Conservation of Habitats and Species Regulations (Habitat Regulations) 2017** https://www.legislation.gov.uk/uksi/2017/1012 England and Wales

The Habitats Regulations 2017 consolidated the various amendments made to the 1994 Habitat Regulations, which were developed to implement the Birds Directive and Habitats Directive (see above) at a national level, though this consolidation only applies in England and Wales. As noted above, in Scotland and in Northern Ireland, the original versions of the Regulations in each region have been retained and amended to include protections for EPS that were initially provided under the WCA (or its equivalent).

The Regulations (as amended) provide for the designation and protection of the national site network (formerly 'Natura 2000 sites'), the adaptation of planning and other controls for those sites, and the protection of EPS (listed on Schedules 2 and 5).

5 In Scotland, as amended by Section 14 of the Wildlife and Natural Environment (Scotland) Act 2011.

6 SNCBs are - in England: Natural England; in Wales: Natural Resources Wales; in Scotland: NatureScot; in Nortern Ireland: Department of Agriculture, Environment and Rural Affairs (DAERA).

The 2017 Regulations (England and Wales, Reg. 43) deems it an offence to:

a) deliberately capture, injure or kill a wild animal of a EPS,
b) deliberately disturb wild animals of any such species,
c) deliberately take or destroy the eggs of such an animal, or
d) damage or destroy a breeding site or resting place of such an animal.

For the purposes of paragraph (b), disturbance of animals includes in particular any disturbance which is likely to:

a) impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or
b) to affect significantly the local distribution or abundance of the species to which they belong.

There are also restrictions on transport, possession and sale.

It is possible to obtain a derogation licence from the relevant SNCB[6] to permit activities which would otherwise contravene the regulations above, including for development purposes, when certain conditions are met. Failure to satisfy the Regulations and obtain a licence where required could result in prosecution and lead to fines and possible imprisonment.

Currently (2021), all EPS are also listed on Schedule 5 of the WCA (outlined above), as it applies in England and Wales. EPS often encountered on development sites include GCN (*Triturus cristatus*), all species of bats, dormice (*Muscardinus avellanarius*) and otters (*Lutra lutra*).

**Countryside and Rights of Way Act 2000**
https://www.legislation.gov.uk/ukpga/2000/37

The Countryside and Rights of Way (CRoW) Act 2000 provides for public access on foot to certain land types, amends the law for public rights of way, increases protection for SSSIs, and strengthens wildlife enforcement legislation. It applies only in England and Wales.

**The Natural Environment and Rural Communities (NERC) Act 2006; The Environment (Wales) Act 2016**
https://www.legislation.gov.uk/ukpga/2006/16

The Natural Environment and Rural Communities (NERC) Act 2006, Section 40 requires that any public body or statutory undertaker in England must have regard to the purpose of conservation of biological diversity in a manner that is consistent with the exercise of their normal functions. This may include enhancing, restoring or protecting a population or a habitat. The intention is to help ensure that biodiversity becomes an integral consideration in the development of policies, and that decisions of public bodies work with the grain of nature and not against it. In Wales, a similar duty has been moved to Section 6 of the Environment (Wales) Act 2016.

As part of this duty, statutory undertakers must have regard to the list of habitats and species which are of principal importance for the purpose of maintaining and enhancing biodiversity. For England, the duty to compile such a list is captured under Section 41 of the NERC Act; in

Wales, under Section 7 of the Environment (Wales) Act. The lists for England are accessible online via the National Archive[7]; for Wales via https://www.biodiversitywales.org.uk/.

**The Hedgerows Regulations 1997**
https://www.legislation.gov.uk/uksi/1997/1160/made

The Hedgerows Regulations 1997 provide protection for 'important' hedgerows for which replanting is not a substitute. The 'importance' of a hedgerow depends upon several archaeological, wildlife and landscape criteria (which are outlined in the Regulations). The regulations deem it an offence to remove an 'important hedgerow' without prior notification to the relevant local planning authority.

**Protection of Badgers Act 1992**
https://www.legislation.gov.uk/ukpga/1992/51

Badgers and their setts are protected under the Protection of Badgers Act 1992 (England, Wales and Scotland). The key part of this legislation in relation to the proposed development are in Section 3, which deems it an offence to:

a) damage a badger sett or any part of it;
b) destroy a badger sett;
c) obstruct access to, or any entrance of, a badger sett;
d) disturb a badger when it is occupying a badger sett,
e) intend to do any of those things or be reckless as to whether those actions would have any of the consequences listed above.

Derogation licences may be obtained from the relevant SNCB[6] under Section 10 of the Act for the purpose of development, to permit activities which would otherwise be unlawful.

Note: there are additional provisions relating to badgers under the WCA Section 11 (Prohibition of certain methods of killing or taking wild animals).

**The Wild Mammals (Protection) Act 1996**
https://www.legislation.gov.uk/ukpga/1996/3

All wild mammals are protected by The Wild Mammals (Protection) Act 1996 (as amended). This makes it an offence to mutilate, kick, beat, nail, or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate any wild mammal.

**Invasive Alien Species (Enforcement and Permitting) Order 2019**
(https://www.legislation.gov.uk/uksi/2019/527/contents/made)

The Invasive Alien Species (Enforcement and Permitting) Order applies principally in England and Wales and the UK's offshore marine area, but also controls imports and exports from the UK (including Scotland and Northern Ireland). It lists species of concern which cannot be imported, kept, bred/grown, transported, sold, used, allowed to reproduce, or released into the environment. This Order replaces some elements relating to invasive species in the Wildlife and Countryside Act 1981 (as amended).

## National, regional and local policy and guidance of relevance

Planning policy relating to ecology and nature conservation is set out below.

7 https://webarchive.nationalarchives.gov.uk/ukgwa/20140712055944/http:/www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx

**National Planning Policy Framework 2021**

Access via: https://www.gov.uk/government/publications/national-planning-policy-framework--2

The National Planning Policy Framework (NPPF) sets out the Government's planning policy in England at the national level. It does not contain specific policies for nationally significant infrastructure projects, which are determined in accordance with the decision-making framework in the Act and relevant National Policy Statements for major infrastructure, as well as any other matters that are relevant (which may include the NPPF). Section 15 (paragraphs 174-188) of the NPPF specifies the requirements for conserving and enhancing the natural environment through the planning and development process to minimise impacts on habitats and biodiversity.

**Planning Practice Guidance**

Accessed via: https://www.gov.uk/government/collections/planning-practice-guidance

The Planning Practice Guidance is a web-resource to support the NPPF, including guidance for Environmental Impact Assessments (https://www.gov.uk/guidance/environmental-impact-assessment) and the Natural Environment (https://www.gov.uk/guidance/natural-environment). The guidance for the Natural Environment explains key issues in implementing the NPPF to protect and enhance the natural environment, including local requirements. The guidance outlines what evidence needs to be taken into account in preparing planning applications to identify and map local ecological networks. It also outlines how biodiversity can be taken into account in preparing a planning application.

**Government's 25-Year Environment Plan 2018**

Accessed via: https://www.gov.uk/government/publications/25-year-environment-plan

The Government's 25-Year Environment Plan 2018 sets out how the UK Government intends to improve the natural health of the UK through improving land, air and water quality, as well as setting out how the effects of climate change will be tackled. The plan promotes the creation or restoration of wildlife-rich habitat outside the protected site network and seeks to recover threatened, iconic or economically important species of animals, plants and fungi, and where possible to prevent human induced extinction or loss of known threatened species in England. The plan sets out a number of goals and corresponding policies that look at managing land sustainably, improving and enhancing landscapes and biodiversity for both marine and terrestrial environments, improving resource efficiency and reducing waste and pollution, whilst also examining the UK's contribution to improving the global environment.

**Cheshire West and Chester Local Plan (Part One) Strategic Policies 2015**

Accessed via: https://consult.cheshirewestandchester.gov.uk/kse/event/24907/section/14193391112 66#14193391112 66

Cheshire West and Chester's Local Plan contains Policy ENV 4 Biodiversity and geodiversity which sets out measures to safeguard and enhance biodiversity through the identification and protection of sites and/or features of international, national and local importance. Sites will be protected from loss or damage taking into account the hierarchy of designations, the irreplaceability of habitats, sites and/or features and their contribution to the borough's ecological network, and the impact on priority habitats and protected/priority species.

Development should not result in a net loss of natural assets and should seek to provide net gains.

# Appendix 8.3 – EcIA Assessment Criteria

Appendix 8.3
Frodsham Solar – EIA Scoping Report

# Sensitivity, Magnitude and Significance of Effect Adopted Methodology

avianecology

| Document Control | | | | |
|---|---|---|---|---|
| Project Name: | Frodsham Solar | | | |
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## CONTENTS

# 1 INTRODUCTION

1.1.1 This Technical Appendix sets out the significance of effect assessment methodologies that will be adopted within the Environmental Statement (ES) Biodiversity chapter required to inform the Frodsham Energy Park ('the Proposed Development') application.

# 2 ASSESSMENT OF SIGNIFICANCE

2.1.1 Ecological Impact Assessment (EcIA) is defined within the CIEEM guidelines[1] as

> *"…a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems*".

2.1.2 The EIA Regulations[2] require the description of the 'likely significant environmental effects of the proposed development on the environment' (Regulation 18(3)(b)). To determine the overall significance of each ecological effect, judgements on the sensitivity of the receptor(s) and the magnitude of impact from the Proposed Development are considered together in order to determine whether or not an effect is likely to be significant. This involves a combination of quantitative and qualitative assessment and the application of professional judgement.

2.1.3 For the purposes of the assessment, effects will be categorised as 'significant' or 'not significant', in line with the EIA Regulations. The assessment considers effects at different geographic scales i.e. where effects may be discernible at a local scale but are not considered significant in the context of the EIA Regulations. For the purpose of the assessment, moderate and major effects are deemed to be 'significant' in EIA terms unless stated otherwise.

2.1.4 A 'significant effect' is considered to be one that either supports or undermines biodiversity conservation objectives for 'important ecological features', or for biodiversity in general.

2.1.5 CIEEM guidelines on ecological impact assessment note that:

> *"A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures."*

2.1.6 For ease of reference, **Table 2.1** sets out adapted CIEEM terminology, which also shows the equivalent EIA terms to be used in the ES chapter.

**Table 2.1: Summary of Significance Levels**

| **Effect (Standard EIA-related terminology and associated assigned significance)** | | **Equivalent CIEEM terminology adapted for Ecological Assessment** |
|---|---|---|
| Negligible | **Neutral** | No discernible or significant on ecological integrity or conservation status (e.g. species or habitat). |
| Minor Adverse | **Not Significant** | Adverse effect on ecological integrity or conservation status, discernible/significant in ecological terms at a Local geographic scale only. |

[1] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (version 1.1). Chartered Institute of Ecology and Environmental Management, Winchester.

[2] Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended).

| Effect (Standard EIA-related terminology and associated assigned significance) | | Equivalent CIEEM terminology adapted for Ecological Assessment |
|---|---|---|
| Moderate-Major Adverse | **Significant** | Adverse effect on ecological integrity or conservation status at a County, National or International geographic scale. |

2.1.7 The Proposed Development has been assessed as having an operational lifespan of up to 40 years for the purpose of the assessment. Ecological effects will be described in terms of their duration as short, medium term and long-term as follows:

- Short term effects are defined as 0 - 3 years;
- Medium term effects are defined as 3 - 15 years; and
- Long term effects are defined as > 15 years

2.1.8 The ecological impact assessment will include:

- An evaluation of identified important ecological features and potential receptors; faunal species, habitats and vegetation (as appropriate) on an international, national and regional basis;
- A description and evaluation of the potential effects of the Proposed Development on statutory and non-statutory sites designated for nature conservation;
- A description and evaluation of the potential effects of the Proposed Development on species and habitats;
- Mitigation measures implemented to address any identified significant adverse effects;
- An assessment of cumulative effects;
- Identification of any residual effects after mitigation; and,
- Identification of opportunities for biodiversity enhancement.

2.1.9 For the purposes of the assessment the importance or sensitivity of an ecological feature will be considered within the context of a defined geographical area, ranging from International (high value) to Site (low/negligible), as detailed in **Table 2.2**.

**Table 2.2: Value/Sensitivity Assessment**

| Value or Sensitivity of Receptor / Geographic Scale of Importance | Definition Examples |
|---|---|
| High - International / European | Greater than a UK scale, typically valued at a European level such as internationally designated sites (Special Protection Areas (SPA), Special Areas of Conservation (SAC) and/ or Ramsar sites) or proposed/candidate site (pSPA or cSAC), large area of a habitats listed in Annex I of the Habitats Directive or smaller areas of such habitat which are essential to maintain the viability of the larger whole, large population of an internationally important species or site supporting such a species (or supplying a critical element of their habitat requirement) or species listed in Annex IV of the Habitats Directive. |
| High - National (England/UK) | England/UK: A nationally designated site (e.g. Site of Special Scientific Interest) or a discrete area which meets the selection criteria for national designation.<br>An area of a priority habitat listed under the Section 31 of the Natural Environment and Rural Communities Act 2006 (NERC) which constitutes a significant proportion of the resource of that habitat in England or the UK as a |

| Value or Sensitivity of Receptor / Geographic Scale of Importance | Definition Examples |
|---|---|
| | whole.<br>A regularly occurring, regionally significant population of any nationally important species listed as a UK BAP / Biodiversity List and priority species listed under the Section 31 of the NERC Act 2006, and Species listed under Schedule 1 or Schedule 5 of the Wildlife and Countryside Act or Annex II or Annex IV of the Habitats Directive. |
| Medium Regional / County (Cheshire) | Locally designated sites (Local Nature Reserves, County or Local Wildlife Sites).<br>Areas of priority habitat which constitutes a significant proportion of the County's resource of that habitat.<br>A regularly occurring, locally significant population of any nationally important species listed as a UK BAP / priority species and priority species listed under Section 31 of the NERC Act 2006, and Species listed under Schedule 5 of the Wildlife and Countryside Act or Annex II or Annex IV of the Habitats Directive. |
| Low - Local | Local area around the Site.<br>For example areas of priority habitat which are not large enough to meet the criteria for County value, or small but sustainable populations of a protected or notable species. |
| Low/Negligible - Site | Within the Site. Features present but of value in relation to the Site only. |

2.1.10 Effects on ecological features will be assessed based upon the interaction between the importance, or sensitivity, of the feature and the magnitude of change it is likely to experience. In accordance with the CIEEM guidelines (2018), an EcIA need only assess in detail, impacts upon important ecological features i.e. those that are considered important and potentially affected. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable. Where ecological features are not considered important enough to warrant further consideration, or where they will not be significantly affected, these are scoped out of the assessment process, and justification for exclusion is provided.

2.1.11 Relevant European, national and local guidance from governments and specialist organisations will be referred to in order to determine the importance (or 'sensitivity') of ecological features. Importance will also be determined using professional judgement and taking account of the results of baseline surveys and the functional role of features within the context of the geographical area.

2.1.12 Importance does not necessarily relate solely to the level of legal protection that a feature receives and ecological features may be important for a variety of reasons, such as their connectivity to a designated site and the rarity of species or the geographical location of species relative to their known range.

2.1.13 Once identified, potential impacts are described making reference to the following characteristics as appropriate: positive or negative, extent, magnitude, duration, timing, frequency, and, reversibility. The judgements on magnitude may need to be adjusted (either up or down) to reflect the duration of the change (i.e. short, medium or long term) and whether it is potentially reversible. The assessment also identifies areas where no change is anticipated and the resulting effect is described as 'not discernible' or 'none'.

2.1.14 Ecological effects are described as far as possible and where available information allows in terms of the parameters detailed in **Table 2.3**.

2.1.15 Magnitude of effect, based on the effects that the Proposed Development would have upon the resource/receptor, is considered within the range of high, medium, low, negligible. Consideration is given to scale, duration of impact/effect (and extent of Proposed Development with reference to the definitions in **Table 2.2**). The assessment will consider how existing baseline conditions may change over time, as for example the baseline conditions could alter through operational land use, in the form of differing management and natural growth or succession of habitats.

**Table 2.3: Environmental Parameters**

| Environmental Parameter | Description |
|---|---|
| Magnitude | The 'size' or amount of the effect is referred to as the magnitude and is determined on a quantitative basis where possible supported by professional judgement. |
| Extent | The area over which an effect occurs. The magnitude and extent of an effect may be synonymous |
| Duration | The time over which an effect is expected to last prior to the recovery or replacement of the ecological receptor. This can be considered in terms of life cycles of species or regeneration of habitats. The duration may be longer than the duration of an activity. |
| Reversibility | Reversible (or temporary) effects are those that occur during the lifetime of the development and where spontaneous recovery or mitigation allows recovery within a reasonable timescale.<br>Permanent effects are those which cannot be recreated within the proposed development or there is no reasonable chance that actions can be undertaken to reverse it. |
| Timing and Frequency | The timing of effects in relation to important seasonal and/or life cycle constraints. The frequency with which activities and simultaneous effects would take place can be an important determinant. |

2.1.16 The assessment of effects is based upon the assessments of magnitude of effects and sensitivity of the resource/receptor to come to a professional judgement of how important this effect is. The magnitude of change effected on ecological receptors is described as set out in **Table 2.4**. The likelihood or probability that an effect will occur is addressed as far as possible based on available information. Whilst it is reasonably straightforward to identify effects that are certain to occur, or conversely will not occur, it is generally more difficult to assign a quantified level to occurrences defined as likely, unlikely or highly unlikely. In these circumstances, professional judgement has been used, with reasoning supported by available evidence.

**Table 2.4: Magnitude of Impact/Change**

| Magnitude | Criteria |
|---|---|
| High | The change may negatively or positively affect the conservation status of a site or species population, in terms of the coherence of its ecological structure and function, that sustains the habitat, complex of habitats and/or the population levels of species of interest. |
| Moderate | Conservation status of a site or species population will not be negatively or positively affected, but some element of the functioning of the site or population might be affected and the change to the site/ population is likely to be significant in terms of its ability to sustain some part of itself in the long term. |
| Low | Neither of the above applies, but some minor negative or positive change is evident on a temporary basis, or the change affects extent of habitat or individuals of a species abundant in the local area. |
| Negligible | No observable effect in either direction |

2.1.17 For an effect to be significant, the ecological integrity or conservation status of a sensitive feature must be influenced in some way. It may be that the effect is substantial in magnitude or scale, irreversible, has a long-term effect, or coincides with a critical period in a species' life-cycle. Where uncertainty or limitations exist, this is acknowledged.

2.1.18 It is recognized that discernible effects can also occur at a local geographic scale which are not sufficiently severe to be assessed as 'significant' in accordance with the EIA approach, and do not require specific mitigation, but nonetheless merit discussion. In the interest of completeness these effects will be discussed within the ES chapter in relation to general construction good practices to be adopted to avoid or minimise low-level or minor disruption to local features, including for example standard pollution prevention and control measures.

# Appendix 11.1 – Gazetteer of Heritage Assets and Events

# Gazetteer of Heritage Assets and Event

| | |
|---|---|
| **Asset/Event Number** | 1 |
| **Asset/Event Name** | Frodsham (Town) Conservation Area |
| **Type of Asset/Event** | Conservation Area |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Conservation Area |
| **Easting** | 351520 |
| **Northing** | 378041 |
| **Parish** | |
| **Council** | CHESHIRE WEST AND CHESTER |
| **Description** | Frodsham Conservation Area was designated by Cheshire County Council on 25 July 1973 and extended by Vale Royal<br>District Council on 17 November 1977. Following the October 2003 designation of the Frodsham (Castle Park Locality)<br>Conservation Area (much of which was formerly part of the Frodsham Conservation Area) a review and appraisal of<br>Frodsham (Town) was completed in Spring 2006 and adopted on 28 September 2006. |

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| | |
|---|---|
| **Asset/Event Number** | 2 |
| **Asset/Event Name** | CAVENDISH FARM HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1104910 |
| **HER Number** | 107/2 |
| **Status** | Listed Building- Grade II |
| **Easting** | 350997 |
| **Northing** | 380400 |
| **Parish** | Halton |
| **Council** | Cheshire West and Chester |
| **Description** | Farm house, said to date from 1622, but with much renewed stonework and alterations. Red sandstone walls and slate roof with three brick chimneys. L-plan, two storeys and attic. Entrance front has doorway in angle with projecting wing. The wing has a string course between storeys and to each storey a 10-light double chamfered mullion and transom window with hoodmould. The windows elsewhere are mostly of three lights and chamfered. The interior has been altered. |

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| | |
|---|---|
| **Asset/Event Number** | 3 |
| **Asset/Event Name** | PARISH CHURCH OF ST JOHN THE EVANGELIST |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130422 |
| **HER Number** | |

| | |
|---|---|
| **Status** | Listed Building- Grade II* |
| **Easting** | 350881 |
| **Northing** | 380490 |
| **Parish** | Halton |
| **Council** | Cheshire West and Chester |
| **Description** | SJ 58 SW WESTON Heath Road South 5/112 Parish Church of St John the Evangelist II* Parish Church. 1896-7 by John Douglas. Sandstone ashlar; Welsh slate roofs, stone slab to spire. W steeple, nave, S porch, narrow N aisle, storeyed chancel built over vestries, N organ chamber.<br><br>Exterior: Steeple tower with 2 massive W buttresses with set-offs, shallow buttresses to the S breaking through nave roof. 2-light W window under hood-mould; stubby broach spire with gabled 2-light bellfry openings to cardinal points, the sills brought down below level of spire eaves. Nave wraps around tower; single lancet to W wall. Groups of flush lancet to S wall, also to N aisle which is contained under catslide roof and stops short of W end of nave. Porch approached by steps with retaining walls; prominent gable coping and apex cross; 2-centred moulded arch under hood- mould. Chancel: storeyed and much higher than nave with single tall lancets to side walls (paired to sanctuary), and shouldered paired lancets to vestry below. E window triple lancet under hood-mould; 2 lancets set low to vestry. Organ chamber-simply treated with tall chimney stack at junction with chancel. Interior. 4-bay nave; windows in deep reveals; 3 arches at W end define baptistry, that to the centre taller than the others. Roof: side purlin with braced collars to principals; wind braces. The N aisle con- struction is original and striking: arcade posts and plate (the latter with inscription), with straight braces, tie stub with straight brace from post to principal; ashlar pieces. Raised chancel with 2-centred moulded arch; arched-brace boarded roof. Fittings: choir stall robust, open fronted, each bay with central turned baluster; polygonal stone pulpit with Cruci- fixion panel; octagonal font, stone; organ (1898) by Alexander Fry; glass by Percy Bacon Brothers.<br><br>A bold and original design; the church occupies a very exposed site. It was financed in part by subscriptions raised world-wide by choirboys and became known as the 'Choirboys' Church'. It is similar in design to Douglas's church at Maentwrog (Merioneth) and was illustrated in the Architect (64, 1900, p.248). |

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| | |
|---|---|
| **Asset/Event Number** | 4 |
| **Asset/Event Name** | BARN SOUTH OF THE OLD HALL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130436 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350908 |
| **Northing** | 380317 |
| **Parish** | Halton |
| **Council** | Cheshire West and Chester |
| **Description** | Barn Circa 1607 with alterations, red sandstone with slate roof 2 storeys, 3 bays. In coursed sandstone blocks with heavy stone lintels. Single bricked up mullion window remains at first floor level in west gables, all other door and window openings built up in masonry or altered. Roof has gable copings and blue tile ridge. There is a later brick addition to the rear of the barn. |

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|---|---|
| **Asset/Event Number** | 5 |

| | |
|---|---|
| **Asset/Event Name** | MARKET CROSS |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130438 |
| **HER Number** | 107/3 |
| **Status** | Listed Building- Grade II |
| **Easting** | 350822 |
| **Northing** | 380507 |
| **Parish** | Halton |
| **Council** | Cheshire West and Chester |
| **Description** | 7.12.65 II Market Cross steps, medieval, square base two steps high to which a third modern step was added when the present Celtic style cross was erected in 1960. |

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| | |
|---|---|
| **Asset/Event Number** | 6 |
| **Asset/Event Name** | THE GRANGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130444 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350805 |
| **Northing** | 380538 |
| **Parish** | Halton |
| **Council** | Cheshire West and Chester |
| **Description** | House 1766 (in tympanum). Roughcast brick with slate roof. 2 storeys 4 bays. Stone plinth and rusticated quoins. Stone pedimented door- case with pulvinated frieze and decorative inscribed tympanum. Six panel door with four panels glazed and rectangular fanlight. Band at first floor sill and eaves cornice. Two later splayed bay windows at ground floor with sashes, elsewhere the sashes are in reveals. Stone copings to roof gables. |

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|---|---|
| **Asset/Event Number** | 7 |
| **Asset/Event Name** | L SHAPED STABLE/PILLARED HAYBARN/SHIPPON 50 METRES SOUTH EAST OF MANOR FARMHO |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253192 |
| **HER Number** | 985/1/0 |
| **Status** | Listed Building- Grade II |
| **Easting** | 352242 |
| **Northing** | 378114 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. BRIDGE LANE SJ 57 NW (South Side) 2/58 L-shaped stable/pillared haybarn/shippon 50 metres south east of Manor Farmhouse. GV II Stable, haybarn and |

shippon; the stable partly C17 enlarged late C18, the haybarn and shippon probably late C18. C17 sandstone forms part of left gable end, back wall and cross-wall of stable; the rest is brown brick in English garden wall bond with graded grey slate roof. Brick pillars, T-shaped in plan, support king-post trusses over L-shaped haybarn. Shippon projects from haybarn, right. Stable has 2 boarded doors, 1 under skewback cambered arch; inserted vehicle opening, left; 2 stone-lined pitching eyes to loft; damaged fireplace in former groom's room. Shippon has doorway under skewback cambered arch and an inserted wide opening; 2 stone-lined pitching eyes to loft. Items 57 to 59 comprise a now rare survival of a farmstead on the main street of a small town.

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| | |
|---|---|
| **Asset/Event Number** | 8 |
| **Asset/Event Name** | 1, CHURCH STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253194 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351741 |
| **Northing** | 377905 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. CHURCH STREET SJ 57 NW (East Side) 2/65 No. 1 (formerly listed as No. 2 High Street). 8/1/1970 GV II House, the ground floor converted to shop. Mid C18, altered. Flemish bond brown brick; hipped grey slate roof. 3 storeys; 3 windows to High Street. Rendered plinth; rusticated quoins; band at 2nd storey ceiling level; parapet with moulded cornice; 6-panel door in eared case with panelled reveals and soffit under semicircular hood on scroll brackets. Blank window right of door; early C20 hip-roofed canted 1-storey bay window left of door with 2-pane sashes. Flush 12-pane sashes to 2nd storey and 6-pane to 3rd storey. 2 brick chimneys. Front to Church Street has early C20 projecting shopfront, 2 12-pane flush sashes to 2nd storey and 2 6-pane to 3rd storey. All sashes have lintels with false voussoirs and keystones and projecting stone cills. |

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|---|---|
| **Asset/Event Number** | 9 |
| **Asset/Event Name** | FRODSHAM RAILWAY STATION WITH FORMER STATIONMASTER'S HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253195 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351860 |
| **Northing** | 377901 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. CHURCH STREET SJ 57 NW (off East Side) 2/66 Frodsham Railway station with former Stationmaster's house. II Railway station and former stationmaster's house 1849. Flemish bond brown brick; graded grey slate roofs. 2 storeys. with 1-storey wing at each end. Jacobethan. Face to forecourt: stone-capped shaped central gable and end gables. Sandstone |

plinth-cap, rusticated rock-faced quoins, some long and short, to windows, mullioned where of 2 lights. Stone cornices over lower windows. 3 lights of lower windows and all upper windows retain margin-paned casements. Diminishing stone-dressed rectangular brick chimneys. Face to platform is similarly detailed, but with replaced double doors to booking office; 4 of the 8 lower storey window lights and 4 1/2 of 6 upper storey lights retain margin-paned casements. Shelter on south platform removed. C20 overbridge is not included in this item. A substantial, little altered and relatively little damaged mid C19 main station building

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|---|---|
| **Asset/Event Number** | 10 |
| **Asset/Event Name** | SHIPPON 10 METRES SOUTH OF MANOR FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253254 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352193 |
| **Northing** | 378102 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | Shippon, probably late C18. English garden wall bond brown brick; grey slate roof. 2 storeys plus loft in roof. Cowshed has 5 skewback camber-arched doorways, 2 with divided boarded doors, 1 with damaged divided boarded door and 2 with undivided boarded doors. External stone steps on rebuilt brick base. Access door to lower loft under skewback camber arch; loading door under wooden lintel. 3 stone-lined pitching eyes in upper loft. Diamond-shaped brick vents to cowshed; loophole vents to lower loft. Kingpost trusses. Cartshed adjoining north end of shippon has no features of special interest. Items 57 to 59 comprise a now rare survival of a farmstead on the main street of a small town. |

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|---|---|
| **Asset/Event Number** | 11 |
| **Asset/Event Name** | COTTAGE AND COACH/CARTSHED 30 METRES EAST OF MANOR FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253266 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352218 |
| **Northing** | 378142 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. BRIDGE LANE SJ 57 NW (South Side) 2/59 Cottage and Coach/ cartshed 30 metres east of Manor Farmhouse. GV II Former cottage and coach and cartshed, now farmbuilding. Early C19. Brick with graded grey slate roof. 2 boarded doors, one in moulded architrave, the other under skewback cambered arch. 2 small pane casements under skewback arches to lower storey and 4 to upper storey, 2 altered; loading door to loft. Coach doorway under basket arch; inserted cart opening. 2 chimneys cut off at ridge level. Listed for group value. Items 57 to 59 comprise a now rare survival of a farmstead on the main street of a small town. |

| | |
|---|---|
| **Asset/Event Number** | 12 |
| **Asset/Event Name** | FRODSHAM VIADUCT NUMBER 53 |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253269 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352858 |
| **Northing** | 378633 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV II Part in Sutton C.P. Railway viaduct over River Weaver and adjoining land, 1848-1850, by A Rendel, Engineer, Thomas Brassey, contractor, for Birkenhead, Lancs & Cheshire Junction Railway Co. Red sandstone, brown brick and cast iron. 2 segmental-arched iron spans of circa 30 metres over river; 2 round arches on west bank (Frodsham C.P.) and 21 on east bank (Sutton C.P.). Piers to iron spans are rusticated tooled ashlar; the other spans have rusticated voussoirs, pier faces and quoins and rock-faced spandrelsl brick reveals. Cornice to iron-span piers, plainer imposts to others. Top of central pier to river modified to take mid C20 concrete track bed. |

| | |
|---|---|
| **Asset/Event Number** | 13 |
| **Asset/Event Name** | ROCK VILLA |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253309 |
| **HER Number** | 6435 |
| **Status** | Listed Building- Grade II |
| **Easting** | 352014 |
| **Northing** | 378124 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. HIGH STREET SJ 57 NW (North Side) 2/71 No. 67, Rock Villa. 17.5.84 II Cottage, circa 1830. Flemish bond brown brick; grey slate roof. 2 storeys; 2 windows. 6-panel door, with fielded crosses in upper 4 panels and flush reeded lower panels, in moulded case with simple entablature. Flush sashes under cambered skewback arches. Stone steps to door. |

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|---|---|
| **Asset/Event Number** | 14 |
| **Asset/Event Name** | 4, HIGH STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253310 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |

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|---|---|
| **Easting** | 351753 |
| **Northing** | 377917 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV House, now shop, mid C18 altered. Flemish bond brown brick; hipped grey slate roof. 3 storeys, 3 windows. Lower storey altered, with superimposed shop front. Rusticated quoins; lintel band to 3rd storey with altered parapet above. Deep 4-pane casements, probably formerly small-pane, to 2nd storey; square 4-pane sashes to 3rd storey. Casements and sashes near-flush; openings have rusticated wedge lintels with raised keystones and projecting stone cills, all painted. Interior not inspected. Listed for group value only. |

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|---|---|
| **Asset/Event Number** | 15 |
| **Asset/Event Name** | 44, HIGH STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253311 |
| **HER Number** | 984/0/1 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351879 |
| **Northing** | 378043 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. HIGH STREET SJ 57 NW (South Side) 2/73 No. 44. 8/1/1970 II Cottage incorporating a probably late C16 1-room cottage and a C17 cottage with short C20 link. Oak frames partly replaced in brick on bedrock outcrop and sandstone plinth, grey slate roof. Right wing (C16?), cased in brick and render, has lower part of cruck frame and large square panel frame visible inside. Left wing of small framing extended 1 metre forward in stone and brick probably early C18 with simple oak truss to front gable end extended backwards probably late Cl7. Doors and windows replaced. Staircase renewed. Framing and roof structure of oak visible internally. |

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|---|---|
| **Asset/Event Number** | 16 |
| **Asset/Event Name** | MILLBANK COTTAGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253314 |
| **HER Number** | 984/0/13; 6413; 6412 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351297 |
| **Northing** | 377587 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (North Side) 2/77 Nos. 1 and 2, Millbank Cottage. GV II Cottage, now 2, early C19. Brown Flemish bond brickwork; graded grey slate roof. 2 storeys; 2 windows. 4-panel door with plain fanlight in round-arched opening. 12-pane recessed sashes |

under gauged brick flat arches. Interior not inspected. Listed for group value only.

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|---|---|
| **Asset/Event Number** | 17 |
| **Asset/Event Name** | MILLBANK FARM |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253316 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351304 |
| **Northing** | 377619 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (North Side) 2/79 No. 1 (Main Street House). GV II House, formerly of miller, C18 or earlier, altered and recased in brick early C19. Brown Flemish bond brickwork with pale headers on sandstone plinth; grey slate roof. 2 storeys plus cellar and attic; 3 windows. Cross-gable left; slightly projecting front: gable right. Verges refaced in hard red brick late C19. 3 brick chimneys (1 on ridge opposite door), recapped in hard red brick. 6-panel door under skewback cambered arch; 16-pane recessed sash window to each storey, right of door; a 12-pane recessed sash window to each storey in each front gable. Interior Chamfered oak beam in rear room, right; painted newel stair with stick balusters, probably early C18; broad-board doors on H-L hinges; some fixed cupboards of Georgian type. |

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|---|---|
| **Asset/Event Number** | 18 |
| **Asset/Event Name** | 47, 49 AND 51, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253317 |
| **HER Number** | 984/0/12 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351436 |
| **Northing** | 377753 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (North Side) 2/80 Nos. 47, 49 and 51. 13/7/79 GV II Row of 3 cottages. C17 and later, altered. Pebbledash to front with brick showing through in intermediate gable, and coursed sandstone bottom right. Some oak small framing at rear. Slate roofs. Each cottage built separately. No. 47 (left) 2 storeys, 2 windows, symmetrical, with flush chimney on left gable and central ridge chimney; 6-pane wood casements to lower storey and to upper storey left; leaded sidelights and small-pane wood centre light to upper casement right. No. 49 has replaced boarded door left with ridge-chimney behind; 1 6-pane wood casement to lower storey with 8-pane sprocket-dormer window above. No. 51, (in right cross-gable) has damaged C19 6-panel door under cambered head, left; one 2-pane casement to each storey; projecting 2-flue brick lateral chimney in front of ridge. Restoration work (early 1985.) suggests that No.51, and part of No.49 with small framing surviving is C17 and Nos.47 and part of No. 49, of brick, somewhat later. Interior planning altered, probably C18 and later. |

| | |
|---|---|
| **Asset/Event Number** | 19 |
| **Asset/Event Name** | ASHLEY HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253318 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351477 |
| **Northing** | 377782 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (North Side) 2/82 No. 59 (Ashley House). GV II House and veterinary surgery, circa 1830. Flemish bond brown brick on sandstone plinth; hipped grey slate roof. 2 storeys; 5 windows, symmetrical. Door of 4 fielded panels in good Roman Doric case with looped radial bar semi-elliptical fanlight in basket-arched recess. 4-pane recessed sashes to lower storey (formerly 12-pane; vertical bars removed); band at 1st floor; 12-pane recessed sashes to upper storey. All windows have gauged brick flat arches and projecting stone cills. Fascia with moulded top beneath widely projecting boxed eaves. Symmetrically placed brick chimneys. Interior not inspected. |

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|---|---|
| **Asset/Event Number** | 20 |
| **Asset/Event Name** | WALLS ON WEST AND NORTH SIDE OF GARDEN AT BACK OF OLD HALL HOTEL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253319 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351539 |
| **Northing** | 377867 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV Garden wall, Georgian, of brown brick with stone copings. The walled garden is circa 50 metres x 30 metres. The wall, about 2 metres high, with plain stone coping, drops in quadrant steps to allow for the slope of the ground. Plain rectangular buttresses. |

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|---|---|
| **Asset/Event Number** | 21 |
| **Asset/Event Name** | 2 TIDE STONES IN GARDEN AT REAR OF OLD HALL HOTEL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253320 |
| **HER Number** | 984/0/10 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351547 |

| | |
|---|---|
| **Northing** | 377922 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (North Side) 2/85 2 tide-stones in garden at rear of Old Hall Hotel. GV II Stones marking high tide points, 1802 and 1862, sandstone. Each stone is rectangular in plan, round-topped, about 50cm high. The north east stone is inscribed "The Tide came to this stone January 21 1802"; the south west stone, on slightly higher ground, is inscribed "THE TIDE CAME TO THIS STONE JANUARY 20TH 1862." |

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|---|---|
| **Asset/Event Number** | 22 |
| **Asset/Event Name** | BROOK HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253321 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351460 |
| **Northing** | 377722 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (South Side) 2/90 No. 38 (.Brook House) . GV II House, circa 1830. Flemish bond brown brick; grey slate roof. 3 storeys, 2 windows; symmetrical. 5-panel door, upper panel glazed in 3 panes, in simple classical doorcase; 2 stone steps. 4-pane flush sashes to ground floor; 16-pane flush sashes to 1st floor; 12-pane flush unequal sashes to 2nd floor. Interior not inspected. Listed for group value. - |

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| | |
|---|---|
| **Asset/Event Number** | 23 |
| **Asset/Event Name** | 52, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253353 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351511 |
| **Northing** | 377742 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (South Side) 2/92 No. 52 (formerly listed as The Gables). 6/4/1978 GV II House with narrow yard to each side flanked by shed expressed as a pavilion. Mid C19. Flemish bond brown brick; grey slate roofs. House 2 storeys plus attic; 3 windows; open pediment gable to street. Painted sandstone plinth and 1st floor band. 6-panel door (upper 4 panels glazed) in pedimented case with panelled reveals and intrados to round arch containing looped radial-bar fanlight. Recessed sashes of 2 panes to lower storey and 4 panes to upper storey; round window to attic with radial bars and circumferential loops. Short wing wall to each side of house with stone coping curved up at each end. Shed to side of each |

yard has open pediment gable to street, a round-arched 6-pane fixed light and a radial-bar round window in gable. Interior not inspected. Apparently built as military premises (see item 93, adjoining).

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|---|---|
| **Asset/Event Number** | 24 |
| **Asset/Event Name** | ENTRANCE TO ARMY PREMISES ADJOINING NUMBER 52 MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253354 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351528 |
| **Northing** | 377752 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV Barrack entrance, mid C19. Rock-faced red sandstone. Segmental arch to gateway 3 metres high by 3 metres wide. Crown and Prince of Wales feathers with motto ICH DIEN on keystone; L COMPANY inscribed on stone above; 2nd EC VB CR (E COMPANY:V BATTALION:CHESHIRE REGIMENT), on voussoirs. Rectangular wing walls (with pedestrian door left) have Cheshire sheaf between 2 mock loopholes at high level to each side of gateway. Crenellated parapet. Included for group value. |

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| **Asset/Event Number** | 25 |
| **Asset/Event Name** | 84, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253355 |
| **HER Number** | 984/0/6 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351621 |
| **Northing** | 377805 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (South Side) 2/94 No. 84. 8/1/1970 GV II House, C17. Oak frame; plaster panels; graded grey slate roof; sandstone plinth. 2 storeys; 3 windows. Small framing with 2 braces beneath coved eaves. Ridge chimney opposite door, flush gable chimney right, both of brick. Replaced 6-panel door. Two 3-light and one 2-light small-pane casements to lower storey; two 2-light and 1 (central) 3-light casement to upper storey. Interior not inspected. |

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| **Asset/Event Number** | 26 |
| **Asset/Event Name** | 90, MAIN STREET |
| **Type of Asset/Event** | Listed Building |

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| **Listing No./NRHE Number** | 1253356 |
| **HER Number** | 984/0/5 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351646 |
| **Northing** | 377821 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (South Side) 2/95 No. 90. GV II Shop, C17 refronted early C19. Brown brick; grey slate roof. 2 storeys; 2 windows. Door of 6 fielded panels, right; small canted bay window left with 2 panes (vertical bar) to front and 2 panes (horizontal bar) to each side. 2 6-pane casements to upper storey. Central chimney behind ridge. Interior. Oak beams in shop; coursed red sandstone wall at rear of shop (through both storeys); some work in small bricks of Cl7 type. Listed for group value. |

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|---|---|
| **Asset/Event Number** | 27 |
| **Asset/Event Name** | 92, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253357 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351652 |
| **Northing** | 377826 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV Shop, front early Cl9. Painted Flemish bond brick; graded grey slate roof. 2 storeys forming a canted bay at right end of Queen's Head inn (item 97 q.v.). Shuttered shop window in wood casing with cornice to front; 2-pane sash in right face; door of 6 fielded panels in left face. Painted 4-pane sashes in central face of upper storey; oblique faces blank. Plinthed brick chimney rises from roof, right. Gable of roof (continuous with that of Queen's Head) behind middle of right oblique face. Upper part of building belongs to Queen's Head. Interior not inspected. |

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|---|---|
| **Asset/Event Number** | 28 |
| **Asset/Event Name** | QUEEN'S HEAD HOTEL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253358 |
| **HER Number** | 984/0/3 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351659 |
| **Northing** | 377832 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |

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|---|---|
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (South Side) 2/97 Queen's Head Hotel (formerly listed as Queen's Head Hotel and Outbuilding adjacent to 20/10/52 Queen's Head Hotel) 13/7/79 GV II Hotel, C17 with front rebuilt probably early C19. Rendered brickwork exposed right; graded grey slate roof. 2 storeys, plus attics with windows in end gables. Recessed porch in round-arched opening with ornate glazed rear door; 2-storey canted bay window left; two 12-pane recessed sashes right of doorway and 3 in canted bay left; upper storey has six 9-pane unequal sashes, 3 in the bay window. Flush brick gable chimneys, left, and at rear of left wing. Attached coach-house at right of rear-yard has upper storey (access by external steps) said to have been meeting-place of court of manor, bearing oval plaque inscribed "THE articles belonging to the Brotherly and Friendly Society of Frodsham were enrolled January 12th 1813". 2 boarded coach doors in basket-arched recessed openings; a horizontal sliding sash and a boarded door, two camber-arched. 2-light 12-pane sashes to meeting-room above. Interior of Inn: probably C17 moulded oak beams in bar. Good C17 plaster ceiling in upper room with raised centralised foliated pattern in each of 3 panels, partly interrupted by subsequently built internal walls. |

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| **Asset/Event Number** | 29 |
| **Asset/Event Name** | STABLE ON EAST SIDE OF YARD BEHIND QUEEN'S HEAD HOTEL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253359 |
| **HER Number** | 984/0/4 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351676 |
| **Northing** | 377816 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (South Side) 2/98 Stable on east side of yard behind Queen's Head Hotel. (formerly listed as barn to South east: of 13/7/1979 Queens Head Hotel) GV II Stable, now Folk Club room, late C17, altered. Tooled coursed red sandstone front gable and lower parts of other walls; irregular English garden wall bond brown brick above. Grey slate roof with coped gable on kneelers to front. Interior: Wooden stalls with hayracks, a good set. Loft not accessible. |

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|---|---|
| **Asset/Event Number** | 30 |
| **Asset/Event Name** | LLOYDS TSB BANK |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253360 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351673 |
| **Northing** | 377847 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | Frodsham Town's Office, now a bank, 1852. Flemish bond red-brown brick; hipped grey slate roof of low pitch. 2 storeys; 5 windows. Italianate. Plinth; lower storey cill band; frieze and cornice at 1st floor; upper storey cill band; frieze and cornice on shaped brackets at eaves. |

Replaced double doors in substantial moulded case with pediment on ornate consoles. 9-pane recessed sashes under wedge lintels to lower storey; 12-pane tall sashes in shouldered and eared architraves with cornices on consoles to upper storey; 2 symmetrically placed chimneys with recessed stucco panels to front. "It was resolved .... that the Rent of the Town's Office in the New Building be ten pounds ten shillings including coals and cleaning". Township of Frodsham Vestry Minute September 30 1852 Cheshire Record Office PC 43/1.

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| **Asset/Event Number** | 31 |
| **Asset/Event Name** | THE GOLDEN LION |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253361 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351727 |
| **Northing** | 377882 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET' SJ 57 NW (South Side) 2/101 The Golden Lion. GV II Inn, formerly hotel, late Georgian. Rendered brick on sandstone plinth; grey slate roof. 3 storeys; 2 windows to Main Street, 5 to Church Street. Roof hipped at corner of streets. Recessed porch to Main Street with door of 4 flush panels in moulded frame, with 3-light recessed sash to each side: 4-pane; 16-pane; 4-pane. Recessed sashes of 16 panes to 2nd storey and 8 panes to 3rd storey. The long face to Church Street has 2 round-arched doorways, 1 with door of 9 raised panels, the other 4 panels. Four 4-pane and one 12-pane sash to lower storey; three of 4 panes to 2nd storey and 4 of 4 panes and 1 of 8 panes to 3rd storey. All windows have plain raised surrounds with stone cills, all painted. Left end of front to Church Street has slightly projecting gable with bargeboards and finial. Interior No visible features of special interest. |

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| **Asset/Event Number** | 32 |
| **Asset/Event Name** | MILL HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253574 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352978 |
| **Northing** | 378569 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | SUTTON C.P. MILL LANE SJ 57 NW (North Side) 2/145 Mill house. IT Mill House,now industrial estate office, circa 1820. Painted brick, front pebbledashed; graded grey slate roof. 2 storeys and attic. 3 windows; symmetrical. Slightly projecting pedimented 2-storey porch; 4-panelled door in opening with rusticated quoins, stepped voussoirs and keystone;16-pane flush sashes; small attic window below pediment, and attic windows in gables; eaves cornice to front. Low 2-storey 1-room wing left and small 1 storey C20 leanto right. During the C19 the mill, of which little remains, was one of the largest of Cheshire's water-powered cornmills. |

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| **Asset/Event Number** | 33 |
| **Asset/Event Name** | K4 TELEPHONE KIOSK NORTH OF RAILWAY BRIDGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253575 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351763 |
| **Northing** | 377843 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | Telephone kiosk type K4 designed 1927 by Sir Giles Gilbert Scott. Cast iron, with glazed door and glazed sides, all with small panes of Georgian proportion. Letter-box and 2 pre-decimal coinage stamp machines in rear of kiosk are an integral part of the design, with bracket for lamp, now removed, over. A rare and well preserved example of the "Giant" telephone kiosk, substantially larger than succeeding designs and incorporating postal facilities. |

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| **Asset/Event Number** | 34 |
| **Asset/Event Name** | K6 TELEPHONE KIOSK TO FRONT OF NUMBERS 101 AND 103 |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261701 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351631 |
| **Northing** | 377857 |
| **Parish** | Parish: Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV II Telephone kiosk. Type K6. Designed 1935 by Sir Giles Gilbert Scott. Made by various contractors. Cast iron. Square kiosk with domed roof. Unperforated crowns to top panels and margin glazing to windows and door. |

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| **Asset/Event Number** | 35 |
| **Asset/Event Name** | 83, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261823 |
| **HER Number** | 984/0/8 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351587 |
| **Northing** | 377837 |

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|---|---|
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (North Side) 2/86 No. 83. GV II Cottage, probably late C18 with some C17 internal features. Flemish bond brown brick on 1 metre rendered sandstone plinth; thatched roof. 2 storeys; 2 windows. Door with 2 tall upper panels and ornate sub-divided lower panel in moulded casing with flat hood on consoles. 4-pane casements, those to lower storey under gauged brick flat arches. Right gable chimney of brick. Interior A little C17 oak framing, but almost totally rebuilt after mid C20 structural collapse. Listed for group value. |

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| **Asset/Event Number** | 36 |
| **Asset/Event Name** | THE BEAR'S PAW HOTEL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261825 |
| **HER Number** | 984/0/2 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351700 |
| **Northing** | 377928 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (North Side) 2/89 The Bear's Paw Hotel. 20.10.52 GV II House, now public house, 1632, restored 1903-4 by Douglas and Minshull. Red coursed sandstone rubble; small-slate roof. 2 storeys, 5 windows; E-shaped, almost symmetrical. Plinth; moulded band at 1st floor; coped gable to each bay has kneelers and eaves and ridge obelisk finials. 4 stone chimneys. 2-storey porch has replaced double doors; 3-light mullioned and transomed window to upper storey with moulded band above. Recessed bay each side of porch has 3-light mullioned and transomed window to each storey. The, wider, end bays have 5-light mullioned and transomed windows. All mullions and transomes recessed ovolo, many restored. Door lintel inscribed W:L:ANNO:DOMINI:1632. Interior altered. |

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| **Asset/Event Number** | 37 |
| **Asset/Event Name** | 108 AND 110, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261827 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351714 |
| **Northing** | 377881 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV 3 shops converted into 2, with living accommodation over. Early C19, plastered. Brick with grey slate roof. Plain stone plinth. No. 108 has altered shop-front and replaced door in panelled case with flat canopy on consoles; No. 110 has 1-pane shop window in plain case with cornice, simple replaced door and 1-pane shop window, with cast-iron lattice vent above, in plain case |

with cornice. Three 16-pane recessed sashes to 2nd storey and three 8-pane. ones to 3rd storey. Interiors not inspected. Listed for group value.

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| **Asset/Event Number** | 38 |
| **Asset/Event Name** | 53, 55 AND 57, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261845 |
| **HER Number** | 984/0/11 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351453 |
| **Northing** | 377759 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV Row of 3 cottages, C17 altered. Pebbledashed on oak frame to front, brick rebuilt ends; graded grey slate roof. 2 storeys; 3 windows. Nos. 53 and 55 (left and centre) under cross gables; roof of No. 57 is parallel with street. Jettied gable to No. 53 is covered in pebbledash. 6-pane casements; replaced doors. Lateral chimney left, ridge chimney opposite door of No. 57, gable chimney right, all of brick. Interior: Oak 1st floor beams and joists. Inglenook to No. 55 behind lobby entrance to No. 57. |

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| **Asset/Event Number** | 39 |
| **Asset/Event Name** | OLD HALL HOTEL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261846 |
| **HER Number** | 984/0/9 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351573 |
| **Northing** | 377830 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MAIN STREET SJ 57 NW (North Side) 2/83 No. 81 (Old Hall Hotel). GV II House, now hotel, probably C17, much altered. Pebbledashed; grey slate roofs. 2 and l storeys; 4 windows. Cross gable left; 1 1/2 storey L-shaped wing right. Recessed centre portion has replaced door in Gothick ogee case, wide small-pane casement left and tall 6-pane sash right; wide small-pane casement to upper storey. right front gable has 3-light 10-pane sash to lower storey and near-flush 16-pane sash to upper storey; left cross-gable has similar sashes and a very small, low 12-pane casement to loft. 3 rendered chimneys: lateral left; on right end gable and on ridge at junction of central and right roofs. Interior: Extended to rear; front portion has oak-framed walls, the framing exposed in main wall parallel with front, probably original rear wall. Flying stair, probably early C19, each rail on 2 turned balusters per step, with curtails; shaped brackets. |

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| **Asset/Event Number** | 40 |
| **Asset/Event Name** | 101 AND 103, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261847 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351629 |
| **Northing** | 377868 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV Pair of shops with accommodation over, early C19 with late C19 shop-fronts and first floor bay windows. Flemish bond brown brick with grey slate roof. 3 storeys; 4 windows, symmetrical plus narrow bay with cart entry, right. Basket-arched recess contains 2 replaced shop doors with fanlights in round-arched openings; square bay shop-window to each side with antae, plain fascia and moulded cornice, that to No. 101 (left) has 5 round-headed 2-pane lights to front and 2 to each side, that to No. 103 replaced in aluminium. Band at 1st floor. Two 12-pane recessed sashes above doorways, under flat gauged brick arch. A canted bay window above each shop window has basket-arched 4-pane sash to front and round-arched 2-pane sash to each oblique face. Recessed 6-pane sashes under gauged brick flat arches to 3rd storey, with stone cills. 2 flush gable chimneys and 1 ridge chimney, of brick. 12-pane recessed sash to 2nd storey and 6-pane to 3rd storey over cart entry. Included for group value only. |

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| **Asset/Event Number** | 41 |
| **Asset/Event Name** | 46 AND 48, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261848 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351485 |
| **Northing** | 377737 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | II GV Pair of cottages, early C19. Brown Flemish bond brickwork; graded grey slate roof. 2 storeys; 2 windows in all. Painted sandstone plinth. 6-panel doors in moulded cases; a stone step to each; 12-pane flush sash to each side and 2 to upper storey. Boarded door to yard entry, left. Lower windows and entry doorway have cambered skewback arches. 2 gable chimneys. Interiors not inspected. Listed for group value. |

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|---|---|
| **Asset/Event Number** | 42 |
| **Asset/Event Name** | FRODSHAM BRIDGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261905 |
| **HER Number** | |

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|---|---|
| **Status** | Listed Building- Grade II |
| **Easting** | 352996 |
| **Northing** | 378452 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | BRIDGE LANE, FRODSHAM AND SJ 57 NW FRODSHAM C.P. SUTTON CAUSEWAY 2/56 Frodsham Bridge. II Part in Sutton C.P. Road bridge over River Weaver, 1850, of red sandstone and limestone. 3 deep segmental arches each circa 25 metres span. Limestone voussoirs with chamfered rock-faced rustication; plain parapets of smooth-finished limestone blocks; all other parts of tooled sandstone with chamfered rustication. Slightly projecting rectangular piers have round-arched niches. Battered abutments. Raised keystone on each face of central arch inscribed 1850. SJ57 NW SUTTON CP SUTTON CAUSEWAY AND BRIDGE LANE FRODSHAM Frodsham Bridge II See under Bridge Lane,Frodsham. |

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| **Asset/Event Number** | 43 |
| **Asset/Event Name** | ROCK COTTAGE AND ROCK FARM |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261906 |
| **HER Number** | 979;6435 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351290 |
| **Northing** | 377064 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | House and cottage, 1680; coursed tooled red sandstone, grey slate roof. 2 storeys; 3 windows. 5-panel door in lining with architrave, under lintel inscribed DW:1 6TBM.80:WW. 9-pane C19 or later casements. 2 brick chimneys: on ridge opposite door and on left gable. Projecting 1-room wing under catslide roof, left. Interior not inspected, but ovolo beams, and joists of oak and small-framed rear wall are discernible in room of left wing and ovolo beams and joists of oak in main wing. Stair renewed. |

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| **Asset/Event Number** | 44 |
| **Asset/Event Name** | 85 AND 89, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1270772 |
| **HER Number** | 984/0/7 |
| **Status** | Listed Building- Grade II |
| **Easting** | 351599 |
| **Northing** | 377841 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | GV 3 cottages, now 2, C17. Irregular English garden wall bond brown brick on weathered red |

sandstone plinth; thatched roofs, that to No. 85 lower than No. 89 (incorporating former No. 87). Replaced doors; replaced small-pane casements to lower storey (including 1 restored leaded casement), and to upper storey of No. 85. 2 dormers to No. 89 have C17 oak frames and small casements. Oak small framing at rear of 89. Chimneys removed above roof level. Interior of No. 89: lobby entrance; inglenook with sandstone baffle and oak bressumer; altered C17 stair; oak-frame wall between No. 89 and former No. 87 has quite large square panels; complete roof structure with diagonal windbraces, purlins and unwrought rafters, all of oak. Corner chimney-breast in end wall at front corner of parlour of former No. 87. No. 85 has similar framing, more altered.

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| **Asset/Event Number** | 45 |
| **Asset/Event Name** | THE OLD HALL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1330364 |
| **HER Number** | 107/1 |
| **Status** | Listed Building- Grade II |
| **Easting** | 350916 |
| **Northing** | 380340 |
| **Parish** | Halton |
| **Council** | Cheshire West and Chester |
| **Description** | Farmhouse 1607 red sandstone with tiled roof. 2 storeys and attic 4 bays including end gables set forward. Entrance porch, slightly set forward, has gothic opening with drip mould. Mullion windows, those at attic level filled in behind mullions. Gable copings refixed following the substitution of tiles for the original slates. Crested ridge. |

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| **Asset/Event Number** | 46 |
| **Asset/Event Name** | REMAINS OF ROCK SAVAGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1330365 |
| **HER Number** | 106/1 |
| **Status** | Listed Building- Grade II |
| **Easting** | 352526 |
| **Northing** | 380098 |
| **Parish** | Halton |
| **Council** | Cheshire West and Chester |
| **Description** | Formerly a mansion 1565 for Sir John Savage, of sandstone on the site of the earlier Clifton Hall. Rock Savage itself was replaced by a later building of the same name in C18 and by 1782 was already deserted and falling into run. Now only fragments of sandstone walling indicate the position of the original 1565 house. |

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|---|---|
| **Asset/Event Number** | 47 |
| **Asset/Event Name** | MANOR FARM HOUSE |

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| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1332962 |
| **HER Number** | 107/4 |
| **Status** | Listed Building- Grade II |
| **Easting** | 350868 |
| **Northing** | 380393 |
| **Parish** | Halton |
| **Council** | Cheshire West and Chester |
| **Description** | Farmhouse early C17, red sandstone with slate roof 2 storeys and attic 3 bays including gable facing highway. Single storey one bay extension south. Gable string course at first floor level and matching drip mould over window in gable apex. Mullion windows at ground and first floor level replaced by sashes but a single stone mullioned window remains in the attic. Interior has moulded and stopped bevelled beams. |

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| **Asset/Event Number** | 48 |
| **Asset/Event Name** | VIADUCT OVER WEAVER NAVIGATION, NUMBER 54 |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1391821 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353362 |
| **Northing** | 379010 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | Viaduct, 1848 1850. Alexander Rendel engineer, Thomas Brassey contractor, for Birkenhead, Lancs & Cheshire Junction Railway Co. Brown brick and cast iron. Segmental-arched cast iron span of 25 metres approximately 28 metres above water level of Navigation, with a lower round brick arch to each side surmounted by doubly-recessed rectangular panel. Square abutments. 4 rectangular buttresses on each face. Moulded cornices: moulded stone imposts to central span; moulded copings. A reinforced concrete tract-bed has been inserted above the cast iron arch. A handsome symmetrical viaduct somewhat marred in appearance by the necessary super-imposed reinforced concrete strengthening. See also item 60 (Frodsham CP). |

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|---|---|
| **Asset/Event Number** | 49 |
| **Asset/Event Name** | Overton, St Lawrence's (Frodsham) Conservation Area |
| **Type of Asset/Event** | Conservation Area |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Conservation Area |
| **Easting** | 352082 |
| **Northing** | 377347 |
| **Parish** | |

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|---|---|
| **Council** | Cheshire West and Chester |
| **Description** | Originally designated as part of the Overton Conservation Area, the Overton, St Lawrence (Frodsham) Conservation Area was created, when the Overton Conservation Area was split in two, with the other half becoming Overton, Five Crosses (Frodsham). |

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|---|---|
| **Asset/Event Number** | 50 |
| **Asset/Event Name** | Weston Village Conservation Area |
| **Type of Asset/Event** | Conservation Area |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Conservation Area |
| **Easting** | 350802 |
| **Northing** | 380426 |
| **Parish** | |
| **Council** | Cheshire West and Chester |
| **Description** | |

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|---|---|
| **Asset/Event Number** | 51 |
| **Asset/Event Name** | Castle Park (Frodsham) Conservation Area |
| **Type of Asset/Event** | Conservation Area |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Conservation Area |
| **Easting** | 351464 |
| **Northing** | 377448 |
| **Parish** | |
| **Council** | Cheshire West and Chester |
| **Description** | Frodsham Conservation Area was designated by Cheshire County Council on 25 July 1973 and extended by Vale Royal District Council on 17 November 1973. Overton Conservation Area was designated by Vale Royal District Council on 8 April 1976. The Frodsham (Castle Park Locality) Conservation Area was designated by Vale Royal Borough Council on 9 October 2003 and was formed by consolidating and extending certain areas from the above two earlier designations. |

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|---|---|
| **Asset/Event Number** | 52 |
| **Asset/Event Name** | CASTLE PARK, FRODSHAM |
| **Type of Asset/Event** | Registered Park and Garden |

# Gazetteer of Heritage Assets and Event

| | |
|---|---|
| **Listing No./NRHE Number** | 1001622 |
| **HER Number** | 984/3/0 |
| **Status** | Registered Park and Garden- Grade II |
| **Easting** | 351424 |
| **Northing** | 377438 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | Private gardens and pleasure grounds laid out by Edward Kemp in 1855 and, with an adjoining area of former parkland, in use as a public park since the early 1930s. |

HISTORIC DEVELOPMENT

The manor of Frodsham was one of those granted to Hugh Lupus, the first Norman Earl of Chester in c 1070 and a manor house is recorded at Frodsham from the C13 (Holroyd 2002). In 1654 the manor house, then in the ownership of the Savage family, was burnt down (Ormerod 1882) and a 1727 engraving by Samuel and Nathaniel Buck entitled Frodsham Castle shows the ruins of this building, then in the ownership of Edward Daniell, with the town beyond (ibid). In c 1750 the property passed to the Ashley family (Hawkin and Duncan 1989). By the late C18 the Ashleys had constructed a new house on the site (Aitken 1795), which Ormerod (1882) records was a mansion called Park Place with parts of the foundation walls of the castle forming the cellars.

In 1851 Park Place was purchased by Joseph Stubs, a manufacturer from Warrington, who proceeded to reconstruct and extend the house and outbuildings under the superintendence of Mr Penson (Sale particulars 1861), possibly architect Thomas Mainwaring Penson (1817-64) of Chester. Stubs employed Edward Kemp (1817-91) to lay out the grounds. Kemp was responsible for the laying out of Birkenhead Park (qv) to designs by Joseph Paxton and was appointed superintendent in 1845. In 1847 he also commenced a private practice producing designs for public parks, cemeteries, and private estates. Kemp had a decisive influence on gardening style in this period following the publication of his book 'How to Lay Out a Small Garden' in 1850 (Elliot 1986). His work at Park Place is included in the 2nd (1858) and 3rd (1864) editions where it is the first example in a section entitled 'Compact Combination of Parts'. It is described as 'a singularly interesting place which I arranged ... in 1855'. Stubs is described by Kemp as an energetic and successful collector and cultivator of rare plants. In his description of the grounds of Park Place, Kemp makes reference to a sheltering tree-clad railway embankment, views to Frodsham and Helsby hills, and the use of gushing water from land-springs. Also described, and illustrated with a part plan, are a formal flower garden with fountains, the arrangement of garden, stable, and farm buildings around three small courtyards, and a terraced kitchen garden, with a conclusion that the plan would 'exhibit the contiguity and connexion of all the different parts of the place' (Kemp 1858).

In 1856 Kemp published a series of seven articles in the Gardeners' Chronicle on Biddulph Grange, Staffordshire (qv), where the garden was substantially complete by the mid 1850s and open to the public from this time (Elliot 1986). Kemp commented particularly on the methods of sub-dividing the various areas, the formal treatment adjacent to the house, the irregular planting of trees and shrubs nearer to the house to form a foreground for the hills beyond (ibid), and on the planting of the American Garden (Gardeners' Chronicle 1856). It is possible that the much smaller-scale design of similar elements at Park Place was influenced by visits to Biddulph by Kemp and/or Stubs.

Stubs died in 1861 and Park Place was sold at auction to Edward Abbott Wright, a cotton manufacturer from Oldham, who renamed the property Castle Park. The Sale particulars refer to the pleasure and kitchen gardens being under the 'masterly superintendence of Mr Kemp'. The 1861 Sale plans show the layout of the grounds as largely in accordance with Kemp's earlier plan and description. A plan by Whitehead of c 1873 indicates some additional paths within the American Garden and the addition of glasshouses adjacent to the kitchen garden. In 1933 the house, outbuildings, and 12 acres (5ha) of the grounds were presented by the Wright

family, under a Deed of Gift to be administered by a Trust, to Runcorn Rural District Council for use as a public park; the official opening ceremony took place on 24 May that year. Further adjoining land, also formerly part of the Wright estate, was purchased by the Council in 1934 and 1937 thus increasing the public park to c 16 acres (c 6.5ha).

In the C20 tennis courts have been constructed in the kitchen garden area, a bowling green on part of an adjacent orchard, and a children's play area to the south of the house. The house, with the addition of a C20 council chamber, remains (2002) in use as general and council offices. To the north-east of the house a former coach house is now (2002) converted for use as an Arts Centre, with some late C20 single-storey additions in the adjoining former stable yard. Buildings in the former adjacent farmyard were converted to a Fire Station c 1933 and later, in 1985, to local authority sheltered housing. Land drainage measures in the C20 on marshes to the north-west of Frodsham have reduced the water table in the area of Castle Park and two ornamental ponds are now (2002) filled in.

Castle Park remains (2002) in use as a public park. It is partly in the ownership of Vale Royal Borough Council and partly in the ownership of Vale Royal Borough Council acting as trustee to the Castle Park Trust.

DESCRIPTION

LOCATION, AREA, BOUNDARIES, LANDFORM, SETTING The c 6.5ha irregular site lies to the west of Frodsham town centre, c 500m south-west of the railway station. To the north-north-west the park adjoins a railway line running at the head of a steep wooded embankment with the boundary, at the foot of the slope, marked by a timber post and rail fence. To the west the northern area of the park adjoins Chester Road with the boundary marked by a low red sandstone wall and a belt of mature trees within the park. To the west the southern area of the park adjoins the C20 Netherton Drive and the gardens of some of the houses. The road boundary is partly marked by hedging with late C20 fencing to the housing. This housing development occupies ground formerly within the C19 park. To the south-east and north-east the park adjoins generally early to mid C20 housing on Howey Lane and Park Lane respectively. These boundaries are generally marked by hedges and C20 fencing with, to the north-east boundary, some sections of C19 railings and iron fencing. In the east of the park a rectangular area (excluded from the area here registered) is laid to grass with some small late C20 buildings and is a local authority service area, bounded by tall evergreen hedging.

The park generally occupies ground rising gently to the south below the steep escarpment of Frodsham Hill c 500m to the south-south-east. In the north-east of the park the ground falls to the north-east with a steep-sided stream valley rising to the south-east. The immediately surrounding area is residential with farmland to the west and the commercial town centre to the north-east.

ENTRANCES AND APPROACHES The principal entrance lies on Chester Road, c 60m south of the railway line, and is set back from the public road. It is marked by a vehicle entrance and adjoining pedestrian entrance each with metal gates between brick piers, the whole dating from the mid C20 but in the same location as the principal entrance indicated on the 1861 Sale plans.

Two further entrances give access from Fountain Lane to the north-east and from Howey Lane to the south-east. The former provides the most direct route from the town centre and is marked by C20 brick gate piers set back from the road. The entrance from Howey Lane now (2002) serves as an access for pedestrians and service vehicles and is marked by a vehicle and adjoining pedestrian entrance, each with timber gates. From this entrance a secondary drive leads north-west between housing for c 100m, closely flanked by hedges, late C20 fencing and with some sections of simple C19 iron fencing to the north-east, before leading into the park. The park is served by two further pedestrian entrances. One of these, approached by a footpath leading c 40m south-west from Park Lane, is marked by timber gate posts and a short flight of stone steps leading down into the eastern corner of the American Garden. The second from Netherton Drive is unmarked. All entrances into the park, except for this last, are as indicated on the 1861 Sale plans.

PRINCIPAL BUILDINGS The house is situated c 80m north-east of the principal entrance and is a two-storey, Neoclassical-style building with a single-storey enclosed stone entrance porch to the main, symmetrical south-west elevation which faces onto a small forecourt. Elevations are generally in brick with stone detailing including quoins, plinth and string courses, dentilled eaves and surrounds to sash windows, with single-storey stone bays to the north-west and south-east elevations. The main shallow-pitched roof is in blue slate with stone chimneys. The house was reconstructed in c 1851 for Stubs by Penson. To the east the C19 house is adjoined by a mid C20 one and a half storey flat-roofed extension. Elevations of the extension are in brick with simple concrete detailing. This extension is largely sited on a former domestic court (Sale plans, 1861) and forms a link between the house and a C19 domestic office building at the north of the former court. The extension is a local authority council chamber.

GARDENS AND PLEASURE GROUNDS The public park comprises four distinct areas: to the north-west the gardens and pleasure grounds around the house with many mature trees; to the north-east the sports areas, on land formerly occupied by the kitchen garden and orchard, together with remaining domestic offices and farm buildings converted to C20 uses; to the south-east the wooded American Garden; and to the south, an open area of former parkland.

From the principal entrance on the west boundary a main drive leads north-north-east to the house from where it continues, parallel to the north-north-west boundary, to the northern entrance from Fountain Lane. Some 300m south-west of this entrance are late C20 ornate iron gates between brick piers, which mark a division between the grounds adjacent to the house and the sheltered housing and Arts Centre. Both of these occupy converted C19 two-storey brick buildings with blue slate roofs, the sheltered housing with blue brick detailing and C20 brick infill panels and the Arts Centre with a clock tower with stone detailing. These face onto the former farm and stable courtyards respectively. To the south-east of the main drive there are routes off to these courtyards and into the north-east area of the grounds, all largely as indicated on the Sale plans of 1861. To the north-west of the entrance drive an embankment falls to the north-west boundary at the foot of the railway embankment. A perimeter path laid out along the valley formed by these two wooded embankments connects with the main drive adjacent to the principal and northern entrances. This path is as indicated on the OS map of 1873.

From the south-east entrance on Howey Lane the entrance drive leads c 230m north-westwards in a shallow curve, from where it curves to the north-east, forming the western boundary of the American Garden and giving views over lawns to the house on lower ground to the north-west. To the north of the American Garden this drive runs between tennis courts to the north-west and a bowling green to the south-east before turning north to meet the main drive adjacent to the northern entrance. The bowling green and, to the south-west, a single-storey brick pavilion with red-tiled roof, date from 1935. Adjoining the tennis courts to the north-west a small area is laid out as a garden for the disabled, with late C20 ramped paths and raised brick planting beds. To the north-west this area adjoins the high brick walls of the Arts Centre and, at a higher level to the south-west, a parking area within the walled former gardeners' court, with door openings leading into each. Within the gardeners' court there are two small brick buildings, one of which, adjoining the south-east wall, is in the location of garden sheds indicated on Kemp's plan of 1858. The tennis courts are sited on the former kitchen garden (Kemp plan, 1858) and the bowling green on a former orchard area (Sale plans, 1861). These areas are laid out in shallow terraces, rising to the south-east, with stone steps and rockwork to embankments. The former kitchen garden is divided from the pleasure grounds at a higher level to the south-west by shrubbery and an embankment with rockwork; the latter was described by Kemp in 1858.

Some 20m north-east of the principal entrance a path leads off the main drive for c 20m to the south-east before dividing, with one arm leading north-east through the pleasure grounds to meet the secondary drive. This path largely follows the route of a dotted line indicated on Kemp's 1858 plan. The second arm leads south-west around the perimeter of a car park area, which is largely enclosed by shrubbery, before curving eastwards to meet the secondary drive c 200m east-south-east of the principal entrance. This path marks a division between an area of the pleasure grounds densely planted with trees to the north, and the rising, generally open ground to the south. The car park is on the site of a former pond described by Kemp in 1858 as 'an ornamental pool', and with the stone surround, as depicted in a late C19 photograph,

partially surviving. The pleasure grounds in the north-west of the public park, adjoining the house, are largely laid to lawn with small groups and individual specimen trees and shrubs. The trees are largely mature with some late C20 planting. A C20 children's play area is laid out immediately to the north-east of the car park.

Immediately to the north-east of the house is an area laid out as a formal flower garden, bounded to the north-west and north-east by high brick walls. The symmetrical plan comprises a perimeter path forming a c 25m square divided into four beds by an axial path leading south-east from an arched opening from the main drive, and a central cross-axial path. The intersection of these paths is marked by a circular bed with a C20 decorative urn and by clipped yews at the corners of the four planting beds. The latter are laid to lawn with a formal arrangement of seasonal planting beds to each. Immediately to the south-east of the flower garden is a timber conservatory with a semicircular central projection. To the south-west the cross-axial path leads along the south-east of the house to the entrance courtyard. To the south-east the axial path, here tree-lined, continues for c 25m to a circular bed with a former fountain basin. The whole of this formal arrangement is very largely in accordance with Kemp's design of 1855 but the fruit houses that he proposed to the north-west of the flower garden were not implemented. The conservatory is first indicated on the 1873 OS map.

In the east of the public park the American Garden, informally planted with trees and rhododendrons, is laid out with access via a series of narrow paths leading off the secondary drive and from the south of the bowling green. The irregular ground within this garden is laid out with winding, intersecting stone-edged paths with short flights of stone steps connecting the varying levels, half-round earthenware drainage channels to the side of the steeper paths, and with rockwork to embankments. In the west of the American Garden paths lead through a wooded dell, at the centre of which, c 130m south-east of the house, a sunken area is planted with yellow azaleas and is the site of a former pond or small reservoir (Sale plans, 1861). To the south-east of the dell the ground rises steeply with a path at the head of the embankment from which there are occasional views north-west to the house, in particular from where the path encircles a mature tree at the edge of the path. This tree is shown encircled by a seat below a conical roof in a late C19 photograph. Kemp describes a similar arrangement at Biddulph Grange in 1856 (Gardeners' Chronicle 1856).

In the south-east the American Garden divides into two narrow arms, one to the south-west returning to the secondary drive and one continuing south-east. Within both arms is a small stream running in a stone channel, the bottom with stepped stone paving. The two streams meet at the junction of the two arms to form a single stream running north-west through the central area of the Garden. In the east arm of the Garden, c 315m south-east of the house and separate from the stream, is a former stone-walled reservoir named Synagogue Well. Beyond this feature the narrow stream valley continues rising eastwards, the stream in a natural bed, to Howey Lane (land to the east of Synagogue Well outside the area here registered). In the central area of the American Garden the channelled stream, flanked by rockwork, winds northwards to run at the foot of a steep wooded embankment adjacent to the north-east boundary, with paths crossing the stream via simple stone slab bridges. Adjacent to the north-east boundary the stream runs in a wider natural bed divided into three sections by low stone dam walls flanking a central stepped stone channel. Kemp, in 1858, describes this area of the grounds planted with large-leafed ferns on the banks of springs and also choice rhododendrons to form an American Garden. The layout of the American Garden is largely as indicated on the OS map of 1873.

The southern area of the public park is largely laid to grass with occasional single trees and, at its north corner, a small area of woodland adjoining the secondary drive. In the south corner of this open area a low mound is planted with bushes and from the whole of this area there are open views to Frodsham Hill to the south-east. A late C19 photograph shows the mound within a field in use for grazing and in the early C20 these were known as Flagpole Mount and Flagpole Field respectively.

REFERENCES

J Aitken, A Description of the Country from Thirty to Forty Miles Round Manchester (1795), pp 413-14 Gardeners' Chronicle 45, (22 November 1856), pp 775-6 E Kemp, How to Lay Out a

Garden; intended as a General Guide in Choosing, Forming or Improving an Estate (2nd edn 1858, 3rd edn 1864), pp 359-62 G Ormerod, The History of the County Palatine and the City of Chester (2nd edn revised and enlarged by T Helsby 1882), p 53 B Elliot, Victorian Gardens (1986), pp 99-105 W R Hawkin and N Duncan, Discovering Castle Park, Frodsham (1989) S Holroyd, Castle Park and Frodsham Castle, (notes for the Friends of Castle Park 2002)

Maps E Kemp, Plan of Park Place (published in Kemp 1858) B P Coxon, Plan, 10 chains to 11/4", to accompany Sale particulars, 1861 (Frodsham & District Local History Group Archive) B P Coxon, Plan, 5 chains to 3 5/16", to accompany Sale particulars, 1861 (Frodsham & District Local History Group Archive) Whitehead, Castle Park Estate belonging to Edward Abbott Wright Esq, 25" to 1 mile, 1873 (1st edn OS base), (Frodsham & District Local History Group Archive) Deed plan of land transferred to Runcorn Rural District Council, 1:1250, 1934 (Vale Royal Borough Council) Plan of Castle Park with details of C20 changes in ownership, 1:2500, 2001 (Friends of Castle Park)

OS 6" to 1 mile: 1st edition published 1882 2nd edition published 1899 1938 edition OS 25" to 1 mile: 1st edition published 1873

Archival items Park Place, Frodsham, Particulars of sale by auction, 20 June 1861 (Frodsham & District Local History Group Archive) Wright family collection of late C19 photographs of Castle Park house, outbuildings and grounds (Frodsham & District Local History Group Archive).

Verbal information given May 2002 by members of The Friends of Castle Park and Frodsham & District Local History Group.

Description written: May 2002 Amended: July 2002 Register Inspector: HMT Edited: October 2002

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|---|---|
| **Asset/Event Number** | 53 |
| **Asset/Event Name** | Old Quarry in Weston |
| **Type of Asset/Event** | QUARRY (AD 19th Century - 1800 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 4250/1/3 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 350640 |
| **Northing** | 380650 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | Quarry marked on the Ordnance Survey 25inch to one mile map, first edition. It is marked as an Old Quarry and is therefore<br>possibly disused.<br><1> Ordnance Survey, 1871-1882, Ordnance Survey 1st edition 25 inch to 1 mile - Cheshire (Maps and Plans). SCH2462 |

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|---|---|
| **Asset/Event Number** | 54 |
| **Asset/Event Name** | Brickfield, Fluin Lane |
| **Type of Asset/Event** | BRICKFIELD (Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |

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|---|---|
| HER Number | 4348 |
| Status | Non-designated Heritage Asset |
| Easting | 352340 |
| Northing | 377640 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | Brickfield marked on the First Edition Ordnance Survey 25 inch and 6inch to 1 mile maps. Brickfields were where clay was<br>both extracted and fired to produce bricks.<br><br>Brickfield marked on the First Edition Ordnance Survey 25 inch and 6inch to 1 mile maps.<br><1> Ordnance Survey, 1871-1882, Ordnance Survey 1st edition 25 inch to 1 mile - Cheshire (Maps and Plans). SCH2462.<br><2> Ordnance Survey, 1881-2, Ordnance Survey 1st edition 6 inch to 1 mile - Cheshire (Maps and Plans). SCH2474 |

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|---|---|
| Asset/Event Number | 55 |
| Asset/Event Name | Bone Works in Frodsham |
| Type of Asset/Event | BONE MILL (Post Medieval - 1540 AD to 1900 AD) |
| Listing No./NRHE Number | |
| HER Number | 4349 |
| Status | Non-designated Heritage Asset |
| Easting | 352810 |
| Northing | 378500 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | Bone Works marked on the First Edition Ordnance Survey 25 inch to 1 mile maps. It is also marked on the first, second and<br>third editions of the ordnance survey 6inch to 1 mile maps<br><1> Ordnance Survey, 1871-1882, Ordnance Survey 1st edition 25 inch to 1 mile - Cheshire (Maps and Plans). SCH2462.<br><2> Ordnance Survey, 1881-2, Ordnance Survey 1st edition 6 inch to 1 mile - Cheshire (Maps and Plans). SCH2474.<br><3> Ordnance Survey, 1896-98, Ordnance Survey 2nd edition 6 inch to 1 mile - Cheshire (Maps and Plans). SCH2472.<br><4> Ordnance Survey, 1911-1914, Ordnance Survey 3rd edition 6 inch to 1 mile - Cheshire (Maps and Plans). SCH3843. |

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|---|---|
| Asset/Event Number | 56 |
| Asset/Event Name | Lime Kiln, Sutton |
| Type of Asset/Event | LIME KILN (Post Medieval - 1540 AD to 1900 AD) |
| Listing No./NRHE Number | |
| HER Number | 4350 |
| Status | Non-designated Heritage Asset |

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|---|---|
| Easting | 352920 |
| Northing | 378630 |
| Parish | SUTTON |
| Council | CHESHIRE |
| Description | Old Lime Kiln marked on the First Edition Ordnance Survey 25 inch to 1 mile maps.<br><1> Ordnance Survey, 1871-1882, Ordnance Survey 1st edition 25 inch to 1 mile - Cheshire (Maps and Plans). SCH2462. |

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| Asset/Event Number | 57 |
| Asset/Event Name | Roman Coin from Runcorn |
| Type of Asset/Event | FINDSPOT (AD 3rd Century - 218 AD to 222 AD) |
| Listing No./NRHE Number | |
| HER Number | 7564 |
| Status | Non-designated Heritage Asset |
| Easting | 350000 |
| Northing | 380000 |
| Parish | |
| Council | CHESHIRE |
| Description | Coin of Elagabalus from the Odessus (Thrace) mint found whilst digging house foundations.<br><br><1> Portable Antiquities Scheme, Various, Portable Antiquities Data Import, LVPL793 (Digital Archive). SCH5212.<br>Coin of Elagabalus from the Odessus (Thrace) mint found whilst digging house foundations.<br><2> The British Museum, Portable Antiquities Scheme Online Database, LVPL793 (Web Site). SCH5176. |

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|---|---|
| Asset/Event Number | 58 |
| Asset/Event Name | Roman Road-Chester to Wilderspool (Route 701) |
| Type of Asset/Event | ROAD (Road-major, Roman - 43 AD to 409 AD) |
| Listing No./NRHE Number | |
| HER Number | 2417/1/0 |
| Status | Non-designated Heritage Asset |
| Easting | 351561 |
| Northing | 377179 |
| Parish | |
| Council | CHESHIRE |
| Description | A road was traced north-east from Chester to connect with the northern road through Warrington (Route 701) at the Roman settlement at Wilderspool. Traces of it were found at junction of Birkenhead Road and Parkside Road in Chester. It was then thought to run via Brook Lane to Hoole Bank. It then follows the road to Bridge Trafford where the agger (Roman road embankment) can be seen alongside at a few points. It is likely that a road linked the Legionary fortress with Wilderspool and the river crossing there. While there are convincing |

road lines as far as Bridge Trafford, and from Preston on the Hill to Wilderspool, the intervening terrain is not suited to straight alignments and as such the road there has not been identified.

Road traced north-east from Chester to connect with the northern road through Warrington (Route 70b) at the Roman
settlement at Wilderspool. Traces of it were found at junction of Birkenhead Rd. and Parkside Rd. in Chester. Then thought
to run via Brook La. to Hoole Bank. It then follows the road to Bridge Trafford where the agger can be seen alongside at a
few points (1). It is likely that a road linked the legionary fortress with Wilderspool and the river crossing there. While there
are convincing road lines as far as Bridge Trafford, and from Preston on the Hill to Wilderspool, the intervening terrain is not
suited to straight alignments and as such the road has not been identified (2).
<1> Margary, I. D., 1973, Roman Roads in Britain, /304 -305 1957 (Book). SCH2903.
<2> Harris, B.E. (ed), 1987, Victoria County History - A History of the County of Chester: Volume I, 1/221 1987 (Book).
SCH3556.
<3> Matthews K J, 1999, The creation of landscapes on the edge of the Empire: roads and the landscapes in northwest
Britannia (Article in Monograph). SCH7073.

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|---|---|
| **Asset/Event Number** | 59 |
| **Asset/Event Name** | Union Church, Bridge Lane, Frodsham |
| **Type of Asset/Event** | BAPTIST CHAPEL (AD 19th Century - 1886 AD to 1887 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Locally Listed Building |
| **Easting** | 352740 |
| **Northing** | 378320 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Criterion (B): Buildings Designed by John Douglas<br>No card<br>A former Baptist Church built of red brick in 1886 - 1887 and enlarged between 1912 - 1915. |

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|---|---|
| **Asset/Event Number** | 60 |
| **Asset/Event Name** | Trinity Methodist Church, Main Street, Frodsham |
| **Type of Asset/Event** | METHODIST CHAPEL (AD 19th Century - 1873 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6001 |
| **Status** | Locally Listed Building |
| **Easting** | 352050 |
| **Northing** | 378080 |
| **Parish** | FRODSHAM |

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|---|---|
| **Council** | CHESHIRE |
| **Description** | CRITERION D: BUILDINGS NOTED IN PEVSNER'S "THE BUILDINGS OF ENGLAND - CHESHIRE"<br>No Card<br>1873 by C O Ellison, Late C13 style. A managed ruin with remaining tower. New church premises to rear of old.<br>Pevsner N & Hubbard E, 1971, The Buildings of England: Cheshire: p221<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Pevsner N & Hubbard E, 1971, The Buildings of England: Cheshire (Book). SCH3078. |

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|---|---|
| **Asset/Event Number** | 61 |
| **Asset/Event Name** | Cholmondeley Arms, 12 Church Street |
| **Type of Asset/Event** | INN (AD 19th Century to AD 20th Century - 1891 AD to 1999 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6197 |
| **Status** | Locally Listed Building |
| **Easting** | 351750 |
| **Northing** | 377830 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>The house has 1891 on the front gable and is built of brick. Mock Tudor on the front.<br>It has a gabled roof with thin slates, laid in even courses, and "V" shaped ridge tiles. The windows are wood casements,<br>mullioned and transomed. Downstairs there is some floral patterned leaded glass. The doors have 4 raised panels, the top<br>2 panels have leaded lights.<br>There is a good Inn sign of the Cholmondeley coat of arms.<br>Previously called "Albert Vaults". |

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|---|---|
| **Asset/Event Number** | 62 |
| **Asset/Event Name** | 8 Church Street |
| **Type of Asset/Event** | BUILDING (AD 18th Century to AD 19th Century - 1714 AD to 1837 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6198 |
| **Status** | Locally Listed Building |
| **Easting** | 351740 |
| **Northing** | 377840 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY |

1977 - 79
Two shops in a Georgian building. They have sash windows and projecting voussoirs. Some of the small panes have been
taken out and replaced with larger windows with a ventilator inset.
The rendered shop front doesn't really help the look of the building.
The shop to left in the attached photo is part of the same building but has been altered out of character. Now it has bay
windows with mock pillars and yellow shutters on the upstairs windows, which have had the small panes removed and
replaced with modern style windows.

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|---|---|
| **Asset/Event Number** | 63 |
| **Asset/Event Name** | Warehouse to rear of Ethel Austins, 6 Church Street |
| **Type of Asset/Event** | WAREHOUSE (AD 19th Century - 1800 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6199 |
| **Status** | Locally Listed Building |
| **Easting** | 351730 |
| **Northing** | 377860 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Victorian 3 storey warehouse<br>Three storey Victorian warehouse with beam for pulley assembley at top of gable. Two loading doors.<br>Ventilation slits at top under eaves.<br>Eaves corbelled, quite decorative.<br>Also brick corbelling under exposed rafters on long side of building.<br>Cambered doorhead, stone sills.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 4 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 64 |
| **Asset/Event Name** | No. 3 Church Street |
| **Type of Asset/Event** | BUILDING (AD 19th Century to First World War - 1874 AD to 1918 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6200 |
| **Status** | Locally Listed Building |
| **Easting** | 351760 |
| **Northing** | 377880 |

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|---|---|
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Post 1874<br>Arch window and doorframe - of moulded terracotta brick with drip mouldings.<br>Cart door (arch over)<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 5 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 65 |
| **Asset/Event Name** | 100 Main Street |
| **Type of Asset/Event** | SHOP (AD 19th Century - 1874 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6201 |
| **Status** | Locally Listed Building |
| **Easting** | 351690 |
| **Northing** | 377860 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Post 1874<br>Victorian shop<br>Manweb offices<br>Original shop front. Used possibly tobe a butchers.<br>Barred fanlight (squared) above door. Double doors to shop. Side entrance has semi circular door head. Wood carving to<br>window frame.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 8 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 66 |
| **Asset/Event Name** | 88 Main Street |
| **Type of Asset/Event** | SHOP (AD 18th Century to Second World War - 1700 AD to 1945 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6399 |

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|---|---|
| **Status** | Locally Listed Building |
| **Easting** | 351640 |
| **Northing** | 377820 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Pleasant shop window, possibly original<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 14 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 67 |
| **Asset/Event Name** | Miriam's, 84a Main Street |
| **Type of Asset/Event** | SHOP (AD 19th Century - 1844 AD to 1874 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6400 |
| **Status** | Locally Listed Building |
| **Easting** | |
| **Northing** | |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>GRADE II<br>Between 1844 -1874<br>Of interest but spoilt by large plate glass window set into stone bay.<br>This building has been linked with HB15 and both units came under tha street number of 84 Main Street. Apparently the small<br>shop was once the saddlers shop and the house his residence.<br>F.F. of this building reveals limewashed gable of 84 (Old Manor House) much decorated in parts.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 16 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 68 |
| **Asset/Event Name** | Barn, 78a Main Street |
| **Type of Asset/Event** | BARN (Post Medieval to Second World War - 1540 AD to 1945 AD) |

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|---|---|
| **Listing No./NRHE Number** | |
| **HER Number** | 6401 |
| **Status** | Locally Listed Building |
| **Easting** | 351600 |
| **Northing** | 377790 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Investigated but not thought to be of special interest<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 17 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 69 |
| **Asset/Event Name** | Conservative Club, 74 Main Street |
| **Type of Asset/Event** | POLITICAL CLUB (AD 19th Century - 1891 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6402 |
| **Status** | Locally Listed Building |
| **Easting** | 351580 |
| **Northing** | 377770 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Architect: Samuel Davis<br>Investigated but not thought to be of special interest.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 18 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 70 |
| **Asset/Event Name** | 70 -72 Main Street |
| **Type of Asset/Event** | HOUSE (AD 19th Century - 1874 AD) |
| **Listing No./NRHE Number** | |

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|---|---|
| **HER Number** | |
| **Status** | Locally Listed Building |
| **Easting** | 351570 |
| **Northing** | 377770 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Post 1874<br>Overton Antiques (72)<br>Victorian 2 house unit. I converted to shop. Egg and Dart decoration on terracotta string course. Terrazzo tile below front<br>door.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 19 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 71 |
| **Asset/Event Name** | 68 Main Street |
| **Type of Asset/Event** | FARMHOUSE (Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6404 |
| **Status** | Locally Listed Building |
| **Easting** | 351560 |
| **Northing** | 377760 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Built of stone and timber, this was originally a farmhouse and then a butchers shop.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 20 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 72 |
| **Asset/Event Name** | Drill Hall, Main Street, Frodsham |
| **Type of Asset/Event** | DRILL HALL (First World War - 1914 AD to 1918 AD) |
| **Listing No./NRHE Number** | |

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|---|---|
| **HER Number** | 6405 |
| **Status** | Locally Listed Building |
| **Easting** | 351530 |
| **Northing** | 377730 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Post 1882, possible 1st World War?<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 21 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 73 |
| **Asset/Event Name** | 42 Main Street |
| **Type of Asset/Event** | SHOP (AD 18th Century to AD 19th Century - 1700 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6406 |
| **Status** | Locally Listed Building |
| **Easting** | 351470 |
| **Northing** | 377730 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Pleasant shop front, possibly original<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 24 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 74 |
| **Asset/Event Name** | 2-4 Fountain Lane, Frodsham |
| **Type of Asset/Event** | ESTATE COTTAGE (AD 19th Century - 1844 AD to 1874 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6407 |
| **Status** | Locally Listed Building |

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|---|---|
| **Easting** | 351490 |
| **Northing** | 377680 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Victorian 1844 - 1874<br>Pair of small one-up-one-down cottages.<br>Gardeners cottage for Castle Park Estate (estate cottages for Abbot Wright family)<br>Modern extension to the rear of No2<br>Sandstone garden retaining wall to road.<br>One up one down with side extension to No 4<br>Original door to No 4.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 25 (Paper Archive). SCH5481 |

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|---|---|
| **Asset/Event Number** | 75 |
| **Asset/Event Name** | 26 & 28 Main Street, Frodsham |
| **Type of Asset/Event** | SEMI DETACHED HOUSE (AD 19th Century - 1874 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6408 |
| **Status** | Locally Listed Building |
| **Easting** | 351420 |
| **Northing** | 377690 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Victorian<br>Investigated, but not thought to be of special interest.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 27 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 76 |
| **Asset/Event Name** | 20 Main Street, Frodsham |
| **Type of Asset/Event** | REGISTER OFFICE (AD 19th Century to AD 20th Century - 1874 AD to 1999 AD) |
| **Listing No./NRHE Number** | |

| | |
|---|---|
| **HER Number** | 6409 |
| **Status** | Locally Listed Building |
| **Easting** | 351400 |
| **Northing** | 377670 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Post 1874<br>Not present on 1874 map<br>One time registrar's office.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 28 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 77 |
| **Asset/Event Name** | 14 Main Street, Frodsham |
| **Type of Asset/Event** | TERRACED HOUSE (AD 19th Century - 1874 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6410 |
| **Status** | Locally Listed Building |
| **Easting** | 351390 |
| **Northing** | 377660 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>C19<br>(Not present on 1874 map)<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 29 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 78 |
| **Asset/Event Name** | Methodist Chapel, Main Street, Frodsham |
| **Type of Asset/Event** | METHODIST CHAPEL (AD 19th Century to AD 20th Century - 1874 AD to 1999 AD) |
| **Listing No./NRHE Number** | |

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|---|---|
| HER Number | 6411 |
| Status | Locally Listed Building |
| Easting | 351380 |
| Northing | 377640 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Post 1874<br>Door: triple layer moulded brick.<br>Semi circular<br>Renwed fanlight.<br>Sandstone wall and wrought iron railings on front<br>Slate roof, gabled, close verge.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 30 (Paper Archive). SCH5481. |

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|---|---|
| Asset/Event Number | 79 |
| Asset/Event Name | Cheshire Cheese, 29 Main Street, Frodsham |
| Type of Asset/Event | PUBLIC HOUSE (AD 19th Century - 1844 AD to 1874 AD) |
| Listing No./NRHE Number | |
| HER Number | 6414 |
| Status | Locally Listed Building |
| Easting | 351360 |
| Northing | 377670 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Between 1844 and 1874<br>Symetrical Victorian building.<br>Called 'The Millstone' 1850.<br>Greenall Whitley pub.<br>Blind window under the pub sign. Also hanging pub sign.<br>Fanlight in semi-circular doorhead.<br>Modern flat roofed extension to rear of building.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 35 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 80 |
| **Asset/Event Name** | 31 & 33 Main Street, Frodsham |
| **Type of Asset/Event** | SEMI DETACHED HOUSE (AD 18th Century to First World War - 1700 AD to 1918 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6415 |
| **Status** | Locally Listed Building |
| **Easting** | 351380 |
| **Northing** | 377680 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 36 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 81 |
| **Asset/Event Name** | 1 to 13 Marsh Lane, off Main Street, Frodsham |
| **Type of Asset/Event** | TERRACE (AD 19th Century - 1882 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6416 |
| **Status** | Locally Listed Building |
| **Easting** | 351400 |
| **Northing** | 377750 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>post 1882<br>Investigated, but not thought to be of special interest.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 37 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 82 |

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|---|---|
| **Asset/Event Name** | Moreton Terrace, Marsh Lane, Frodsham |
| **Type of Asset/Event** | TERRACE (AD 19th Century - 1882 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6417 |
| **Status** | Locally Listed Building |
| **Easting** | 351320 |
| **Northing** | 377710 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Post 1882<br>Terrace of Victorian houses with Ruabon string courses and Ruabon fancy brick work in gables. Approximately 10 courses of<br>Ruabon bricks at base of buildings. Rest of brickwork Flemish bond picked out with light yellow/brown headers. Windows<br>sash with fine astragals except Nos 4 and 14 which have modern replacements.<br>Stone steps.<br>Slight projection of chimney from gable end of No 14.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 37 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 83 |
| **Asset/Event Name** | 75 & 77 Main Street, Frodsham |
| **Type of Asset/Event** | HOUSE (AD 19th Century - 1800 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6418 |
| **Status** | Locally Listed Building |
| **Easting** | 351560 |
| **Northing** | 377810 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Brick string course, concealed under pebbledash (no 77) and rendering (no 75).<br>3 light casement windows. Internal beams (boxed and papered over). Owner had discovered wattle and daub in interior, but<br>plastered over it. Possibly lath and plaster.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings |

Survey Index Card,
FRO/HB 42 (Paper Archive). SCH5481.

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|---|---|
| **Asset/Event Number** | 84 |
| **Asset/Event Name** | 91 -99 Main Street |
| **Type of Asset/Event** | TERRACE (AD 19th Century to AD 20th Century - 1874 AD to 1999 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6419 |
| **Status** | Locally Listed Building |
| **Easting** | 351610 |
| **Northing** | 377850 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Post 1874<br>Terrace of Georgian style houses.<br>Houses have been restored and now form a pleasant unpretentious part of street scene.<br>Symmetrical look.<br>Imitation rectangular leaded canes in transome windows - new but in keeping.<br>Doorways have flat canopies, vanity of glass panelling.<br>All door sills, frames etc..... Painted same colour - black.<br>Passageway at left of no 91 (see photo) leading to gardens behind.<br>Modern extension to the rear of 95.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 47 (Paper Archive). SCH5481. |

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| | |
|---|---|
| **Asset/Event Number** | 85 |
| **Asset/Event Name** | 27 High Street |
| **Type of Asset/Event** | HOUSE (AD 19th Century to AD 20th Century - 1874 AD to 1999 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6420 |
| **Status** | Locally Listed Building |
| **Easting** | 351820 |
| **Northing** | 378030 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79 |

Adjoining the George Inn. No 29. similar but new windows.
Panelled door, stone step, near to pavement level.
Projecting string course - brick.
Stone lintels.
Slightly projecting rendered plinth - probably stone.
<1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).
SCH5487.
<2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,
FRO/HB 48 (Paper Archive). SCH5481.

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| | |
|---|---|
| **Asset/Event Number** | 86 |
| **Asset/Event Name** | National Westminster, 117 Main Street |
| **Type of Asset/Event** | BANK (FINANCIAL) (AD 20th Century - 1900 AD to 1999 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6421 |
| **Status** | Locally Listed Building |
| **Easting** | 351670 |
| **Northing** | 377910 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>20th century<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 50 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 87 |
| **Asset/Event Name** | 119 Main Street |
| **Type of Asset/Event** | SHOP (AD 19th Century to First World War - 1800 AD to 1918 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6422 |
| **Status** | Locally Listed Building |
| **Easting** | 351680 |
| **Northing** | 377900 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY |

1977 - 79
Mock Tuder - brick building
Built later than shops to right (In Step and Mr Chips - HB 52). Not very interesting.
<1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).
SCH5487.
<2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,
FRO/HB 51 (Paper Archive). SCH5481.

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|---|---|
| **Asset/Event Number** | 88 |
| **Asset/Event Name** | 119a and 121 Main Street |
| **Type of Asset/Event** | HOUSE (AD 18th Century to First World War - 1700 AD to 1918 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6423 |
| **Status** | Locally Listed Building |
| **Easting** | 351680 |
| **Northing** | 377910 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Two shops in fake fronted stone cottage.<br>Mock tudor front.<br>Rendered stone, probably sandstone. Not immediately visible but thickness of walls is such as to suggest stone underneath<br>rendering.<br>Two dormers with wood finials.<br>Roof has hog's back in it, stone ridge, old quarry slates.<br>Stacks look as if they used to project before saddlery was built on next door.<br>Double doors to Mr Chips, low shop windows, door surrounds rounded, possibly stone now covered with concrete. Guttering<br>addded later - cuts across dormers.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 52 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 89 |
| **Asset/Event Name** | 123 Main Street |
| **Type of Asset/Event** | SHOP (Post Medieval to Second World War - 1540 AD to 1945 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6424 |
| **Status** | Locally Listed Building |

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|---|---|
| **Easting** | 351690 |
| **Northing** | 377910 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>NB Rear is reputed to be brick. Could not visit.<br>Main shop door has square cut pilasters (sunk panelled) and rectangular architrave.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 53 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 90 |
| **Asset/Event Name** | 9 High Street |
| **Type of Asset/Event** | HOUSE (AD 19th Century - 1800 AD to 1840 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6425 |
| **Status** | Locally Listed Building |
| **Easting** | 351750 |
| **Northing** | 377970 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Late Georgian/early Victorian House<br>Fairly plain Georgian type house with evidence of one time use as a shop. Downstairs windows are newer, one has a<br>concrete lintel. Former shop window at right. Concrete render at base of house. Panelled door. Chimney has some indication of water tabling, but may well be simply a decoration.<br>Well worn stone step.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 55 (Paper Archive). SCH5481 |

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|---|---|
| **Asset/Event Number** | 91 |
| **Asset/Event Name** | Red Lion, 17 High Street |
| **Type of Asset/Event** | PUBLIC HOUSE (AD 19th Century to AD 20th Century - 1837 AD to 1901 AD) |
| **Listing No./NRHE Number** | |

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|---|---|
| **HER Number** | 6426 |
| **Status** | Locally Listed Building |
| **Easting** | 351770 |
| **Northing** | 377990 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Victorian public house.<br>Plinth and part of string course in Ruabon brick.<br>Some yellow brick in string course too.<br>Hanging pub sign.<br>Sloping sills.<br>Ornate corbelling under eaves.<br>Diamond pattern brought out on roof by different coloured slates.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 56 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 92 |
| **Asset/Event Name** | Former Police HQ, High Street |
| **Type of Asset/Event** | POLICE STATION (AD 19th Century - 1849 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6427 |
| **Status** | Locally Listed Building |
| **Easting** | 351800 |
| **Northing** | 378020 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79 1849<br>Of historical but not architectural, interest.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 57 (Paper Archive). SCH5481 |

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|---|---|
| **Asset/Event Number** | 93 |
| **Asset/Event Name** | 1 Ship Street |

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|---|---|
| **Type of Asset/Event** | HOUSE (Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6428 |
| **Status** | Locally Listed Building |
| **Easting** | 351780 |
| **Northing** | 378010 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Stone cottage.<br>Admixtures. Back wall brick. Chimneys plastered over - could be stone or brick. Main part of cottage stone, rendered and<br>rusticated.<br>Yorkshire sliding sash window upstairs; three light casement downstairs, centre light opens.<br>Emd wall has projecting dog-leg chimney which terminates 4ft from ground. Three interesting small windows, one with very<br>simple wooden frame, one with simple hood and hinges.<br>Corrugated asbesdos outshut.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 58 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 94 |
| **Asset/Event Name** | 1894 Hall Beside Former Police HQ, Ship Street |
| **Type of Asset/Event** | ASSEMBLY HALL (AD 19th Century - 1894 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6429 |
| **Status** | Locally Listed Building |
| **Easting** | 351790 |
| **Northing** | 378030 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>1894<br>of historical, but not architectural, interest.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 59 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 95 |
| **Asset/Event Name** | Trinity House, High Street |
| **Type of Asset/Event** | VICARAGE (AD 19th Century - 1872 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6430 |
| **Status** | Locally Listed Building |
| **Easting** | 352070 |
| **Northing** | 378100 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>1872<br>Victorian brick house<br>The original vicarage to the church next door which is now partially demolished (the steeple and part of the knave being<br>retained). Five yellow brick string courses. Porch has arched entrance with 3 quatrefoils carved in stone keystone and at<br>sides. This decoration is repeated over the windows and on the gateposts.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 60 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 96 |
| **Asset/Event Name** | Rock Cottage, 52 High Street |
| **Type of Asset/Event** | HOUSE (AD 19th Century - 1825 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6431 |
| **Status** | Locally Listed Building |
| **Easting** | 351990 |
| **Northing** | 378090 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>1825<br>Original labourers cottage with additions.<br>Was originally an agricultural labourers cottage with one room up and one down. Has beenextended greatly but not recently.<br>Floor joists in one part rested on sandstone underneath which was a hollow. When these rotted the hollow was filled with |

concrete with the result that it is now lower than the other floors.
<1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).
SCH5487.
<2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,
FRO/HB 61 (Paper Archive). SCH5481.

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|---|---|
| **Asset/Event Number** | 97 |
| **Asset/Event Name** | George Inn, 25 High Street |
| **Type of Asset/Event** | FARMHOUSE (AD 19th Century - 1844 AD to 1850 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6432 |
| **Status** | Locally Listed Building |
| **Easting** | 351810 |
| **Northing** | 378030 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>1844 - 1850<br>Public House<br>Reference in 1850 directory.<br>Once a farm with land stretching to Ship Street and the marshes. When it became a public house it was owned by a Mrs<br>Gardner, who owned the adjoining terrace of houses.<br>Stone facing at base of building imitates stone plinth. Corrugated plastic covers gable.<br>Hanging pub sign. Panelled door. Possibly once had a fanlight, now filled in.<br>Stables across the yard at the side may well have belonged to pub.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 62 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 98 |
| **Asset/Event Name** | 37 High Street |
| **Type of Asset/Event** | HOUSE (AD 18th Century - 1764 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6433 |
| **Status** | Locally Listed Building |
| **Easting** | 351830 |
| **Northing** | 378050 |
| **Parish** | FRODSHAM |

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|---|---|
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>1764 on down pipe.<br>String course of Flemish Bond on front cottage is 3 courses brick, 1 course of stone block. Brick courses are plastered and<br>painted.<br>Upper floor has 2 3x4 sashes (one above door and one above downstairs window).<br>N0. 35 High Street is pebbledashed on front but reputed to have oak beams, cupboards and skirting boards. Owns shippon to<br>rear of 37 High Street (stone block). Front doors of 35 and 37 High Street are identical to that of 67 High Street. Ie square<br>cut pilasters, square architrave.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 63 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 99 |
| **Asset/Event Name** | The Cottage, Albert Row, off High Street |
| **Type of Asset/Event** | HOUSE (AD 18th Century - 1700 AD to 1799 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6434 |
| **Status** | Locally Listed Building |
| **Easting** | 351820 |
| **Northing** | 378060 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Possibly 18th century<br>Lower face rendered sandstone, upper tier brick added later.<br>Outshut to right of the house added later.<br>Outshut to left of the house and lower tier of house were probably one or two stone cottages.<br>Upper windows cambered, lower square of with Yorkshire sliding sashes.<br>Outshut: old quarry slates, diminishing courses. Old plank door with wooden lintel. Old wooden frame to window but glass<br>now fixed directly into rendering. Rendered but stone doesn't appear to be of as good quality as that on the cottage gable.<br>Used possibly to be an outhouse to original cottage.<br>Whole building possibly linked to 35 and 37 High Street where servants from the Bears Paw used to live - date 1764.<br>Signs of cobbles in yard to left of cottage.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 64 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 100 |
| **Asset/Event Name** | 50 High Street |
| **Type of Asset/Event** | HOUSE (Post Medieval to Second World War - 1540 AD to 1945 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6438 |
| **Status** | Locally Listed Building |
| **Easting** | 351970 |
| **Northing** | 378080 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Plain elegant house. New windows which detract from appearance. Three steps up to front door. Ashlar plinth.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 70 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 101 |
| **Asset/Event Name** | 40 High Street |
| **Type of Asset/Event** | HOUSE (AD 19th Century - 1837 AD to 1850 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6436 |
| **Status** | Locally Listed Building |
| **Easting** | 351860 |
| **Northing** | 378030 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Early Victorian<br>Built on rock sandstone - stone steps and rail to front door.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 68 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 102 |
| **Asset/Event Name** | 23, 30 & 32 High Street |
| **Type of Asset/Event** | CRUCK (Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6437 |
| **Status** | Locally Listed Building |
| **Easting** | 351830 |
| **Northing** | 377990 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Built on a rock sandstone. Stone steps to front door. Original fishermens cottages. Remains of cruck frame in 32. Ceiling<br>beams visible in No 30.<br>Alterations have revealed wattle and daub.<br>Modernisation has not been carried out well and little remains of original buildings. Pebbledash. Bow magnetic wrought iron<br>window boxes. Now open plan stairs in No 32. Slate roofs. Some original sash & casement windows, original plank doors,<br>with fake hinges etc.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 69 (Paper Archive). SCH5481 |

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|---|---|
| **Asset/Event Number** | 103 |
| **Asset/Event Name** | The Knoll, High Street |
| **Type of Asset/Event** | TOWER (AD 19th Century - 1838 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6439 |
| **Status** | Locally Listed Building |
| **Easting** | 351920 |
| **Northing** | 378030 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79 Doctors Surgery Complex with additions. Would appear to have been added to in the early Victorian period.<br>"Folly"tower with good alround views over Frodsham to Helsby. According to the occupants the building has always been a<br>doctors residence. |

Builder same as 'Netherdale' Carriage Drive.
Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card, FRO/HB
71 (Paper Archive). SCH5481.
Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report). SCH5487.

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|---|---|
| **Asset/Event Number** | 104 |
| **Asset/Event Name** | 1 & 1a Bridge Lane |
| **Type of Asset/Event** | HOUSE (AD 19th Century - 1800 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6440 |
| **Status** | Locally Listed Building |
| **Easting** | 352220 |
| **Northing** | 378170 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Early Victorian House<br>Range of outbuildings and pen at rear. Pen could have been a pig pen. Brick with a sandstone top. Condition tatty.<br>Old 2 storey outshut to rear, balanced by similar modern outshut - reverse L shaped.<br>Water barrel (metal).<br>Several small paned windows to house.<br>Now 2 dwellings, originally one. No. 1 in poorer condition than 1a. Internal beams in 1a (no access given to either house).<br>Older window in No. 1. - small paned.<br>Simple moulding on door architrave.<br>Rough shaped sandstone blocks on plinth. Valleys not visible.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 75 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 105 |
| **Asset/Event Name** | East Bank, Bridge Lane |
| **Type of Asset/Event** | HOUSE (AD 19th Century - 1800 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6441 |
| **Status** | Locally Listed Building |
| **Easting** | 352300 |
| **Northing** | 378140 |

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| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>At least 100 years old<br>Late Georgian, early Victorian building<br>Stone and brick bay windows with parapet incorporating porch. Boxed guttering. Corinthian style decoration on pillars.<br>Parapet type of wood cornice at eaves.<br>2 wells in rear yard.<br>Internal shutters.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 76 (Paper Archive). SCH5481. |

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|---|---|
| Asset/Event Number | 106 |
| Asset/Event Name | East Bank Cottage, Bridge Lane |
| Type of Asset/Event | SEMI DETACHED HOUSE (Post Medieval to First World War - 1540 AD to 1918 AD) |
| Listing No./NRHE Number | |
| HER Number | 6442 |
| Status | Locally Listed Building |
| Easting | 352320 |
| Northing | 378150 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Largely rebuilt brick house on an older sandstone base.<br>Apparently two cottages made into one small house.<br>Main interest lies in sandstone base. At east gable end squared blocks with chisel marks visible to 4 feet. Base tapers away<br>until not visible at all at W end. In E gable end (at 3ft high) there is a window in the sandstone wall, now blocked up with<br>bricks and whitewashed over.<br>Lower tier brickwork is English bond, giving way to modern bond just below 1st floor window, giving appearance of house<br>having been rebuilt from there upwards. All windows modern casements with thick astragals and upward opening central<br>light. Swept dormers with cambered lead windows.<br>Probably modern roof in natural slates with newish chimneys (modern bond). New doors.<br>Guttering not continuous, breaks<br>for 4ft below swept dormers.<br>Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card, FRO/HB<br>77 (Paper Archive). SCH5481.<br>Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report). SCH5487. |

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|---|---|
| **Asset/Event Number** | 107 |
| **Asset/Event Name** | 78 High Street |
| **Type of Asset/Event** | TERRACED HOUSE (AD 19th Century - 1800 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Locally Listed Building |
| **Easting** | 352160 |
| **Northing** | 378130 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Plain brick terraced cottage<br>Renaissance type architrave around door.<br>Four steps from street to door. Cellar. Stone ridge tiles on roof and small window in apex of gable.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 78 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 108 |
| **Asset/Event Name** | 26 Ship Street |
| **Type of Asset/Event** | TERRACED HOUSE (AD 19th Century - 1847 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6444 |
| **Status** | Locally Listed Building |
| **Easting** | 351810 |
| **Northing** | 378140 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Datestone 1847<br>September 1978. Much altered. Rendered and painted white, new windows. Remaining half of terrace unaltered.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card, |

FRO/HB 80 (Paper Archive). SCH5481.

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|---|---|
| **Asset/Event Number** | 109 |
| **Asset/Event Name** | 30 & 32 Ship Street |
| **Type of Asset/Event** | TERRACED HOUSE (AD 19th Century to AD 20th Century - 1847 AD to 1978 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6445 |
| **Status** | Locally Listed Building |
| **Easting** | 351820 |
| **Northing** | 378140 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79 Datestone 1847<br>Bult between 1844 (tithe map) and 1874 (J Higson's Survey)<br>September 1978. Much altered. Rendered and painted white, new windows. Remaining half of terrace unaltered.<br>Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card, FRO/HB<br>81 (Paper Archive). SCH5481.<br>Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report). SCH5487. |

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|---|---|
| **Asset/Event Number** | 110 |
| **Asset/Event Name** | Pin Mill Brow House, Howey Lane |
| **Type of Asset/Event** | HOUSE (AD 18th Century - 1700 AD to 1750 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6447 |
| **Status** | Locally Listed Building |
| **Easting** | 351830 |
| **Northing** | 377360 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79 (1)<br>Early C18<br>Cottage with barn attached<br>'Long house' type with stabling/shippon at one end, but with no access from house itself. Beams throughout. Boxed stairs with door. Cellar entered from kitchen, now blocked up and filled with rubble. Kitchen and<br>bedroom above added on in c. 1901. Two chimney stacks, thatin sitting room to the right of main door projects approx. 2<br>1/2ft into room. Some plank doors. |

Outbuildings plastered with horsehair, lime and dung mixture (inside).
House derives its name from cottage industry carried out there using water power from stream in back garden (now
culverted). Wire from Warrington was sent out to be made into pins. After this industry had declined the cottage became a
smallholding. No remains of the pin mill machinery have been found by the present occupants.(2)
<1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).SCH5487.
<2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,
FRO/HB 85 (Paper Archive). SCH5481.

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| | |
|---|---|
| **Asset/Event Number** | 111 |
| **Asset/Event Name** | Netherton Farm, Mattys Lane, Netherton |
| **Type of Asset/Event** | FARMHOUSE (Post Medieval to Second World War - 1540 AD to 1945 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6449 |
| **Status** | Locally Listed Building |
| **Easting** | 351150 |
| **Northing** | 377100 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Large farmhouse with extensions probably dating from different periods.<br>Some old stone or quarry slates in diminishing courses. Main part of building has recently been reroofed, but partly using old<br>slates. New ridge tiles.<br>Some old beams<br>Sandstone, rendered.<br>Walls are fairly thick, judging by the window recesses.<br>Windows fairly new but in character.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 92 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 112 |
| **Asset/Event Name** | Netherton Hall, Netherton |
| **Type of Asset/Event** | HOUSE (AD 18th Century to AD 19th Century - 1700 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6450 |
| **Status** | Locally Listed Building |

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|---|---|
| Easting | 351220 |
| Northing | 377050 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>A large Georgian house with outbuildings<br>It is built onto a stone base and there is a stone ridge to the roof. There are old wooden beams, cambered heads to the<br>windows and there is one deep arched window at rear. The front door has a semi circular fanlight and it has an original<br>panelled door. Some of the other doors have been bricked in.<br>There is a rendered extension at the side.<br>Outbuildings<br>Originally sandstone farm buildings, these are now mainly brick but have traces of older walls. Stone ridges to the roofs.<br>Pitch holes with stone surrounds and rope marks. A door at one end has stone lintel, also a window at the side.<br>Old stalls, beams, stone steps, invaded by greenery.<br>NB Outbuilding in photo was at one time used as chapel (information from A. Plinston)<br>Once owned by Lord Cholmondeley. |

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|---|---|
| Asset/Event Number | 113 |
| Asset/Event Name | Marsh Green Cottages, Marsh Lane |
| Type of Asset/Event | FARMHOUSE (AD 18th Century to AD 19th Century - 1700 AD to 1899 AD) |
| Listing No./NRHE Number | |
| HER Number | 6452 |
| Status | Locally Listed Building |
| Easting | 351160 |
| Northing | 377790 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Early C19? Possibly earlier.<br>Group of three cottages, formerly one farmhouse.<br>Farmhouse with dairy at one end, now converted into a cottage. Internal beams throughout. Modernoutshuts at both ends.<br>New casement windows. Rendered and rusticated. Painted white. Middle cottage has modern 'bow' window.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 96 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 114 |
| **Asset/Event Name** | National School, Church Street |
| **Type of Asset/Event** | NATIONAL SCHOOL (AD 19th Century - 1835 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6453 |
| **Status** | Locally Listed Building |
| **Easting** | 351780 |
| **Northing** | 377770 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>1835<br>Former National School.<br>Dressed stone at base, with stone architraves and labels.<br>Fancy bargeboard.<br>Outshut with entrance at side.<br>Windows a combination of types. 3 panes wide, 4 panes high. Top and bottom parts of window swivel, middle 2 rows form a<br>sash window.<br>Separate schoolroom at rear, of later Victorian appearance, possibly an infant school. Now used as tyre depot. (5.10.78<br>Confirmed by A Plimston, this was the infant school)<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 98 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 115 |
| **Asset/Event Name** | Kydd's Wine Bar, Church Street |
| **Type of Asset/Event** | SHOP (AD 19th Century to AD 20th Century - 1837 AD to 1901 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6454 |
| **Status** | Locally Listed Building |
| **Easting** | 351790 |
| **Northing** | 377760 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>One of 4 Victorian shops in terrace. Accomodation above.<br>Narrow mullioned sash windows.<br>Shop fronts well preserved exept for one. Brackets under slight canopy.<br>Original square drainpipes. |

Attractive door with canopy to first storey at side as if this were a storage space. Provision for pulley system.
One terracotta finial.
Receded corner in patterned brick.
Recessed entrances
Outshuts with tall chimneys.
<1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).
SCH5487.
<2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,
FRO/HB 99 (Paper Archive). SCH5481.

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|---|---|
| **Asset/Event Number** | 116 |
| **Asset/Event Name** | Drovers Arms, Church Street |
| **Type of Asset/Event** | PUBLIC HOUSE (AD 19th Century to AD 20th Century - 1800 AD to 1999 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6455 |
| **Status** | Locally Listed Building |
| **Easting** | 351840 |
| **Northing** | 377770 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Long brick building with Victorian facade on gable facing road.<br>Gable: terracotta brick decorations round mullion windows and door. Also terracotta brick quoins and corbelling under the<br>eaves. Provision for hanging sign. Ventilation holes.<br>Stone window heads.<br>Side walls inferior, possibly older as if facade had been rebuilt. Windows sloping, of uneven height above ground? Tall<br>ornamental chimneys. Yorkshire sliding sashes.<br>Stone steps.<br>Cellar<br>Iron hook on pavement - use not obvious.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 100 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 117 |
| **Asset/Event Name** | Rose Cottage, Ship Street |
| **Type of Asset/Event** | SEMI DETACHED HOUSE (AD 18th Century to AD 20th Century - 1784 AD to 1978 AD) |
| **Listing No./NRHE Number** | |

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|---|---|
| HER Number | 6456 |
| Status | Locally Listed Building |
| Easting | 351880 |
| Northing | 378250 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>1784<br>Plaque on wall - 1784 H.W.E<br>Georgian cottages now one house<br>Modern porch on side. Door on front blocked in - cambered head - x 2.<br>Chimney breast projects from side wall.<br>Modern outshut.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 101 (Paper Archive). SCH5481. |

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|---|---|
| Asset/Event Number | 118 |
| Asset/Event Name | Hatley Farm, Dig Lane |
| Type of Asset/Event | FARMHOUSE (AD 19th Century - 1850 AD) |
| Listing No./NRHE Number | |
| HER Number | 6457 |
| Status | Locally Listed Building |
| Easting | 350890 |
| Northing | 377070 |
| Parish | FRODSHAM |
| Council | CHESHIRE |
| Description | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>1850?<br>Mid Victorian Farmhouse<br>Possibly built on site of older building. Stone base, cobbled yard, stone ridge on roof. Farm buildings partly sandstone.<br>Windows at front replaced. Windows at rear have fairly thin glazing bars. Rusticated stone srchitrave and square fanlight at<br>front door. Stone heads to windows at front only.<br>No internal beams.<br>Possible connection with nearby railway. Appearance similar to many 'railway houses'.<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>FRO/HB 102 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 119 |
| **Asset/Event Name** | Aston Arms, Mill Lane, off Chester Road |
| **Type of Asset/Event** | PUBLIC HOUSE (Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6815 |
| **Status** | Locally Listed Building |
| **Easting** | 353030 |
| **Northing** | 378540 |
| **Parish** | SUTTON |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>SUT/HB 2 (Paper Archive). SCH5481. |

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|---|---|
| **Asset/Event Number** | 120 |
| **Asset/Event Name** | A56 Swing Bridge over River Weaver |
| **Type of Asset/Event** | SWING BRIDGE (AD 20th Century - 1900 AD to 1999 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6817 |
| **Status** | Locally Listed Building |
| **Easting** | 353480 |
| **Northing** | 378870 |
| **Parish** | SUTTON |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487.<br><2> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,<br>SUT/HB 14 (Paper Archive). SCH5481 |

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|---|---|
| **Asset/Event Number** | 121 |

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|---|---|
| **Asset/Event Name** | Telephone Kiosk, Main Street (north side) Frodsham |
| **Type of Asset/Event** | TELEPHONE BOX (AD 20th Century - 1935 AD to 1968 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6922 |
| **Status** | Locally Listed Building |
| **Easting** | 351630 |
| **Northing** | 377850 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION F: NON-LISTED RED K6 TELEPHONE KIOSKS In the pavement at the back of the kerb and adjacent to a listed<br>K6 kiosk outside No 101<br>Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report). SCH5487 |

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|---|---|
| **Asset/Event Number** | 122 |
| **Asset/Event Name** | Telephone Kiosk, Main Street (south side) |
| **Type of Asset/Event** | TELEPHONE BOX (AD 20th Century - 1935 AD to 1968 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6923 |
| **Status** | Locally Listed Building |
| **Easting** | 351520 |
| **Northing** | 377750 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION F: NON-LISTED RED K6 TELEPHONE KIOSKS In the pavement adjacent to the wall of No. 52.<br>Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report). SCH5487 |

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|---|---|
| **Asset/Event Number** | 123 |
| **Asset/Event Name** | Telephone Kiosk off Chester Road, Netherton |
| **Type of Asset/Event** | TELEPHONE BOX (AD 20th Century - 1935 AD to 1968 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6924 |
| **Status** | Locally Listed Building |
| **Easting** | 351270 |
| **Northing** | 377040 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |

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|---|---|
| **Description** | CRITERION F: NON-LISTED RED K6 TELEPHONE KIOSKS In the grass verge between Chester Road (A56) and Howey Lane.<br>Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report). SCH5487 |

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|---|---|
| **Asset/Event Number** | 124 |
| **Asset/Event Name** | Telephone Kiosk, Ship Street |
| **Type of Asset/Event** | TELEPHONE BOX (AD 20th Century - 1935 AD to 1968 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 6926 |
| **Status** | Locally Listed Building |
| **Easting** | 351950 |
| **Northing** | 378320 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION F: NON-LISTED RED K6 TELEPHONE KIOSKS In the boundary between Nos. 84 and 86 Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report). SCH5487 |

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| | |
|---|---|
| **Asset/Event Number** | 125 |
| **Asset/Event Name** | Millstone House, 43 Main Street, Frodsham |
| **Type of Asset/Event** | HOUSE (Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | MCH18055 |
| **Status** | Locally Listed Building |
| **Easting** | 351410 |
| **Northing** | 377710 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Criterion ( C )<br>Buildings formerly listed at grade III which are no longer on the statutory list<br>No card<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487. |

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|---|---|
| **Asset/Event Number** | 126 |
| **Asset/Event Name** | Outbuildings, Queen's Head, 94 Main Street |
| **Type of Asset/Event** | OUTBUILDING (AD 17th Century - 1600 AD to 1699 AD) |
| **Listing No./NRHE Number** | |

| | |
|---|---|
| **HER Number** | 6970 |
| **Status** | Locally Listed Building |
| **Easting** | 351670 |
| **Northing** | 377810 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | CRITERION E: BUILDINGS INCLUDED IN THE VALE ROYAL BOROUGH COUNCIL HISTORIC BUILDINGS SURVEY<br>1977 - 79<br>Mapping addedd 20/02/2013<br>No card.<br>Cannot identify<br><1> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).<br>SCH5487. |

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|---|---|
| **Asset/Event Number** | 127 |
| **Asset/Event Name** | Birkenhead and Chester Line (L & NWR/GWR) |
| **Type of Asset/Event** | RAILWAY (AD 19th Century to AD 21st Century - 1840 AD to 2050 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 2527/1/0 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 350826 |
| **Northing** | 377204 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | The Birkenhead and Chester railway incorporates two separate lines; the first ran from Birkenhead south to Chester and was<br>incorporated in 1838 by Act of Parliament, opening in 1840 initially to an ad hoc station at Brook Lodge and later to Chester<br>General Station. The second line ran from Chester north east to Warrington, originally owned by the Birkenhead, Lancashire<br>and Cheshire Junction Railway, it opened in 1850.<br>In 1859 the two lines merged to become the Birkenhead Railway, running from Birkenhead to Chester and then on to<br>Warrington. In 1860 it became a joint railway, operated by both the London and North Western Railway Company and the<br>Great Western Railway Company. The line originally ran to Flookersbrook where a number of cottages were used as a<br>temporary station until 1840 when Chester General Station was built. (1)<br><1> Norton P A, 1984, Railways and Waterways to Warrington (Book). SCH2793.<br><2> Ordnance Survey, 1871-1882, Ordnance Survey 1st edition 25 inch to 1 mile - Cheshire (Maps and Plans). SCH2462.<br><3> Harris, B.E. (ed), 1987, Victoria County History - A History of the County of Chester: Volume I (Book). SCH3556.<br><4> Bolger. P., 1984, An illustrated history of the Cheshire Lines Committee, p23 (Book). SCH6823. |

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|---|---|
| **Asset/Event Number** | 128 |
| **Asset/Event Name** | Primative Methodist Chapel and Mission Church, |
| **Type of Asset/Event** | MISSION CHURCH (AD 18th Century to AD 19th Century - 1700 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 7479 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352910 |
| **Northing** | 378350 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | The site of a Primative Methodist Chapel and Mission Church. Demolished |

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|---|---|
| **Asset/Event Number** | 129 |
| **Asset/Event Name** | Primitive Methodist Chapel in Clifton |
| **Type of Asset/Event** | METHODIST CHAPEL (AD 19th Century - 1800 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 7490 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352630 |
| **Northing** | 379910 |
| **Parish** | RUNCORN & WIDNES |
| **Council** | CHESHIRE |
| **Description** | Primitive Methodist Chapel in Clifton |

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| | |
|---|---|
| **Asset/Event Number** | 130 |
| **Asset/Event Name** | Windmill (?) associated with Frodsham Saltworks |
| **Type of Asset/Event** | WINDMILL (Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 7801 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352630 |
| **Northing** | 378860 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | A desk-based assessment was undertaken in 1993 at the site of Frodsham Saltworks in advance of a residential<br>development. This identified a windmill recorded at the site of the saltworks by the River Weaver on Greenwood's map of<br>1819. Also field names ('Tween Mills') on the Frodsham Tithe Award indicate the existance of a |

mill or mills in this location. It
is suggested that this mill or mills could have been for drainage purposes rather than grinding of corn.
<1> Chester Archaeology, 1993, Saltworks Farm, Frodsham: Desk-based Assessment, September 1993, R2052, p.8
(Client Report). SCH4139.

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|---|---|
| **Asset/Event Number** | 131 |
| **Asset/Event Name** | Probable Post Medieval Flood Defence, East of |
| **Type of Asset/Event** | FLOOD DEFENCES (Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | MCH23952; 7915 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 350260 |
| **Northing** | 379060 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | <1> L - P Archaeology, 2015, Archaeological Monitoring of Frodsham Wind Farm (Client Report). SCH8202.<br>A programme of archaeological monitoring was carried out during groundworks associated with the development of<br>Frodsham Wind Farm, Helsby, in April 2015. A desk based survey undertaken for the project in 2010 had identified an<br>earthwork recorded on historic maps to the east of Frodsham Marsh Farm. This was visited in 2015, it is readily visible and<br>forms a landmark in the area. It was interpreted as a probable Post Medieval flood defence constructed of imported material<br>and dredged silts from the canalised areas. |

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|---|---|
| **Asset/Event Number** | 132 |
| **Asset/Event Name** | The Manchester Ship Canal |
| **Type of Asset/Event** | SHIP CANAL (AD 19th Century - 1887 AD to 1894 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 14208 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 349688 |
| **Northing** | 379209 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | <1> Ashmore, O, 1982, The Industrial Archaeology of North West England, P.21 (Book). SCH3181.<br>The idea of a manchester ship canal goes back in origin to the 1820s or earlier, but was revived in the late 1870's when<br>Manchester business men feared a permanent trade recession ans were concerned about the cost of trading through |

Liverpool Docks
Following the passing of the Manchester Ship Canal Act in 1885, the 25 and and half mile (57km) canal was built between
1887 and 1894, enabling sea going vessesl to come up from eastham to the new docks at Salford and making Manchester
into a major port. Apart from the work on the main cut and locks, the construction involved the building of major railway
deviation bridges and swing bridges on the main road crossings
<2> Nevell, M & George, D, 2014, A Guide to the Industrial Archaeology of Cheshire, p.2 (Book). SCH8021.
p.3 The Manchester Ship Canal opened in 1894 from Salford to Eastham locks northwest of Ellesmere Port. Transformed
Manchester into an inland port. Also helped boost chemical production along its lower reaches between Ellesmere Port and
Warrington
p.53 It canalised the course off the River Mersey from Warrington to Carrington and then the River Irwell to Manchester. West
of Runcorn the ship canal is divided from the estuary by a long embankment to its sea exit at Eastham locks. The opening of
the canal marked the end of the ports at the Runcorn terminus of the Bridgewater canal and at Warrington. It also cut off
Ellesmere Ports direct access to the Mersey Estuary.
<3> Historic England, 2017, Canal and River Navigations National Overview., Part 2. p.207-208 (Report). SCH8424.
One of the heroic feats of Victorian engineering, the Manchester Ship Canal built under an Act of 1885 had a difficult
gestation and cost more than twice its original estimate. It had to acquire the Bridgewater Navigation to be supplied by water
from the River Irwell and build numerous high level rail bridges and swing road bridges and the Barton Swing Aqueduct to
carry the Bridgewater Canal over the Ship Canal. Engineered by Leader Williams, it opened in 1894 and deadweight ships of
12,500 tons could now reach the extensive new docks at Salford and Manchester.
Most of the immense engineering works are of considerable significance as examples of very fine large scale Victorian
construction.
The River Mersey and the Ship Canal are spanned by several notable railway and road bridges including those at Runcorn
and Warrington.

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|---|---|
| **Asset/Event Number** | 133 |
| **Asset/Event Name** | Methodist Victoria Hall |
| **Type of Asset/Event** | WESLEYAN METHODIST CHAPEL (AD 19th Century - 1814 AD? to 1874 AD?) |
| **Listing No./NRHE Number** | |
| **HER Number** | 14312 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352160 |
| **Northing** | 378080 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Former early nineteenth century Methodist chapel and Sunday school.<br><br><1> See map for surveyor, c.1837-51, Cheshire Tithe Maps and Awards, EDT 162/2 c.1846 |

(Maps and Plans). SCH3266.
The plot is described as a homestead in the ownership of the Trustees of Methodist Chapel and cottages.
<2> Ordnance Survey, 1871-1882, Ordnance Survey 1st edition 25 inch to 1 mile - Cheshire, SJ5278, 1874-1875 (Maps
and Plans). SCH2462.
The building is labelled as a Wesleyan Methodist Chapel (Disused). Fluin Lane is labelled Chapel Lane.
<3> Ordnance Survey, 1896-1898, Ordnance Survey 2nd edition 25 inch to 1 mile - Cheshire, SJ5278, 1898-1899 (Maps
and Plans). SCH3848.
Depicts a Sunday School.
<4> Various, Various, Oral communication to the HER, Edwards R, 17/08/2018 (Oral Communication). SCH2330.
The building is still extant, but has been converted to another use. The street (east) elevation has a large roller door opening
inserted. Any flanking ground floor windows have been removed, but the tall rounded top windows of the first floor survive,
though bricked up. The southern elevation has been rendered for ¾ of its length. A line of four tall rounded top windows are
evident on the first floor (also bricked up) and one and a half on the ground floor. To the rear (west) is an unsympathetic two
and a half storey extension with a sloped roof. A one and a half storey extension occupies half the length of the southern
elevation and extends further west than the chapel building. A (fake?) parapet contains a name stone: Victoria Hall.
<5> Main Street Community Church, Main Street Community Church, Frodsham, 17/08/2018 (Web Site). SCH8516.
1814, Methodist Victoria Hall opened on Fluin Lane.
<6> Ordnance Survey, Ordnance Survey Land Line and Master Map Vector Maps, 17/08/2018 (Maps and Plans).
SCH4491.

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|---|---|
| **Asset/Event Number** | 134 |
| **Asset/Event Name** | Post Medieval Fire Pit, North of Main Street, |
| **Type of Asset/Event** | FIRE PIT (Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 14994 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351350 |
| **Northing** | 377660 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Post Medieval Fire Pit, North of Main Street, Frodsham; recorded during an archaeological evaluation in 2019 in advance of<br>the area being re-developed for residential purposes. The fire pit represents the sole remains of a row of post medieval<br>houses fronting onto Main Street.<br><br><1> Aeon Archaeology, 2019, The Cheshire Cheese PH, 29 Main Street, Frodsham, Cheshire, WA6 7AZ: Archaeological<br>Evaluation, R4343 (Client Report). SCH8750.<br>An archaeological excavation was undertaken in 2019 on land to the west of The Cheshire |

Cheese Public House (29, Main
Street) in advance of the area being re-developed for residential purposes, including the conversion and refurbishment of the
public house itself.
The archaeological evaluation identified a single feature at the site; a square, brick-built ash pit pertaining to a fireplace.
Although no associated archaeological remains were uncovered it is almost certain that the fire pit belonged to one of the
post medieval houses depicted on the 1846 Tithe Map as fronting on to Main Street and was the only structural element to
have survived a phase of demolition at the site. The survival of the ash pit is due to it having been cut into the natural glacial
substrata and thus situated at a lower depth to the associated house structure. The use of ash pits were common throughout
the post-medieval period and functioned partly as a flue bringing air into the fire base, but also as a pit to collect the
associated ash. These required regular emptying so that the fire would draw as efficiently as possible. Covering the fire pit
was a large spread of wire-cut, unfrogged red bricks and black fly ash which were employed to level the area in advance of it
being utilised as a car park. The wire-cut nature of the bricks suggests an origin somewhere near the beginning of the 20th
century but the presence of modern plastic within the matrix of the bricks suggests that they were deposited within the last
forty years.
Five individual artefacts were recovered during the excavation phase; two examples of clay pipe stems, a single sherd of
Victorian blue transfer ware and two examples of Annular ware.

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| **Asset/Event Number** | 135 |
| **Asset/Event Name** | Roman coin |
| **Type of Asset/Event** | FINDSPOT (Roman - 43 AD to 409 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 112 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 350560 |
| **Northing** | 380580 |
| **Parish** | RUNCORN & WIDNES |
| **Council** | CHESHIRE |
| **Description** | Roman Coin, Constantine "Providentia Augg" type, found by local school boy just below turf. Site may not be considered certain (1).<br><1> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ58SW7 (Index). SCH2487.<br><2> Longley D, various, Longley Archive, /no.295 (Paper Archive). SCH2005. |

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|---|---|
| **Asset/Event Number** | 136 |
| **Asset/Event Name** | Bronze Age inhumation & pottery vessel |
| **Type of Asset/Event** | FUNERARY SITE (Burial site, (?) Bronze Age - 2600 BC to 801 BC) |

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| **Listing No./NRHE Number** | |
| **HER Number** | 115 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352000 |
| **Northing** | 380000 |
| **Parish** | RUNCORN & WIDNES |
| **Council** | CHESHIRE |
| **Description** | A possible inhumation and incised pygmy cup was reported as being found at Clifton (1).<br><1> Cheshire County Council, 1974, County Treasures Record, 2/AR 030 1979 (Y) (Index). SCH1000.<br><2> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, 1980 SJ58SW18 (Index). SCH2487.<br><3> Longley D, various, Longley Archive, /no.87 (Paper Archive). SCH2005 |

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|---|---|
| **Asset/Event Number** | 137 |
| **Asset/Event Name** | Great and Little Mill Fields, Clifton |
| **Type of Asset/Event** | WATERMILL ((?) Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 124 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351900 |
| **Northing** | 380500 |
| **Parish** | RUNCORN & WIDNES |
| **Council** | CHESHIRE |
| **Description** | Placenames on the Tithe Award Map and in the Cholmondeley records suggest a watermill site (1).<br><1> Cheshire History, 14/34 Bott O J P 1984 (Journal/Periodical). SCH811. |

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|---|---|
| **Asset/Event Number** | 138 |
| **Asset/Event Name** | Clifton Village |
| **Type of Asset/Event** | SHRUNKEN VILLAGE (Shrunk/Shifted Village, Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 106/0 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352400 |
| **Northing** | 380200 |
| **Parish** | RUNCORN & WIDNES |
| **Council** | CHESHIRE |
| **Description** | Clifton Village appears in the Domesday Book and there are frequent references to it throughout the medieval period.<br>Medieval and later villages were abandoned by their inhabitants for many reasons. The effects |

of disease and poor harvests
made rural living difficult, and whole communities are thought to have relocated to urban settlements. Landowners
sometimes relocated settlements for aesthetic reasons and for landscaping. Once abandoned the villages quickly became
derelict and were not inhabited again surviving only as earthworks, often visible only from aerial photographs. They can also
be identified by documentary evidence or the presence of a church where there is no settlement.

<1> Dodgson J McN, 1970-2, 1981, The Place-Names of Cheshire, 2/164 (Y) (Book). SCH3228.
<1> Dodgson J McN, 1970-2, 1981, The Place-Names of Cheshire, vol .II p.164 (Book). SCH3228.
<2> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ58SW17 (Index). SCH2487.

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|---|---|
| **Asset/Event Number** | 139 |
| **Asset/Event Name** | Weston Village |
| **Type of Asset/Event** | SHRUNKEN VILLAGE (Shrunk/Shifted Village, Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 107/0 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 350870 |
| **Northing** | 380420 |
| **Parish** | RUNCORN & WIDNES |
| **Council** | CHESHIRE |
| **Description** | Weston Village was mentioned in Domesday and there are frequent references since. It is now swamped by modern<br>development but retains several important post-medieval buildings. A shrunken village is a settlement that shows evidence of<br>earlier houses that have not been re-inhabited.<br><br>Weston Village. Mentioned in Domesday and frequent references since (1). Now swamped by modern development but<br>retaining several important post- medieval buildings.<br><1> Dodgson J McN, 1970-2, 1981, The Place-Names of Cheshire, 2/182 (Y) (Book). SCH3228.<br><1> Dodgson J McN, 1970-2, 1981, The Place-Names of Cheshire, vol .II p.182 (Book). SCH3228. |

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|---|---|
| **Asset/Event Number** | 140 |
| **Asset/Event Name** | Clifton Park, Rock Savage Park |
| **Type of Asset/Event** | DEER PARK (Medieval - 1066 AD? to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 106/2 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352660 |
| **Northing** | 380110 |
| **Parish** | RUNCORN & WIDNES |

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| **Council** | CHESHIRE |
| **Description** | Deer Park associated with the mansion at Rock Savage and probably with the earlier Clifton Hall. Mentioned in Inquisition<br>Post Mortem of Thomas Savage 1636. Long disparked (1). Numbers of references to this park occur in the Cholmondeley<br>papers, Cheshire Record Office. Shown on Speed's map of 1611 (4).<br><1> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ58SW16 (Index). SCH2487.<br><2> Lancashire & Cheshire Antiquarian Society, 1883 -, Transactions of the Lancashire & Cheshire Antiquarian Society,<br>20/27 Harrison W 1902 (Journal/Periodical). SCH3293.<br><3> Shirley, E P, 1867, Some account of English deer parks, with notes on the management of deer, /206 (Book).<br>SCH1108.<br><4> Various, Various, Oral communication to the HER, Turner R C (Oral Communication).<br>SCH2330. |

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|---|---|
| **Asset/Event Number** | 141 |
| **Asset/Event Name** | Frodsham Court House |
| **Type of Asset/Event** | COURT HOUSE (Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/0/14 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351670 |
| **Northing** | 377870 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Work on the Court House at Frodsham had been under way since the 1620s. In the late 17th century one corner was built.<br>The other corners were leased as shops (1).<br><1> Thomspon, P, 1980, Frodsham: The Archaeological Potential of a Town, /5 (Report).<br>SCH1251. |

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|---|---|
| **Asset/Event Number** | 142 |
| **Asset/Event Name** | Frodsham |
| **Type of Asset/Event** | TOWN (Borough, Early Medieval - 410 AD? to 1065 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/0/0 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351600 |
| **Northing** | 377800 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | A non-defensive settlement developed at Frodsham in the Saxon period, traces of which survive in the name of Frodsham |

itself (Frotes-ham) and in fragments of possible Saxon sculpture in the church. Domesday describes an area of three hides
paying tax, with land for nine ploughs. Of the nine ploughs, two were held by the Manor in Lordship and two by eight
villagers and three smallholders. The settlement also supported a priest and a church. In 1066 the Manor belonged to Earl
Edwin and was valued at eight pounds, although by 1086 it had fallen to four pounds, having in part been laid waste by
William I. In 1071 Frodsham was incorporated in the Norman Earldom of Chester and a charter of 1093 granted tithes from
the church to St Werburgh's Abbey, Chester. In the 1280s these were transferred to Vale Royal Abbey. The borough charter
was granted by the Earl between 1209 and 1228, referring free burgages, each with an acre of land, upon the town. In 1280,
110 burgages are recorded in Frodsham although half of these were void by 1351. During the 13th and 14th centuries about
20 different trades and occupations are mentioned, although agriculture remained an essential occupation. Frodsham
developed as a port until the Weaver Navigation allowed ships further upstream, from 1721. The medieval Manor levied
revenue from the profits of this trade and from markets and fairs held in the town. A small dockyard developed on the west
bank of the Weaver, reaching its peak during the Napoleonic Wars. Also in the 18th century a salt refinery was established
on the Weaver. The medieval town was probably concentrated between Marsh Lane and the Rock and up Church Street as
far as London Road. The Castle (RN: 984/1) with ancillary buildings was situated on land at the west end of the town and the
church (RN: 988/1) on the hill at Overton. The medieval high street was originally further south than the present street. Main
Street and High Street now have a frontage of 17th and 18th century buildings replacing earlier buildings. Frodsham
Lordship consisted of the villages of Overton, Bradley, Netherton and Woodhouses (1).
<1> Thomspon, P, 1980, Frodsham: The Archaeological Potential of a Town, /2-5 (Report). SCH1251.
<2> Frodsham Local History Group, 1985, Discovering Old Frodsham, /4 (Monograph). SCH1051.
<3> Higham N J, 1984-9, Professor Nick Higham's Aerial Photographs, 1986/1/21 & 1986/1/23, 01/08/1986 (Aerial
Photograph). SCH7659.

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| **Asset/Event Number** | 143 |
| **Asset/Event Name** | Frodsham parish bridge |
| **Type of Asset/Event** | BRIDGE (Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 987 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 353000 |
| **Northing** | 378450 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Frodsham parish bridge at east end of the town dates from the reign of Henry III. The original bridge was of wood. In 4 Henry |

V, John Done, forester of Delamere was requested to give one oak for the repairs of Frodsham bridge. The bridge was
rebuilt in brick in the reign of Elizabeth I. In 1625 it was rebuilt in stone & consisted of 4 arches. This was taken down many
years ago to make way for the present structure (1).
<1> Ormerod, G., 1882, The History of the County Palatine and City of Chester, 2/53 (Y) (Book). SCH1389.

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|---|---|
| **Asset/Event Number** | 144 |
| **Asset/Event Name** | Prehistoric flint scrapers, Frodsham |
| **Type of Asset/Event** | FINDSPOT (Flints 2 of, Neolithic - 4000 BC to 2601 BC) |
| **Listing No./NRHE Number** | |
| **HER Number** | 964 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352700 |
| **Northing** | 378000 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Two scrapers, probably Neolithic, were found off Townfield Lane (1).<br><1> County Historic Environment Record, 1973-1985, Cheshire Archaeological Bulletin, 3/59 Jarworzyn J 1975<br>(Journal/Periodical). SCH565.<br><2> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, 1980 SJ57NW24 (Index). SCH2487.<br><3> Longley D, various, Longley Archive, /no.429 (Paper Archive). SCH2005 |

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|---|---|
| **Asset/Event Number** | 145 |
| **Asset/Event Name** | Coin findspot in Frodsham |
| **Type of Asset/Event** | FINDSPOT (Undated) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/0/18 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352100 |
| **Northing** | 378200 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | A silver groat of Mary I, found at 5 Belvedere Close, Frodsham (1).<br><1> County Historic Environment Record, 1973-1985, Cheshire Archaeological Bulletin, 6.82 LLoyd Morgan G 1978<br>(Journal/Periodical). SCH565. |

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| **Asset/Event Number** | 146 |

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|---|---|
| **Asset/Event Name** | Roman Coins from Frodsham |
| **Type of Asset/Event** | FINDSPOT (Roman - 43 AD to 409 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 974 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352150 |
| **Northing** | 378100 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Two Roman coins found in Frodsham. The obverse reads N CAESAR AUG, while the reverse is badly corroded (1).<br><1> County Historic Environment Record, 1973-1985, Cheshire Archaeological Bulletin, 3/60 Petch D F 1975<br>(Journal/Periodical). SCH565.<br><2> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ57NW23 1975 (Index). SCH2487.<br><3> Harris, B.E. (ed), 1987, Victoria County History - A History of the County of Chester: Volume I, 1/233 Petch D F 1987<br>(Book). SCH3556.<br><4> Longley D, various, Longley Archive, /no.432 (Paper Archive). SCH2005. |

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|---|---|
| **Asset/Event Number** | 147 |
| **Asset/Event Name** | Bronze Age axe hammer, Frodsham Parish |
| **Type of Asset/Event** | FINDSPOT (Bronze Age - 2600 BC to 801 BC) |
| **Listing No./NRHE Number** | |
| **HER Number** | 968 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351900 |
| **Northing** | 378100 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | A Bronze Age stone axe hammer with straight-sided perforation, was found in a garden in High Street, Frodsham & presented<br>to the Grosvenor Museum in 1964 (1). Group XV (2).<br><1> Grosvenor Museum, Grosvenor Museum Accessions, SJ57NW22 (Index). SCH407.<br><2> County Historic Environment Record, 1973-1985, Cheshire Archaeological Bulletin, 4/36 Petch D F 1976<br>(Journal/Periodical). SCH565.<br><3> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ57NW22 1975 (Index). SCH2487.<br><4> Harris, B.E. (ed), 1987, Victoria County History - A History of the County of Chester: Volume I, Longley D 1/89 1980<br>(Book). SCH3556.<br><5> Longley D, various, Longley Archive, /no.359 (Paper Archive). SCH2005. |

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| **Asset/Event Number** | 148 |

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|---|---|
| **Asset/Event Name** | 105 Main Street |
| **Type of Asset/Event** | GARDEN (Garden-domestic, Post Medieval - 1540 AD to 1900 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/0/17 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351630 |
| **Northing** | 377910 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Excavation at rear of 105 Main Street, to investigate the rear of the burgage plots on N side of Main Street. However, no<br>medieval features were found. Features consisted of a series of short 19th century garden bedding trenches and a series of<br>square postholes, which were presumably associated with staking of crops, and a considerable depth of garden soil. The<br>garden soil produced late medieval to 19th century pot sherds, the late medieval sherds were all small and heavily abraded.<br>From the base of the soil came a late Mesolithic core. The gardening activites may be associated with a seedsman, who<br>held extensive land at the rear of the property and who is recorded on the Tithe Map of 1844 as one of the occupiers of 105<br>& 107. The absence of earlier rubbish pits may be explained by the dumping of waste over the end of the plot where it was<br>periodically flushed by the sea, before the building of the Manchester Ship Canal in 1894, and the absence of wells to the<br>presence of a spring line c.65-70m behind the street frontage. The original medieval plot size may have been 7m wide x 70m<br>long, and the original borough may have been 5.39 hectares, with a total street frontage of 770m (1).<br><1> Turner R C, 1984, 105 Main Street, Frodsham (Unpublished Report). SCH53. |

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| **Asset/Event Number** | 149 |
| **Asset/Event Name** | Park Place and Castle Park in Frodsham |
| **Type of Asset/Event** | FORTIFIED MANOR HOUSE (Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/2/0 |
| **Status** | Locally Listed Building |
| **Easting** | 351380 |
| **Northing** | 377540 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Castlering Archaeology, 2004, Castle Park, Frodsham, Cheshire: Archaeological Desk-Based Assessment & Site Visit,<br>R2524 (Client Report). SCH4578.<br><1> Frodsham Local History Group, 1985, Discovering Old Frodsham, /6 (Monograph). SCH1051.<br>Park Place - A Georgian mansion, built by Daniel Ashley in the 18th century, on the site of the ruined manor house (RN: |

984/1). In 1851 the house was bought by Joseph Stubbs, who largely rebuilt the house and laid out the extensive gardens.
The next owner, Edward Abbott Wright, bought the house in 1861 and his family occupied it until 1931. The house then
passed to Runcorn Rural District Council.
<2> Vale Royal Borough Council, 2006, Vale Royal Borough Council's List of Locally Important Buildings (Report).
SCH5487.
Large manor house situated off Chester, Frodsham Road in its own extensive grounds with car park (site of mill pool with
sluice gate in part existing). Grounds used as public park, ornamental gardens with pleasant glass greenhouse.
It would appear that the grounds housed the remains of the castle up to the latter part of the C18 (see sketch by S& N Buck in
1727) and were demolished to make way for the present hall.
Joseph Abbott Wright gave the hall and grounds to the Runcorn Rural District in 1932. Internally the rooms and offices have
been altered somewhat to accommodate the council and private offices. The staircase stands, originally of bleached pine, in
good condition with moulded ceiling above stairwell. Several panels of relief sculptures depicting cherubs hunting adorn the
walls. Mirrored side panels to window frames in the present collecting offices which also has a moulded ceiling of circular
design and according to information was gold leaf adorned and now painted blue. The front door is original and substantial
with terrazzo and tiled entrance lobby. To L hand side of the building a carriageway goes down to the stables and coach
house with a working clock and tower. Was used as the fire station. A stone flagged courtyard is surrounded by a variety of
small buildings, some in state of disrepair. The Wright coat of arms is positioned over stable door. The clock tower has
stone quoins and brick string courses. The builder thought to be Ashley.
<3> Vale Royal Borough Council, 1977-79, The Vale Royal Borough Council Historic Buildings Survey Index Card,
FRO/HB 140 (Paper Archive). SCH5481.
<4> Castlering Archaeology, 2005, Castle Park House, Castle Park, Frodsham, Cheshire; Archaeological Watching Brief.,
R2564 (Client Report). SCH4730.
A watching brief was undertaken at Castle park House in 2005 in advance of renovation and restoration of the house, with the
aim of gaining more information on the location of the early castle or manor house. The works on site included the lowering of
floor levels within the basement of Castle Park House, the demolition of the modern council chamber and reductions in
ground levels over the area formerly occupied by the council chamber. However, no evidence of a house earlier than the 18th
century building was discovered. The present building appears to have been constructed entirely on sand.
Castle Park was once an extensive estate during the medieval and post medieval period. A manor house is recorded in 1280
and repairs to the great chamber were undertaken in 1312-13. The 14th century structure appears to have been in the style of
a fortified manor house with great hall, tower, kitchens, stables and other outbuildings in the grounds. However the precise
location of the early manor house is undetermined to date.
The 17th century castle or house was almost completely burnt to the ground by fire in 1654. An engraving by Samuel and
Nathaniel Buck dated 1727 is the only record of the ruins of the former manor house. The ruins were demolished and a new
Georgian mansion known as 'Park Place' built by the Ashley family. In 1851 the house was purchased by Joseph Stubs who

extended and reconstructed the house and outbuildings, and who commissioned Edward Kemp to lay out woods and gardens
comprising over 24 acres. Kemp was a landscape designer and Castle Park is a designated landscape park (see 984/3/0).
Kemp's planned parkland appears to have erased any evidence of earlier occupation. The house and grounds passed to the
Wright family who bequeathed the house, outbuildings and 12 acres of land to Runcorn Rural District Council for use as a
public park.

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| **Asset/Event Number** | 150 |
| **Asset/Event Name** | Fishpond in Frodsham |
| **Type of Asset/Event** | FISHPOND (Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/1/1 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351250 |
| **Northing** | 377300 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | One of three fishponds adjacent to the manor. Shown on the Tithe Map. One of these lay across Chester Road, between Dig Lane Farm and the Castle (1).<br><1> Thomspon, P, 1980, Frodsham: The Archaeological Potential of a Town, /6 (Report). SCH1251.<br><2> See map for surveyor, c.1837-51, Cheshire Tithe Maps and Awards, EDT 162 1844 (Maps and Plans). SCH3266. |

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|---|---|
| **Asset/Event Number** | 151 |
| **Asset/Event Name** | Fishpond in Frodsham |
| **Type of Asset/Event** | FISHPOND (Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/1/2 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351350 |
| **Northing** | 377400 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Site of three medieval fishponds adjacent to the manor built on the site of Frodsham Castle. Fishponds were often part of large estates or monasteries in medieval times. Fish was an important part of the diet for the rich, particularly for those in religious houses where abstinence from meat was frequently required. They are shown on a Tithe Map. Tithe Maps were produced between 1838 and 1854 and record the names of owners, tenants, and values of |

property in each parish. They
were created to establish taxation rates.

One of three fishponds adjacent to the manor. Shown on the Tithe Map. Situated between the Castle and Kiln Field and
called the Great Fish Pond (1).
<1> Thomspon, P, 1980, Frodsham: The Archaeological Potential of a Town, /6 (Report). SCH1251.
<2> See map for surveyor, c.1837-51, Cheshire Tithe Maps and Awards, EDT 162 1844 (Maps and Plans). SCH3266

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|---|---|
| **Asset/Event Number** | 152 |
| **Asset/Event Name** | Fishpond in Frodsham |
| **Type of Asset/Event** | FISHPOND (Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/1/3 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351350 |
| **Northing** | 377600 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | One of three fishponds adjacent to the manor. Shown on the Tithe Map. Situated to the north of the Castle, now under the<br>railway line (1).<br><1> Thomspon, P, 1980, Frodsham: The Archaeological Potential of a Town, /6 (Report). SCH1251.<br><2> See map for surveyor, c.1837-51, Cheshire Tithe Maps and Awards, EDT 162 1844 (Maps and Plans). SCH3266. |

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|---|---|
| **Asset/Event Number** | 153 |
| **Asset/Event Name** | Frodsham Castle |
| **Type of Asset/Event** | CASTLE (Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/1/0 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351380 |
| **Northing** | 377540 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Frodsham Castle was to be built at the same time as Chester, Beeston and Shotwick castles as part of a defensive system,<br>but was superseded once Beeston was completed. During the 13th and 14th centuries it was used as a gaol, but by 14th<br>century it had become a fortified manor house. The house burnt down on 10 October 1654. And in the mid 18th century the |

site was cleared and a Georgian house, Castle Park, was built. Fragments of Norman foundations are said to exist in the
cellars of the present building.

The Norman Castle at Frodsham was burnt down in 1654. The only remains are some foundations incorporated in the cellars
of Castle Park, built on the site in 1721 (1). Frodsham Castle was to be built with Chester, Beeston & Shotwick as part of a
defensive system, but was superseded once Beeston was completed. During 13th & 14th C it was used as a gaol, but by
14th C it had become a fortified manor house. The great hall, tower, kitchens stables & other outbuildings in the castle
grounds were rebuilt in 13th & 14th & a bridge was built on the N side. In 17th C there were further repairs and alterations to
the kitchens, pantries, butteries, hall & dining chamber. The house burnt down on 10 October 1654. The ruins of the manor
house are shown in Samuel & Nathaniel Bucks engraving of 1727. In mid 18th C the site was cleared & a Georgian house
was built. Fragments of Norman stonework are said to exist in the cellars of the present building (2)&(3). An ancient lamp, a
plate, a cannon ball & several coffins were found amongst the ruins of the castle (1).
<1> Ormerod, G., 1882, The History of the County Palatine and City of Chester, 2/53 (Y) (Book). SCH1389.
<2> Thomspon, P, 1980, Frodsham: The Archaeological Potential of a Town, /5-6 (Report). SCH1251.
<3> Frodsham Local History Group, 1985, Discovering Old Frodsham, /6 (Monograph). SCH1051.
<4> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ57NW9/1964 (Index). SCH2487.

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|---|---|
| **Asset/Event Number** | 154 |
| **Asset/Event Name** | Synagogue Well |
| **Type of Asset/Event** | TOWN (Borough, Medieval - 1066 AD? to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/0/16 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351680 |
| **Northing** | 377420 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | The Synagogue well rises close to the site of Frodsham Castle. It has a large square stone basin to receive the surplus<br>water. The well has neither an inscription nor a history, nor is it known how it acquired its name. It is suggested that St<br>Agnes was its patron (1). The well is rectangular & enclosed by a wall of sandstone blocks of uncertain date. It is dry. There<br>are remains of rock cut steps leading down into it in its NE corner. In 1976 it was being used as a receptacle for garden<br>rubbish (2).<br><1> Beamont W, 1881, The Ancient Town of Frodsham, /12 (Book). SCH3020.<br><2> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ57NW10/1964 (Index). SCH2487.<br><3> Frodsham Local History Group, 1985, Discovering Old Frodsham, /21 (Monograph). |

SCH1051.

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|---|---|
| **Asset/Event Number** | 155 |
| **Asset/Event Name** | Frodsham Medieval Watermills |
| **Type of Asset/Event** | FORTIFIED MANOR HOUSE (Fortified Manor, Medieval - 1066 AD to 1539 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 984/1/4 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351400 |
| **Northing** | 377400 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | The earliest detail of a mill at Frodsham describes the winter mill, which may be the site of the manor mill, existing in the 14th century. By 1280 the manor drew revenue from three mills, with a pool, but their location is unknown. An upper and lower mill are recorded at the manor. The Tithe Map shows a mill pool on the east side of Chester Road, south-west of the manor. The second mill and the miller's house lay on the north-east side of the manor, adjacent to the pond. Burdett's 1777 map indicates two mills, one of which appears north of Chester Road, towards Marsh Green. In the 17th century a series of flagged watercourses and pool walls were repaired linking the upper pool and lower pool at Pales Yard (1). The two watermills of Frodsham formerly within the park, were pulled down about 30 years since (ie c.1852), on the construction of the railway (2).<br>Castlering Archaeology, 2004, Castle Park, Frodsham, Cheshire: Archaeological Desk-Based Assessment & Site Visit, R2524 (Client Report). SCH4578.<br><1> Thomspon, P, 1980, Frodsham: The Archaeological Potential of a Town, /6 (Report). SCH1251.<br><2> Ormerod, G., 1882, The History of the County Palatine and City of Chester, 2/53 (Y) (Book). SCH1389.<br><3> Cheshire History, 11/54 Bott O J P 1983 (Journal/Periodical). SCH811. |

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|---|---|
| **Asset/Event Number** | 156 |
| **Asset/Event Name** | Bronze Age spearheads from Frodsham Marsh |
| **Type of Asset/Event** | FINDSPOT ((at some time) Bronze Age - 1600 BC to 1201 BC) |
| **Listing No./NRHE Number** | |
| **HER Number** | 1013 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 349180 |
| **Northing** | 378720 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |

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| **Description** | Two Middle Bronze Age looped socketed spearheads were found in the Frodsham Marsh section of the Manchester Ship<br>Canal. One is in the Grosvenor Museum and the other in Warrington Museum.<br><br><1> Lancashire & Cheshire Antiquarian Society, 1883 -, Transactions of the Lancashire & Cheshire Antiquarian Society,<br>50/89 Jackson J W 1934 (Journal/Periodical). SCH3293.<br>Two Middle Bronze Age looped socketed spearheads were found in the Frodsham Marsh section of the Manchester Ship<br>Canal. One is in the Grosvenor Museum and the other in Warrington Museum.<br><2> Shone W, 1911, Prehistoric Man in Cheshire, p.69 (Book). SCH2710.<br>The spearhead in the Grosvenor was found deep down in the alluvium and was presented to the museum by a contractor<br>from Helsby in 1908. It is 6.125 inches long x 1.25 inches wide.<br><3> Varley, W. J. & Jackson, J. W., 1940, Prehistoric Cheshire, Schedule III (Book). SCH2692.<br><4> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ47 NE 2 (Index). SCH2487.<br><5> Davey P & Forster E, 1975, Bronze Age Metalwork from Lancashire and Cheshire (Monograph). SCH488.<br>Grosvenor example illustrated.<br><6> Harris, B.E. (ed), 1987, Victoria County History - A History of the County of Chester: Volume I, p.102 (Book).<br>SCH3556.<br><7> Longley D, various, Longley Archive, no.365 (Paper Archive). SCH2005. |

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|---|---|
| **Asset/Event Number** | 157 |
| **Asset/Event Name** | Roman Road - Chester to Wilderspool, Warrington |
| **Type of Asset/Event** | ROAD (Road-major, Roman - 43 AD to 409 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 2417/1/2 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 351700 |
| **Northing** | 377300 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Roman road from Chester to Wilderspool. The road must have rounded the precipitous hills behind Frodsham & the older<br>road climbs higher up the hillside than the present road by Howey Lane & Church Lane, which probably represent the earlier<br>course (1).<br><1> Margary, I. D., 1973, Roman Roads in Britain, /304-305 (Book). SCH2903 |

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|---|---|
| **Asset/Event Number** | 158 |
| **Asset/Event Name** | Possible Roman Road in Frodsham Parish |
| **Type of Asset/Event** | ROAD (Road-minor, Roman - 43 AD to 409 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 2461 |
| **Status** | Non-designated Heritage Asset |

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| **Easting** | 351250 |
| **Northing** | 377250 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Test trench at Netherton end of the drive between the eastern boundary hedge of Dig Lane Fm and the A56. Removal of the topsoil revealed a pebbled surface hammered into hard red clay. On the west side the original ditch had been deepened and a field drain inserted and topped with modern clinker. The width of the track was unclear due to a small quarry which has destroyed the east side. A cut through the stony surface showed it to be 150mm deep in the centre tapering to 75mm on the western side. Beneath there was a layer of hard dark brown sand 250mm thick on the natural of hard red sand. Could be a route founded by the Romans possibly used as an entrance drive to Frodsham Castle (1).<br><1> Various, Written Communication to the HER, Dutton R J A 1995 (Written Communication). SCH3756. |

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|---|---|
| **Asset/Event Number** | 159 |
| **Asset/Event Name** | Sutton Mill |
| **Type of Asset/Event** | MILL HOUSE (AD 19th Century - 1800 AD? to 1840 AD?) |
| **Listing No./NRHE Number** | |
| **HER Number** | 956/1 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 353340 |
| **Northing** | 378610 |
| **Parish** | SUTTON |
| **Council** | CHESHIRE |
| **Description** | The mill was described in 1965 as the largest of the Cheshire mills, with 4-storeys and many additions. It had an internal loading way direct from the River Weaver. The mill was re-equipped during the First World War. After 1918 some equipment was taken to Edinburgh; the rest was sold for scrap around 1940. The mill has been powered, in turn, by water, steam & electricity (2).<br>By 1982 there had been considerable demolition of the buildings associated with the mill. However a two storey building with an arched opening for the tail race and a three storey building with loading openings direct to the river survived. The mill was described by White as an"extensive Corn Mill", by Norris in 1969 as the "largest of Cheshire's Mills"(3).<br>The mill house, now industrial estate office, was constructed circa 1820. During the nineteenth century the mill, of which little remains, was one of the largest of Cheshire's water-powered corn mills. (4).<br>The mill was powered by water and steam. The turbine remains (5). Shown on Bryant's 1831, Swire and Hutchins 1830 (6& 7).<br>Mill, many buildings and the mill race are clearly depicted on the Tithe map for the township and Ordnance Survey maps dating from the nineteenth and twentieth centuries (8, 9& 10).<br>Bryant, A., 1831, Map of the County Palatine of Chester (Maps and Plans). SCH2114.<br><2> Lancashire & Cheshire Antiquarian Society, 1883 -, Transactions of the Lancashire & |

Cheshire Antiquarian Society,
75-6/57 Norris J H 1965 (Journal/Periodical). SCH3293.
<3> Ashmore, O, 1982, The Industrial Archaeology of North West England, p.64 (Book). SCH3181.
<4> Department for the Environment, 1971-2005, List of Buildings of Special Architectural & Historic Interest, p.60
(Report). SCH1934.
<5> Cheshire County Council, 1974, County Treasures Record, 4/IA.036 (Index). SCH1000.
<7> Swire, W. & Hutchings, W. F., 1830, Map of the County Palatine of Chester (Maps and Plans). SCH2116.
<8> Ordnance Survey, 1909-1912, Ordnance Survey 3rd edition 25 inch to 1 mile - Cheshire (Maps and Plans).
SCH4361.
<9> Ordnance Survey, 1871-1882, Ordnance Survey 1st edition 25 inch to 1 mile - Cheshire (Maps and Plans). SCH2462.
<10> See map for surveyor, c.1837-51, Cheshire Tithe Maps and Awards, EDT 380/1 & 380/2 (Maps and Plans).
SCH3266.

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| **Asset/Event Number** | 160 |
| **Asset/Event Name** | Rocksalt Refinery, Frodsham |
| **Type of Asset/Event** | SALT WORKS (AD 17th Century to AD 19th Century - 1600 AD to 1899 AD) |
| **Listing No./NRHE Number** | |
| **HER Number** | 977/1 |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 352720 |
| **Northing** | 378790 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Rock salt was discovered at Marbury, near Northwich in 1670. Works for refining the salt were then set up on the west bank<br>of the Weaver at Frodsham by the end of the 17th century. The 18th century saltworks were built on the same site and are<br>shown on the Cholmondeley Estate map of 1778. The Rock salt was transported from Northwich to Frodsham by boat but<br>improvements in the River Weaver made it possible to transport coal to the salt field in Northwich, so the works at Frodsham<br>became redundant. They survived as a Glue Works until around 1923, when the site became derelict.<br>Excavation at the site by the Frodsham Local History Group in 1990 revealed wooden sleepers from the old quayside railway<br>and a brick-paved area with curved brick channels lined with pitch.<br><br><1> Thomspon, P, 1980, Frodsham: The Archaeological Potential of a Town, p.7 (Report). SCH1251.<br>A works for refining rock salt was set up on the west bank of the Weaver following the discovery of rock salt at Marbury, near<br>Northwich in 1670.<br><2> Barker, T. C., 1951, Lancashire coal, Cheshire salt and the rise of Liverpool, p.86 (Article in Journal). SCH8044.<br>A works for the refining of rock-salt was apparently in being before 1694 at Frodsham, as the company was ready to declare<br>a dividend in 1695. |

(A small-scale plan indicates that the refinery was situated in the area of Frodsham Bridge.)
<3> Ordnance Survey, 1870-1982, Ordnance Survey Archaeological Record Card, SJ57NW15 (Index). SCH2487.
On 16/06/64 the site of the saltworks was visited by T.P.Waggott, a field investigator working for the Ordnance Survey, his
comment was as follows. 'The area is now a rubbish dump and no trace of the salt works remains.'
<4> Cheshire County Council, 1992-1995, Cheshire Past, Vol 1/1992 p.22 (Newsletter). SCH870.
By 1772, a saltworks was operating near Saltworks Farm at Frodsham Bridge, presumably on the same site as the earlier
refinery. This is shown on the Cholmondeley Estate map of 1778. In 1792 the works was producing 6-7,000 tons of refined
rock salt per annum. Sailing flats transported coal from south Lancashire and rock salt from Northwich to Frodsham.
Improvements in the River Weaver made it possible to transport coal to the salt field, so the works at Frodsham became
redundant. In 1879 they were described as Glue Works, which survived until c.1923, when site became derelict.
Excavation by Frodsham Local History Group in July 1990 uncovered remains of the former saltworks. A trench 66m long x
1m wide was opened parallel to the quay wall. It revealed wooden sleepers and a brick-paved area, also curved brick
channels lined with pitch and the corner of a building interpreted as a forge or smithy. Other features on site include an
arched underground brick structure and a large circular structure shown on maps of 1778& 1874. Many of the excavated
features relate to the 19th century use of the site as glue works.
<5> Cheshire County Council, 1974, County Treasures Record, 4/IA.034 & 35 (Index). SCH1000.
<6> Chester Archaeology, 1993, Saltworks Farm, Frodsham: Desk-based Assessment, September 1993, R2052, p.16-17
(Client Report). SCH4139.
A desk-based assessment was undertaken at Saltworks Farm Frodsham in 1993 in advance of its development for residential
purposes. Although none of the original post medieval salt refinery and associated buildings survive, wall foundations and
underground chambers were recorded.
<7> Gifford and Partners, 1999, Report on an Archaeological Watching Brief at Saltworks Farm Development Phases 2
and 3, Frodsham, Cheshire., R2118 (Client Report). SCH4092.
A watching brief was undertaken in 1999 to monitor ground disturbance works associated with the housing development at
Saltworks Farm, this work followed on from the 1993 desk-based assessment (see 6). The excavation of a service trench was
monitored as part of the Phase 2 development, within this a section of brick and mortar wall on a sandstone footing was recorded. This appears to date to the 19th century and although it lies in the area of the former saltworks, the date suggests
that it may have formed part of the post-saltworks use of the site.
<8> Ordnance Survey, 1881-2, Ordnance Survey 1st edition 6 inch to 1 mile - Cheshire (Maps and Plans). SCH2474.
[SJ 52727879] Salt Works (Disused)

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|---|---|
| **Asset/Event Number** | 161 |
| **Asset/Event Name** | 108-110 Main Street, Frodsham |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3496 |

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| **Status** | Event |
| **Easting** | 351700 |
| **Northing** | 377800 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Lower part of rear wall to 110 demolished and footings dug out. Excavated trench c 0.8m deep. Undisturbed fine<br>light brown friable/loose sand, with no inclusions located on the base and SE section. Overlain on SE side by<br>make up layers associated with the concrete yard. The NW section revealed deposits associated with the wall<br>and internal floor to 110. Extension to 109 to be deomolished and new footings cut in approximately 2 weeks.<br>R Edwards<br>22.4.02<br><br>Unpublished Document: County Historic Environment Record. Site Visit/Watching Brief Observation<br>Report Form. 2002 |

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| **Asset/Event Number** | 162 |
| **Asset/Event Name** | 59 Main Street, Frodsham |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3502 |
| **Status** | Event |
| **Easting** | 351400 |
| **Northing** | 377800 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Foundation trenches inspected and seen to be c. 1.2m deep and 0.6m wide. Topsoil (0.7m) overlay sand and<br>marl. Recent pit (not bottomed) seen in section of N.W. corner of extension. See annotated architects drawings<br>for details.<br>M D Leah<br>2.6.00<br><br>Unpublished Document: County Historic Environment Record. Site Visit/Watching Brief Observation<br>Report Form. 2000 |

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| **Asset/Event Number** | 163 |
| **Asset/Event Name** | Saltworks Farm, Frodsham: Desk-based Assessment, |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |

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|---|---|
| **HER Number** | ECH3562 |
| **Status** | Event |
| **Easting** | 352400 |
| **Northing** | 378700 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Archaeological desk-based assessment undertaken in September 1993 for land (38 acres) at Saltworks Farm,<br>Frodsham, in advance of development of the site for residential purposes. Work comprised an investigation of the<br>history of the farm and surrounding land supplemented with a field inspection to identify and record any features<br>of archaeological interest.<br>The present day Saltworks Farm is in a dilapidated state with all the 20th century buildings either derelict or partly<br>demolished. None of the original salt refinery or factory buildings remain standing but wall foundations do survive<br>as do underground chambers. Historical evidence suggests a late 17th century date for the foundation of the<br>complex. Map and placename evidence also suggest the existence of a mill by the River Weaver at the site, although no physical evidence was observed in this project.<br>As far as the outlying land is concerned, very little evidence for earlier activity was found on the reclaimed<br>marshland north of the site. This was drained in 1942 producing a productive mixed arable and grass farmland.<br>On the higher ground at the southern extent two rectangular features were observed on aerial photographs. Their<br>function and date are uncertain but possibly indicate an earlier field system or structure, alternatively they may<br>relate to later drainage of the site. (1)<br><br>Client Report: Chester Archaeology. 1993. Saltworks Farm, Frodsham: Desk-based Assessment, September 1993. R2052. |

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| **Asset/Event Number** | 164 |
| **Asset/Event Name** | Main Street Chapel, Frodsham: An Archaeological |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3571 |
| **Status** | Event |
| **Easting** | 351400 |
| **Northing** | 377700 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Archaeological watching brief conducted at Main Street Chapel, Frodsham during excavation of foundations for a<br>single storey extension ot the structure on its north-west and south-west sides. No archaeological features dating<br>to before the 19th century were positively identified. The stratigraphy of the area suggests that land on which the |

chapel had been built had been used for cultivation over a long period, perhaps indicating that it either lay outside
the medieval and early modern town, or represented a burgage plot that remained unused until the 19th century.

Client Report: Greater Manchester Archaeological Unit. 1995. Main Street Chapel, Frodsham: An
Archaeological Watching Brief. R2070

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| **Asset/Event Number** | 165 |
| **Asset/Event Name** | Saltworks Farm Development Phases 2 and 3, Frodsham |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3611 |
| **Status** | Event |
| **Easting** | 352500 |
| **Northing** | 378600 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Archaeological watching brief of ground disturbance works undertaken in relation to the construction of access<br>roads and service trenches for sewers within Phases 2 and 3 of the housing development at Saltworks Farm.<br>Only one archaeological feature was identified in the Phase 3 development this being a post-medieval boundary<br>ditch which produced 19th and 20th century ceramic evidence. Also, as part of the Phase 2 development, during<br>the excavation of a service trench, brick and mortar walls on a sandstone footing were recorded. (1)<br><br>Client Report: Gifford and Partners. 1999. Report on an Archaeological Watching Brief at Saltworks<br>Farm Development Phases 2 and 3, Frodsham, Cheshire.. R2118. |

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| **Asset/Event Number** | 166 |
| **Asset/Event Name** | North-western ethylene pipeline English Section: |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3618 |
| **Status** | Event |
| **Easting** | 350876 |
| **Northing** | 378889 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Field-walking and watching brief assessment undertaken for sites of potential archaeological |

interest located on
the course of the North-Western Ethylene Pipeline. (1)

Client Report: Maynard D. 1993. North-western ethylene pipeline English Section: Archaeological
Studies 1988-1993. Gazeteer of Archaeological Sites: Volume 4, Cheshire. R2113.

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| **Asset/Event Number** | 167 |
| **Asset/Event Name** | North Western Ethylene Pipeline |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3702 |
| **Status** | Event |
| **Easting** | 351473 |
| **Northing** | 378851 |
| **Parish** | ELLESMERE PORT AND NESTON |
| **Council** | CHESHIRE |
| **Description** | Client Report: Lancaster University Archaeological Unit. 1993. North-Western Ethylene Pipeline: English Section: Archaeological Studies 1988-1993 Final Report. R2209. |

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|---|---|
| **Asset/Event Number** | 168 |
| **Asset/Event Name** | North Western Ethylene Pipeline Project |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3721 |
| **Status** | Event |
| **Easting** | 352063 |
| **Northing** | 378863 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | Client Report: Lancaster University Archaeological Unit. 1990. North Western Ethylene Pipeline Project. R2210. |

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|---|---|
| **Asset/Event Number** | 169 |
| **Asset/Event Name** | Archaeological Review of Land at 63 Main Street, |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3772 |
| **Status** | Event |

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| **Easting** | 351500 |
| **Northing** | 377800 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | An archaeological desk-based assessment and evaluation were undertaken, in 1999, for land at 63, Main Street,<br>Frodsham. The desk-based assessment revealed a potential for remains to exist of medieval date. Three<br>trenches were fully investigated. A fairly large sandstone built well of probable nineteenth century date was<br>recorded in Trench 2, together with more recent pitting activity, overlying a deposit of sandy, agricultural soil. The<br>agricultural soil was also present in Trenches 1 and 3. A single sherd of medieval pottery was recovered from a<br>modern context.<br>2 reports: Written Report and Appendices, R2281/1-2 (1)<br><br>Client Report: L-P Archaeology & AOC Archaeology Group. 1999. Archaeological Review of Land at<br>63 Main Street, Frodsham, Cheshire: Desk-Based Assessment and Archaeological Evaluation |

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|---|---|
| **Asset/Event Number** | 170 |
| **Asset/Event Name** | Land to the rear of 59 Main Street, Frodsham: An |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH3780 |
| **Status** | Event |
| **Easting** | 351400 |
| **Northing** | 377800 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | An archaeological watching brief was undertaken in 1998/1999 on land off Chapelfields, to the rear of 59 Main<br>Street, Frodsham. The study lies within the centre of the former medieval borough of Frodsham and there was a<br>potential of the presence of former medieval burgage plots, however, no archaeological deposits or artefacts were<br>identified. (1)<br><br>Client Report: University of Manchester Archaeological Unit. 1999. Land to the rear of 59 Main Street,<br>Frodsham: An Archaeological Watching Brief. R2284. R2284 |

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|---|---|
| **Asset/Event Number** | 171 |
| **Asset/Event Name** | Castle Park, Frodsham, Cheshire: Archaeological Desk- |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |

# Gazetteer of Heritage Assets and Event

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|---|---|
| **HER Number** | ECH4077 |
| **Status** | Event |
| **Easting** | 351500 |
| **Northing** | 377420 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | An archaeological desk-based assessment and site visit were undertaken in 2004 for a site at Castle Park,<br>located on the south-west side of Frodsham, to the west of the A56. Castle Park is a Grade II listed park and<br>garden. It was an extensive estate during the medieval and post medieval periods.The size of the estate has<br>reduced over the last hundred years and it is now owned by Vale Royal Borough Council. The site includes the<br>main entrance of the park, recreational areas, and the house known as 'Park Place', together with its outbuildings<br>and gardens. Park Place was built in the eighteenth century on the site of a seventeenth century castle/house<br>which burnt down in 1654. The development proposals comprise the renovation and restoration of the park,<br>including Park Place and its ancilliary buildings. (1)<br><br>Client Report: Castlering Archaeology. 2004. Castle Park, Frodsham, Cheshire: Archaeological Desk-<br>Based Assessment & Site Visit. R2524. R2524 [Mapped features: #8343 ; #11911 ] |

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|---|---|
| **Asset/Event Number** | 172 |
| **Asset/Event Name** | the Queen's Head Public House, Main Street, Frodsham |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4118 |
| **Status** | Event |
| **Easting** | 351600 |
| **Northing** | 377800 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Visit to inspect foundations for new extension to the rear of present pub.<br>1) An inspection of the foundation trenches revealed no archaeological deposits. Natural sand ( with much<br>modern disturbance) was found immediately below the ground surface.<br>2) Within the building much timber framing was revealed. Also two sandstone fireplaces with brick chimneys<br>exposed.<br><br>Unpublished Document: County Historic Environment Record. Site Visit/Watching Brief Observation<br>Report Form. 19/05/2005 |

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|---|---|
| **Asset/Event Number** | 173 |
| **Asset/Event Name** | Frodsham Cut and Lock, River Weaver, Frodsham, |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4140 |
| **Status** | Event |
| **Easting** | 353400 |
| **Northing** | 378400 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Client Report: Oxford Archaeology North. 2005. Frodsham Cut and Lock, river Weaver, Frodsham,<br>Cheshire. R2554. |

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|---|---|
| **Asset/Event Number** | 174 |
| **Asset/Event Name** | REVIVE, Stage 1 Assessment: River Weaver Project - |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4167 |
| **Status** | Event |
| **Easting** | 352560 |
| **Northing** | 379130 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | A stage 1 archaeological assessment was undertaken in 2004-2005 for various sites to the north of Frodsham<br>with respect to soft end-use land reclamation. The study forms part of the REVIVE (Regenerating the<br>EnVironment InVests in the Ecomomy) in Cheshire and Warrington programme. The sites investigated were<br>identified as potential sites for regeneration and image improvement in Frodsham and along the Frodsham to<br>Northwich River Weaver corridor.<br>Two reports - R2611.1: November 2004 and R2611.2: December 2005 (1-2)<br><br>Client Report: White Young Green. 2004. REVIVE Stage 1 Assessment: River Weaver Project - Frodsham Sites. R2611.1. R2611.1 [Mapped features: #8427 ; #8428 ; #8429 ; #8430 ] (1) XY<br>Client Report: White Young Green Environmental Limited. 2005. REVIVE in Cheshire & Warrington,<br>Chester City andREVIVE in Cheshire & Warrington, Chester City and Vale Royal Boroughs: Archaeological Survey, River Weaver Project - Frodsham Sites. R2611.2. R2611.2 |

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|---|---|
| **Asset/Event Number** | 175 |

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|---|---|
| **Asset/Event Name** | Castle Park House, Castle Park, Frodsham, Cheshire; |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4206 |
| **Status** | Event |
| **Easting** | 351390 |
| **Northing** | 377540 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Watching brief undertaken in 2005 during groundworks at Park House. The current alterations for the re-use of<br>the cellar appear to be designed to have minimum impact on the existing sandstone fabric of the cellars, which<br>appears to have survived from the mid-eighteenth century house. Within the limitations of the watching brief, no<br>evidence of an earlier house on site has been located. The present building appears to have been constructed<br>entirely on sand.<br>Archive holder = Cheshire Museums Service. (1)<br><br>Client Report: Castlering Archaeology. 2005. Castle Park House, Castle Park, Frodsham, Cheshire;<br>Archaeological Watching Brief.. R2564. R2564 [Mapped features: #8472 ; #12004 ] |

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|---|---|
| **Asset/Event Number** | 176 |
| **Asset/Event Name** | Frodsham Rail Connection, Frodsham, Cheshire: Draft |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4499 |
| **Status** | Event |
| **Easting** | 352319 |
| **Northing** | 379082 |
| **Parish** | SUTTON |
| **Council** | CHESHIRE |
| **Description** | A desk based assessment and walk over survey in order to understand the impact of the development (installation<br>of a 25kV underground cable running in an easterly direction from Frodsham Substation to Weaver Junction) on<br>the archaeological resource.<br>An archaeological watching brief was recommended.<br><br>Client Report: Oxford Archaeology North. 2008. Frodsham Rail Connection, Frodsham, Cheshire:<br>Draft Desk Based Assessment and Walkover Survey.. R2867. R2867 |

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|---|---|
| **Asset/Event Number** | 177 |

# Gazetteer of Heritage Assets and Event

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|---|---|
| **Asset/Event Name** | Report on Northwest Telent Techmac Design and |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4557 |
| **Status** | Event |
| **Easting** | 352060 |
| **Northing** | 378190 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | An appraisal or assessment of cultural heritage along the M56 between junctions J9 and J16. Identified listed<br>buildings and sites from which the proposed signs would be visible. These include a moated site, fishpond and<br>connecting channel at Elton, a heavy anti aircraft gun site 400m west of Sutton Fields Farm and two sections of<br>Roman Road between Appleton and Stretton<br><br>Client Report: Golder Associates (UK) Ltd. 2009. Report on Northwest Telent Techmac Design and<br>Consultancy Services Framework Provision of Variable Message Signs on the M56 Between Junctions J9 -16. R2904. R2904 [Mapped features: #8813 ; #11073 ] |

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|---|---|
| **Asset/Event Number** | 178 |
| **Asset/Event Name** | Frodsham Rail Connection, Frodsham, Cheshire. |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4603 |
| **Status** | Event |
| **Easting** | 352129 |
| **Northing** | 379166 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | A desk based assessment and walkover survey of the proposed route of a cable trench from Frodsham<br>Substation to a trackside substation near to Weaver Junction (railway). Subsequent mitigation in the form of<br>further desk based assessment, topographic survey of selected sites and watching brief of the ground works took<br>place. Few archaeological features were identified but finds of 12 to 14 century pot in the vicinity of Sutton may<br>indicate an earlier hall.<br><br>Client Report: Oxford Archaeology North. 2009. Frodsham Rail Connection, Frodsham, Cheshire. Archaeological Desk-Based Assessment, Walkover and Topographic Surveys, and Watching Brief.<br>R2955. R2955 |

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|---|---|
| **Asset/Event Number** | 179 |
| **Asset/Event Name** | Pre-sanction Engineering Capenhurst to Frodsham (4ZE) |
| **Type of Asset/Event** | Documentary research |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4611 |
| **Status** | Event |
| **Easting** | 352608 |
| **Northing** | 378653 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | Desk-based assessment prepared for National Grid in order to inform a programme of works on the overhead<br>power line between Capenhurst and Frodsham<br><br>Client Report: AMEC. 2005. Pre-sanction Engineering Capenhurst to Frodsham (4ZE) 11060: Phase 1<br>Archaeology. R2925 |

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|---|---|
| **Asset/Event Number** | 180 |
| **Asset/Event Name** | Frodsham Wind Farm, The Environmental Statement |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4626 |
| **Status** | Event |
| **Easting** | 350065 |
| **Northing** | 378574 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | An assessment of impacts in terms of archaeology and cultural heritage, both physical and visual, through effects<br>of the Frodsham Wind Farm.<br><br>Client Report: RSK ENSR Environment Ltd. Frodsham Wind Farm, The Environmental Statement. R2959. |

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|---|---|
| **Asset/Event Number** | 181 |
| **Asset/Event Name** | Fiddler's Ferry to Frodsham (4ZF) OHL Phase 1, |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH4710 |
| **Status** | Event |

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|---|---|
| Easting | 352934 |
| Northing | 379489 |
| Parish | RUNCORN & WIDNES |
| Council | CHESHIRE |
| Description | Desk-based assessment of the archaeological impact of the refurbishment of the overhead line between Fiddler's<br>Ferry power station and electricity substation adjacent to the river Weaver, Frodsham<br><br>Client Report: AMEC. 2010. Fiddler's Ferry to Frodsham (4ZF) OHL, Phase 1, Archaeology and Cultural Heritage Desk Based Assessment. R3027. |

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|---|---|
| Asset/Event Number | 182 |
| Asset/Event Name | Cultural heritage assessment for the Second Mersey |
| Type of Asset/Event | DESK BASED ASSESSMENT |
| Listing No./NRHE Number | |
| HER Number | ECH4804 |
| Status | Event |
| Easting | 351298 |
| Northing | 380394 |
| Parish | RUNCORN & WIDNES |
| Council | CHESHIRE |
| Description | Cultural heritage study prepared by Gifford in conection with proposals for the construction of the Mersey Second<br>Crossing between Runcorn and widnes (revision of 2003 EIA)<br><br>Client Report: Gifford and Partners. 2006. The Mersey Gateway: Cultural Heritage Study. R2520.2 |

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|---|---|
| Asset/Event Number | 183 |
| Asset/Event Name | The Mersey Gateway Project: Cultural Heritage (Chapter |
| Type of Asset/Event | DESK BASED ASSESSMENT |
| Listing No./NRHE Number | |
| HER Number | ECH5262 |
| Status | Event |
| Easting | 351652 |
| Northing | 380119 |
| Parish | RUNCORN & WIDNES |
| Council | CHESHIRE |
| Description | A revised cultural heritage assessment completed for the Second Mersey Crossing to identify cultural heritage<br>features in the landscape affected by the project. The study also advised on mitigation.<br><br>Report: Halton Borough Council. 2008. The Mersey Gateway Project: Chapter 13 Cultural |

Heritage.
R3253. R3253 [Mapped features: #9701 ; #11150 ; #12747 ]

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|---|---|
| **Asset/Event Number** | 184 |
| **Asset/Event Name** | Church Fields Park, Frodsham |
| **Type of Asset/Event** | FIELD VISIT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH5568 |
| **Status** | Event |
| **Easting** | 351970 |
| **Northing** | 377390 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Adjacent to the road cutting (Pinmill Brow) is a sequence of three terraces. These are natural landforms clearly<br>associated with the horizontal bedding of the bedrock. This site has a good covering of (almost) east-west aligned<br>ridge and furrow, possibly late medieval in date, but it would be difficult to date definitively without further<br>investigation. The latest features, which would appear to truncate the ridge and furrow are the mound and<br>possible ditch identified and reported by Dr Walsh (SCH7075). It is probable that these features are associated<br>with small scale quarrying of the outcropping sandstone.<br><br>Written Communication: Walsh, T. 2013. Earthwork Fragments, Church Fields Park, Frodsham. 19/03/2013. Walsh, T - 19/03/2013<br>(1)<br>Unpublished Document: Cheshire Historic Environment Record. Various. Historic Environment Record<br>Site Visit Record. ECH5568 |

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|---|---|
| **Asset/Event Number** | 185 |
| **Asset/Event Name** | North West Rapid Coastal Zone Assessment (NWRCZA): |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH6212 |
| **Status** | Event |
| **Easting** | 349779 |
| **Northing** | 378923 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | Between August 2007 and September 2009 Archaeological Research Services Ltd carried out, on behalf of<br>English Heritage, a desk based rapid coastal zone assessment of the threat posed to heritage |

assets on the North
West coast by rising sea level and coastal erosion. The North West Rapid Coastal Zone Assessment (NWRCZA)
is one of a series of projects initiated by English Heritage around the coasts of England. The brief specifically
required that the assessment be undertaken with reference to Defra's Shoreline Management Plan 2 (SMP 2).
The area assessed, extends from the Anglo-Welsh border in the Dee Estuary to the Anglo-Scottish border in the
Solway Firth.
The NWRCZA study area consists of almost 900km of coastline between the Lowest Astronomical Tide (LAT)
and 1km inland from Mean High Water Springs (MHWS). The review of the heritage assets has been based on a
consideration of two data sets. The first consists of the Historic Environment Records (HERs) maintained by or for
the Local Authorities with curatorial responsibilities for this section of the coast, namely Cheshire Archaeology
Planning Advisory Service, Merseyside Archaeological Service, Lancashire County Council, Cumbria County
Council and the Lake District National Park Authority. The second data set consists of the aerial photograph
coverage of the study area from which all archaeological features visible have been mapped to the standards of
English Heritage's National Mapping Programme.
In assessing the threat to heritage assets posed by sea level rise, major sites and groups of sites are discussed
individually and the threats they face evaluated. Categories of more numerous types of site are also discussed but
the issue of threat is dealt with in a series of tables in which the SMP policy unit is noted along with the importance
of individual sites and the degree of threat are rated as high, medium or low. Nearly 75% of the sites recorded in
the desk-based assessment date from the Second World War and consist of numerous categories of site such as
pillboxes or anti-tank obstacles or ephemeral features such as minefields.
The NWRCZA study has established that many heritage assets in the coastal zone are under threat from rising
sea level and also that a number of categories of asset are as yet poorly understood making an evaluation of the
threat difficult.
The desk-based assessment formed Phase 1 of the project, Phase 2, undertaken between 2009-2011, comprised
field checking of a selection of the sites recorded (Phase 2 recorded as a separate event - see ECH6531).
Archive relating to the project resides in the Historic England's Archive, Swindon. (1-4)

Report: Archaeological Research Services Ltd. 2009. North West Rapid Coastal Zone Assessment (NWRCZA). R4248. R4248
(1)
Client Report: Archaeological Research Services Ltd. 2011. North West Rapid Coastal Zone assessment (NWRCZA): Final SMP2 Version. R2698. R2698a
(2)
Client Report: Archaeological Research Services Ltd. 2011. North West Rapid Coastal Zone Assessment (NWRCZA): Updated Phase 1 Executive Summary. R2698b. R2698b
Digital Archive: Archaeological Research Services Ltd. 2007-9. North West Rapid Coastal Zone National Mapping Programme Assessment Survey. Digital Archive [Mapped features: #18201 ; #18202 ]

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|---|---|
| **Asset/Event Number** | 186 |
| **Asset/Event Name** | Saltworks Farm, Frodsham Bridge, Excavation 1990 |
| **Type of Asset/Event** | EXCAVATION |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH6214 |
| **Status** | Event |
| **Easting** | 352700 |
| **Northing** | 378700 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | Trial excavation parallel to the quay wall recorded features probably associated with the glueworks which reused the 17th century salt working site.<br><br>Newsletter: Cheshire County Council. 1992-1995. Cheshire Past. Vol 1/1992 p.22 |

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|---|---|
| **Asset/Event Number** | 187 |
| **Asset/Event Name** | Archaeological Monitoring of Frodsham Wind Farm |
| **Type of Asset/Event** | WATCHING BRIEF |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH6338 |
| **Status** | Event |
| **Easting** | 349100 |
| **Northing** | 378000 |
| **Parish** | FRODSHAM |
| **Council** | CHESHIRE |
| **Description** | A programme of archaeological monitoring was carried out during groundworks associated with the development<br>of Frodsham Wind Farm, Helsby, in April 2015. The site lies on land between the River Mersey and Helsby in an<br>area known as Ince Marsh, Helsby Marsh and Frodsham Marsh. Desk-based research (ECH4626) suggested<br>that the area had a low potential for Prehistoric, Roman and Early Medieval archaeology, but some potential for<br>the presence of Medieval structures evidenced by homesteads recorded in the 19th century tithe apportionment.<br>There was also a high potential for survival of a Post Medieval flood defence earthwork recorded on historic<br>maps, along with high potential for some remains associated with a World War II prisoner of war camp identified<br>from vertical air photographs dating to the 1940s. A walkover survey was undertaken in order to identify remains<br>for these sites, along with monitoring of works associated with creation of the site compound, situated just to the<br>south of the site of the POW camp. The latter works revealed mid 20th century concrete structures and demolition<br>material associated with the POW camp.<br><br>Client Report: L - P Archaeology. 2015. Archaeological Monitoring of Frodsham Wind Farm. |

R3985.
R3985

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|---|---|
| **Asset/Event Number** | 188 |
| **Asset/Event Name** | The Cheshire Cheese PH, 29 Main Street, Frodsham, |
| **Type of Asset/Event** | EXCAVATION |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH6738 |
| **Status** | Event |
| **Easting** | 351350 |
| **Northing** | 377660 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | An archaeological excavation was undertaken in 2019 on land to the west of The Cheshire Cheese Public House<br>in support of a residential development comprising six new dwellings, also the conversion and refurbishment of<br>the public house itself.<br>The archaeological potential is focused on the fact that the site lies within Frodsham's area of Archaeological<br>Potential, as defined during research conducted by the Cheshire Historic Towns Survey, which reflects the<br>presumed extent of the settlement of Frodsham in the medieval and post medieval periods. During these periods,<br>the street frontages are the locations most likely to have been occupied by dwellings and a 25" ordnance survey<br>map of c.1880 shows the present public house and outbuildings whilst the tithe map of 1846 shows an earlier<br>structure occupying the present building's footprint, with further structures to the east in what is now the car park.<br>The tithe apportionment describes the structures as "homesteads" and they are best interpreted as domestic<br>dwellings with long thin plots to the rear.<br>Five individual artefacts were recovered during the excavation phase; two examples of clay pipe stems, a single<br>sherd of Victorian blue transfer ware and two examples of Annular ware<br><br>Client Report: Aeon Archaeology. 2019. The Cheshire Cheese PH, 29 Main Street, Frodsham Cheshire, WA6 7AZ: Archaeological Evaluation. R4343. R4343 |

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|---|---|
| **Asset/Event Number** | 189 |
| **Asset/Event Name** | Protos Park and Q Line, Cheshire: Heritage Impact |
| **Type of Asset/Event** | DESK BASED ASSESSMENT |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH6805 |
| **Status** | Event |
| **Easting** | 351652 |

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|---|---|
| **Northing** | 378849 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | A heritage impact assessment has been produced in 2019 in connection with proposals to refurbish an overhead<br>powerline between two substations near Ince in Cheshire, together with the installation of further equipment at<br>both substations.<br>The assessment identified a single undesignated heritage asset within 250m of the scheme, although it will not be<br>subject to any potential direct impact. The nature of the scheme is such that ground disturbance works are limited<br>and no mitigation is proposed for the scheme as a whole<br><br>Client Report: Clwyd Powys Archaeological Trust. 2019. Protos Park and Q Line, Cheshire: Heritage Impact Assessment. R4405. R4405 [Mapped features: #17448 ; #17449 ] |

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|---|---|
| **Asset/Event Number** | 190 |
| **Asset/Event Name** | Cheshire National Mapping Programme and Lidar |
| **Type of Asset/Event** | AERIAL PHOTOGRAPH INTERPRETATION |
| **Listing No./NRHE Number** | |
| **HER Number** | ECH7026 |
| **Status** | Event |
| **Easting** | 350509 |
| **Northing** | 377663 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | The project identified, interpreted and recorded all probable and possible archaeological features visible as<br>earthworks, cropmarks, soilmarks, parchmarks and structures on air photographs, lidar and height-data derived<br>surface models within the area selected for the project.<br>The survey covered a total of 218 Ordnance Survey kilometre grid squares around the city of Chester. This<br>includes the Cheshire Plain incorporating the Dee valley south of Chester and the northern extent of the Mid-<br>Cheshire Ridge. These areas were chosen because of their archaeological significance, with evidence for<br>continued human occupation stretching back to the Mesolithic period, and the risk posed to this resource by<br>proposed development and changes in agricultural practice.<br>Archaeological sites and features identified by the project were mapped to Historic England's National Mapping<br>Programme (NMP) standards.<br>The mapping and interpretation were based on the evidence of oblique and vertical aerial photographs held by the<br>Historic England Archive, Cambridge University, Cheshire Archaeology Planning Advisory Service; lidar supplied<br>by the Environment Agency via their online geostore; digital surface model derived from Next Perspectives™<br>height data; orthophotography provided by Next Perspectives™ through the APGB Agreement. |

Rectification of
scanned photographs was undertaken using AERIAL 5.36 for accurate mapping. Control was derived from
orthophotography. Height data provided by Next Perspectives™ through the APGB Agreement was used to create
digital elevation models in AERIAL. These were used to give greater accuracy in areas of varying topography.

Report: Historic England & Archaeological Research Services. 2022. Cheshire National Mapping Programme and Lidar Mapping Project: The Chester Environs. N/A.
(1)
Digital Archive: Historic England & Archaeological Research Services. 2022. Cheshire National Mapping Programme and Lidar Mapping Project: The Chester Environs. N/A. [Mapped features: #18077 ; #18078 ]

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|---|---|
| **Asset/Event Number** | 191 |
| **Asset/Event Name** | Ridge and Furrow |
| **Type of Asset/Event** | Ridge and Furrow |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 350596 |
| **Northing** | 378525 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | Centre point of 52 areas of medieval/post-medieval ridge and furrow recorded from historic aerial photography within the western area of The Site.<br><br>Monument Number 1463140<br>https://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=1463140&resourceID=19191 |

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| | |
|---|---|
| **Asset/Event Number** | 192 |
| **Asset/Event Name** | Ridge and Furrow |
| **Type of Asset/Event** | Ridge and Furrow |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 350528 |
| **Northing** | 378083 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | The northern extent of an area of medieval / post-medieval ridge and furrow extends to the southern boundary of The Site |

Monument Number 1625893

https://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=1625893&resourceID=19191

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|---|---|
| **Asset/Event Number** | 193 |
| **Asset/Event Name** | Buildings |
| **Type of Asset/Event** | Buildings |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 349519 |
| **Northing** | 378986 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | Centre point of Five Second World War Military structures recorded from historic aerial photography within the western area of the Site. These structures may relate to a Prisoner of War (PoW) camp documented as holding German and Italian PoW's and employed in digging local agricultural drainage channels during internment. |

Monument Number 1464193
https://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=1464193&resourceID=19191

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| | |
|---|---|
| **Asset/Event Number** | 194 |
| **Asset/Event Name** | Ridge and Furrow |
| **Type of Asset/Event** | Ridge and Furrow |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Non-designated Heritage Asset |
| **Easting** | 349700 |
| **Northing** | 378311 |
| **Parish** | |
| **Council** | CHESHIRE |
| **Description** | Centre point of One area of post-medieval ridge and furrow recorded from historic aerial photography within the western area of The Site |

Monument Number 1464186

https://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=1464186&resourceID=19191

# Gazetteer of Heritage Assets and Event

| | |
|---|---|
| **Asset/Event Number** | 195 |
| **Asset/Event Name** | Ince Manor monastic grange and fishpond |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1009635 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 344924 |
| **Northing** | 376529 |
| **Parish** | Ince |
| **Council** | Cheshire West and Chester |
| **Description** | A monastic grange was a farm owned and run by a monastic community and independent of the secular manorial system of communal agriculture and servile labour. The function of granges was to provide food and raw materials for consumption within the parent monastic house itself, and also to provide surpluses for sale for profit. The first monastic granges appeared in the 12th century but they continued to be constructed and used until the Dissolution. This system of agriculture was pioneered by the Cistercian order but was soon imitated by other orders. Some granges were worked by resident lay-brothers (secular workers) of the order but others were staffed by non-resident labourers. The majority of granges practised a mixed economy but some were specialist in their function. Five types of grange are known: agrarian farms, bercaries (sheep farms), vaccaries (cattle ranches), horse studs and industrial complexes. A monastery might have more than one grange and the wealthiest houses had many. Frequently a grange was established on lands immediately adjacent to the monastery, this being known as the home grange. Other granges, however, could be found wherever the monastic site held lands. On occasion these could be located at some considerable distance from the parent monastery. Granges are broadly comparable with contemporary secular farms although the wealth of the parent house was frequently reflected in the size of the grange and the layout and architectural embellishment of the buildings. Additionally, because of their monastic connection, granges tend to be much better documented than their secular counterparts. No region was without monastic granges. The exact number of sites which originally existed is not precisely known but can be estimated, on the basis of numbers of monastic sites, at several thousand. Of these, however, only a small percentage can be accurately located on the ground today. Of this group of identifiable sites, continued intensive use of many has destroyed much of the evidence of archaeological remains. In view of the importance of granges to medieval rural and monastic life, all sites exhibiting good archaeological survival are identified as nationally important.<br><br>Ince Manor monastic grange is one of only two examples in Cheshire of standing manorial buildings belonging to an abbey, and is one of only five similarly surviving monuments in the north of England. The medieval buildings remain in a good state of preservation and there are only three other similar sites in the country displaying more complex structures. Monastery Cottages is one of the best preserved examples of manorial lodgings in England, while the Hall possesses the rare and unusual feature of an entrance defended against attack. The monument is known to have belonged to St Werburgh's Abbey during the early medieval period and evidence of pre-Conquest features will survive within, below and near the Hall and Monastery Cottages. Similarly, further evidence of other post-Conquest structures associated with the grange will also survive.<br><br>Details<br>The monument is Ince Manor monastic grange and fishpond. The site is bounded by Kinsey's Lane to the south west, The Square to the south east, Marsh Lane to the north east, and a boundary bank to the north west. Within this area lies a courtyard of about 0.2 ha in extent that is flanked on two sides by the ruins of sandstone buildings of 13th/14th century or earlier origin, still standing to roof height. The building to the north east is the Hall, a single open structure measuring 15.8m by 6.4m, while that to the north west is Monastery Cottages, |

originally a range of lodgings with four separate chambers. Part of a stone-based wall survives along the south west boundary of the courtyard and a well, now blocked, exists in the courtyard's south west corner. Lying between the courtyard and Kinsey's Lane are Park Cottages, formerly a stable or barn associated with a farm adjoining and supporting the manor. The manor was enclosed by a boundary wall with stone copings and plinths that survives along Kinsey's Lane, Marsh Lane, and facing The Square. Surrounding the manor and its boundary wall is a rock-cut moat 6.4m wide and 2.7m deep that is partly infilled, and partly overlain by modern roads, but still survives to the east of the Hall and in the gardens of Park Cottages and Beytna. The moat's course is defined by a bank up to 1m high north west of Monastery Cottages. Midway across the field behind Monastery Cottages is a second, smaller boundary bank up to 0.5m high. North of Monastery Cottages, and some 25m beyond the line of the infilled moat, is a dry fishpond c.23m by 22m and 0.5m deep with a stone retaining wall on two sides. The Manor at Ince was one of the earliest recorded properties of St Werburgh's Abbey, Chester. The community of secular canons at Chester was disbanded at the Conquest in 1066, but was reinstated as a Benedictine Abbey in 1093. At that date the pre-Conquest manorial properties, including Ince, were guaranteed as part of the monastic estate. The Domesday Book in 1086 records the manor as possessing three hides, with arable land for five ploughs (about 121 ha), and about 1.8 ha of meadow. Edward I was entertained at the Manor in 1277. In 1399 the abbot and convent obtained a licence to crenellate the manor house which was confirmed in 1410. In 1439/40 most of the demesne lands at Ince were farmed or leased out to John Wilkinson and others. By 1538 Ince Manor had been let out to Richard Cowley. After the Dissolution both the manor and rectory of Ince were included in properties of St Werburgh's and they remained in church ownership until the death of Henry VIII in 1547, after which they passed to Sir Richard Cotton. Since then the manor has passed through the hands of various notable families. The Hall and Monastery Cottages are listed Grade I, the enclosing wall around the complex is listed Grade II. All buildings (other than the Hall and Monastery Cottages), property boundaries, driveways, paths and service pipes are excluded from the scheduling, although the ground beneath these features is included. The stone- based wall along the south west of the courtyard, the well, the courtyard and the stone enclosing wall are all included within the scheduling.

MAP EXTRACT The site of the monument is shown on the attached map extract.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 13516
Legacy System: RSM
Sources
Books and journals
Thompson, P, Ince Manor Medieval Monastic Buildings on the Mersey Marshes, (1982)
Other
DOE, Buildings of Special Hist & Arch Interest,
DOE, Buildings of Special Hist & Arch Interest,
Fairclough, Mr. (site owner), To Robinson, K.D. MPPFW, (1991)
Title: Ordnance Survey 1st Edition 6" Map Source Date: 1872 Author: Publisher: Surveyor:
Title: Ordnance Survey Source Date: 1910 Author: Publisher: Surveyor:

| | |
|---|---|
| **Asset/Event Number** | 196 |
| **Asset/Event Name** | Middleton moated monastic grange, eight fishponds and connecting channels |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1009847 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 355596 |

| | |
|---|---|
| **Northing** | 377032 |
| **Parish** | Aston |
| **Council** | Cheshire West and Chester |
| **Description** | A monastic grange was a farm owned and run by a monastic community and independent of the secular manorial system of communal agriculture and servile labour. The function of granges was to provide food and raw materials for consumption within the parent monastic house itself, and also to provide surpluses for sale for profit. The first monastic granges appeared in the 12th century but they continued to be constructed and used until the Dissolution. This system of agriculture was pioneered by the Cistercian order but was soon imitated by other orders. Some granges were worked by resident lay-brothers (secular workers) of the order but others were staffed by non-resident labourers. The majority of granges practised a mixed economy but some were specialist in their function. Five types of grange are known: agrarian farms, bercaries (sheep farms), vaccaries (cattle ranches), horse studs and industrial complexes. A monastery might have more than one grange and the wealthiest houses had many. Frequently a grange was established on lands immediately adjacent to the monastery, this being known as the home grange. Other granges, however, could be found wherever the monastic site held lands. On occasion these could be located at some considerable distance from the parent monastery. Granges are broadly comparable with contemporary secular farms although the wealth of the parent house was frequently reflected in the size of the grange and the layout and architectural embellishment of the buildings. Additionally, because of their monastic connection, granges tend to be much better documented than their secular counterparts. No region was without monastic granges. The exact number of sites which originally existed is not precisely known but can be estimated, on the basis of numbers of monastic sites, at several thousand. Of these, however, only a small percentage can be accurately located on the ground today. Of this group of identifiable sites, continued intensive use of many has destroyed much of the evidence of archaeological remains. In view of the importance of granges to medieval rural and monastic life, all sites exhibiting good archaeological survival are identified as nationally important.<br><br>Despite being located in a woodland context Middleton monastic grange survives well. Its earthworks remain well preserved and the monument is unencumbered by modern development. The site will therefore contain considerable evidence of its original form and the activities which occurred on the enclosed island. Limited excavation at the site found dressed stone remains and further evidence of the monastic grange and subsequent Middleton Hall will exist. An unusual aspect of this monument is its large number of associated waterlogged fishponds which will retain organic material in their sediments. The scale of the moated site and number and complexity of the associated fishponds confirm that this was a grange of considerable importance to its founding monastery.<br><br>Details<br>The monument is Middleton medieval monastic moated grange together with eight fishponds and connecting channels. It is divided into four separate constraint areas. The site includes an island measuring some 64m by 54m that is surrounded by a dry moat up to 12m wide and 2.5m deep. An outer bank 8m wide and 1m high flanks the moat's southern arm. The southwest quadrant of the island has been separated from the remainder by a dry ditch up to 8m wide and 2.5m deep. In `The Coppice', to the east of the moat, lie eight fishponds and connecting channels. At the northeastern end of `The Coppice' are a set of three irregularly-shaped waterlogged ponds measuring, from north to south, some 65m by 37m, 67m by 35m, and 24m by 16m. At the southeastern end of `The Coppice' there is a second set of three ponds measuring, from north to south, 20m by 6m, 43m by 12m, and l7m by 11m. The northerly and central of these ponds remains waterlogged, the southerly pond is dry. Situated between these ponds and the moat are a further two waterlogged ponds, each measuring some 16m by 8m, with an outlet channel issuing from the westerly. The site is considered to be the Mid-Eston referred to in Domesday and known to have belonged to St Werburgh's Church in Chester. The site was confirmed to Norton Priory by John Lacy, Earl of Lincoln and Halton c.1236. A chapel is known to have existed at Middleton with a priest provided by Norton Priory. After the Dissolution the chapel is thought to have continued in use and the island occupied by Middleton Hall. Limited excavation in the moat in 1920 revealed stone octagonal pillars for supporting a timber bridge. All field boundaries are excluded from the scheduling as is the |

corrugated metal sheeting placed across the narrowest part of the northernmost fishpond. The ground beneath these features, however, is included.

MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 13515
Legacy System: RSM
Sources
Books and journals
Talbot, H, Plan of Aston Moat, (1985)
JHEB, , 'Cheshire Sheaf' in Cheshire Sheaf, , Vol. 17, (1920)
Ormerod, G, 'History of Cheshire' in History of Cheshire, , Vol. 3, (1882)
Richards, R, 'Lancs And Chesh Arch Soc' in Trans Lancs And Chesh Arch Soc, , Vol. 102, (1950)
Other
Dennison, E, MPP Single Monument Class Descriptions - Fishponds, (1987)
Dennison, E., MPP Single Monument Class Descriptions - Fishponds, (1988)
SMR No. 932/1/1, Cheshire SMR, Middleton Grange, (1988)

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| | |
|---|---|
| **Asset/Event Number** | 197 |
| **Asset/Event Name** | Peel Hall moated site, Kingsley |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1010795 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 354038 |
| **Northing** | 375533 |
| **Parish** | Kingsley |
| **Council** | Cheshire West and Chester |
| **Description** | Around 6,000 moated sites are known in England. They consist of wide ditches, often or seasonally water-filled, partly or completely enclosing one or more islands of dry ground on which stood domestic or religious buildings. In some cases the islands were used for horticulture. The majority of moated sites served as prestigious aristocratic and seigneurial residences with the provision of a moat intended as a status symbol rather than a practical military defence. The peak period during which moated sites were built was between about 1250 and 1350 and by far the greatest concentration lies in central and eastern parts of England. However, moated sites were built throughout the medieval period, are widely scattered throughout England and exhibit a high level of diversity in their forms and sizes. They form a significant class of medieval monument and are important for the understanding of the distribution of wealth and status in the countryside. Many examples provide conditions favourable to the survival of organic remains.<br><br>Peel Hall moated site survives well and is a good example of the site of a medieval moated mansion house. The monument retains considerable archaeological potential for the survival of evidence of the structural foundations of two earlier building phases of Peel Hall beneath the present house and lawns.<br><br>Details<br>The monument comprises an attractive and well maintained moated site, the island of which is |

occupied by Peel Hall, its outbuildings and lawns. The island measures c.35m square and is raised above the level of the surrounding fields. It is surrounded by a spring-fed waterlogged moat c.9m max. width x 1.8m deep that has been lined with a sandstone wall. The moat widens close to the N corner where provision was made for cattle watering. There are two bridges affording access, that across the NW arm is of sandstone and brick, while the bridge across the SW arm has ornate pinnacled cast-iron posts. The monument has been landscaped with the addition of an ornamental circular island with access via a footbridge close to the W corner. Peel Hall was the ancient seat of the Ardernes family but was burnt down sometime after 1663. A new house was built and this in turn was replaced by the present structure c.1840. Both bridges and the sandstone wall lining the moat are Grade II Listed. The hall and its outbuildings; both bridges and the sandstone wall lining the moat; a path from the bridge over the SW arm to the hall; and all fences and walls flanking the monument are excluded from the scheduling. The ground beneath all these features, however, is included. The ornamental island in the moat is included as any works on it will disturb other remains in the moat. The footbridge which allows access to it is excluded.

MAP EXTRACT The site of the monument is shown on the attached map extract.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 13461
Legacy System: RSM
Sources
Books and journals
Hanshall, JH, History of Cheshire, (1817), 453
Other
10/10/1990, Gleave, Mr T ,
Darvill, T, MPP Single Monument Class Descriptions - Moats, (1989)
DOE, List of Buildings of Historic & Architectural Interest,
SMR No. 976/1, Cheshire SMR, Peel Hall, (1988)

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| | |
|---|---|
| **Asset/Event Number** | 198 |
| **Asset/Event Name** | Promontory fort on Helsby Hill 250m north west of Harmers Lake Farm |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1013292 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 349267 |
| **Northing** | 375388 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | Promontory forts are a type of hillfort in which conspicuous naturally defended sites are adapted as enclosures by the construction of one or more earth or stone ramparts placed across the neck of a spur in order to divide it from the surrounding land. Coastal situations, using headlands defined by steep natural cliffs, are common while inland similar topographic settings defined by natural cliffs are also used. The ramparts and accompanying ditches formed the main artificial defence, but timber palisades may have been erected along the cliff edges. Access to the interior was generally provided by an entrance through the ramparts. The interior of the fort was used intensively for settlement and related activities, and evidence for timber- and stone- walled round houses can be expected, together with the remains of buildings used for storage and enclosures for animals. Promontory forts are generally Iron Age in date, most having been constructed and used between the sixth century BC and the mid-first |

century AD. They are broadly contemporary with other types of hillfort. They are regarded as settlements of high status, probably occupied on a permanent basis, and recent interpretations suggest that their construction and choice of location had as much to do with display as defence. Promontory forts are rare nationally with less than 100 recorded examples. In view of their rarity and their importance in the understanding of the nature of social organisation in the later prehistoric period, all examples with surviving archaeological remains are considered nationally important.

The promontory fort on Helsby Hill is one of a small group of promontory forts in central Cheshire. Despite having been ploughed over, the fort on Helsby Hill survives reasonably well and the ploughsoil will mask significant buried remains. The 1955 excavation of the outer rampart revealed the revetting to seven courses of stone. The monument will retain evidence of the domestic economy and the land use of its period of occupation. The interior will have evidence of habitation sites and defences preserved beneath the soil.

Details
The monument includes a bivallate (double rampart) promontory hill fort on Helsby Hill. The monument is situated on a spur of the central red sandstone ridge which bisects Cheshire. The fort looks out over the estuary of the Mersey. It commands views of the Dee Valley and the Delamere Forest to the west and east respectively.

The fort is defended by the steep cliffs which form the north and west sides of the promontory. On the south and east sides the ground slopes gradually up to the ramparts which defend the fort. There are two banks with ditches between and to the south of the outer rampart. A single inturn of the inner rampart at the west end which leaves a gap of 10m between the inturn and the cliff edge may represent the original entrance. The area of the interior is 1.9ha in extent.

The ramparts have been severely degraded in the two arable fields which occupy the south edge of the defences and the eastern half of the monument. The outer bank is barely visible in the west field and the outer ditch has become infilled and is only identifiable in aerial photographs. The two ramparts in the eastern field only stand 0.4m high and the ditch between is only just visible. The infilled outer ditch is again a cropmark visible on aerial photographs. The inner rampart is well preserved on the west side within the area of public access and here it stands to a height of 2.5m. There is a modern gap in the inner rampart where the lane end to the south enters the enclosure. There are no visible traces of settlement in the interior of the fort, although extensive remains will survive beneath the present ground surface.

The outer rampart was excavated in 1955. A section cut through on the south side revealed that the bank was composed of earth, revetted with dry stone and laced with timbers across the width. This bank was originally 4m wide and was estimated to have stood 2.5m high. The stone revetting shows in the soil of the eastern field also, proving that the inner rampart was of similar construction.

Field boundaries and the surface of the lane into the fort from the south are excluded from the scheduling, although the ground beneath them is included.

MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 5 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 25689
Legacy System: RSM
Sources
Books and journals
Bulock, J D, Helsby Camp, (1955), 107
Other
Cheshire County SMR, (1986)

| | |
|---|---|
| **Asset/Event Number** | 199 |
| **Asset/Event Name** | Bradley promontory fort above Beechbrook 50m south of Beechmill House |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1013296 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 353945 |
| **Northing** | 376796 |
| **Parish** | Kingsley |
| **Council** | Cheshire West and Chester |
| **Description** | Promontory forts are a type of hillfort in which conspicuous naturally defended sites are adapted as enclosures by the construction of one or more earth or stone ramparts placed across the neck of a spur in order to divide it from the surrounding land. Coastal situations, using headlands defined by steep natural cliffs, are common while inland similar topographic settings defined by natural cliffs are also used. The ramparts and accompanying ditches formed the main artificial defence, but timber palisades may have been erected along the cliff edges. Access to the interior was generally provided by an entrance through the ramparts. The interior of the fort was used intensively for settlement and related activities, and evidence for timber- and stone- walled round houses can be expected, together with the remains of buildings used for storage and enclosures for animals. Promontory forts are generally Iron Age in date, most having been constructed and used between the sixth century BC and the mid-first century AD. They are broadly contemporary with other types of hillfort. They are regarded as settlements of high status, probably occupied on a permanent basis, and recent interpretations suggest that their construction and choice of location had as much to do with display as defence. Promontory forts are rare nationally with less than 100 recorded examples. In view of their rarity and their importance in the understanding of the nature of social organisation in the later prehistoric period, all examples with surviving archaeological remains are considered nationally important.<br><br>Despite having been ploughed, the promontory fort at Bradley survives reasonably well and will retain significant information on the form and construction of the rampart as well as the manner in which the interior was used. It is one of a small group of promontory forts in Cheshire.<br><br>Details<br>The monument includes a univallate (single rampart) promontory fort overlooking the valley of the River Weaver at Bradley. The fort is situated on the edge of the sandstone ridge which bisects the county from Frodsham on the north side to the Welsh border near Wrexham. The fort is on a spur on the steep south bank of the brook which flows into the Weaver. Unusually it is situated below the high ground to the east. The fields slope down to the fort on the south side and there is a single ditch and bank constructed in a semicircle to defend the spur. The defences on the north east and north west are formed by the very steep sides of the spur overlooking the valley. The outer ditch and rampart are very degraded, the result of ploughing in the past, and the distance between the front of the ditch and rear of the rampart is 80m. There is no indication of an entrance, but a gully in the side of the hollow way on the north west side may be the way into the interior. On the east side of the defences and in the next field the hedge boundary appears to incorporate the original bank and ditch. This is one of a small group of promontory forts in Cheshire and is the smallest of them. The interior is 0.61ha in extent. The surface of the lane on the west side is excluded from the scheduling where it clips the monument at the north west corner, although the ground beneath is included.<br><br>MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 5 metre boundary around the archaeological features, considered to be essential for the |

monument's support and preservation.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 25693
Legacy System: RSM
Sources
Books and journals
Longley, D, Prehistoric Sites in Cheshire, (1979), 48

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| | |
|---|---|
| **Asset/Event Number** | 200 |
| **Asset/Event Name** | Hillfort on Woodhouse Hill 500m west of Mickledale. |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1013297 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 351067 |
| **Northing** | 375725 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | Slight univallate hillforts are defined as enclosures of various shapes, generally between 1ha and 10ha in size, situated on or close to hilltops and defined by a single line of earthworks, the scale of which is relatively small. They date to between the Late Bronze Age and Early Iron Age (eighth - fifth centuries BC), the majority being used for 150 to 200 years prior to their abandonment or reconstruction. Slight univallate hillforts have generally been interpreted as stock enclosures, redistribution centres, places of refuge and permanent settlements. The earthworks generally include a rampart, narrow level berm, external ditch and counterscarp bank, while access to the interior is usually provided by two entrances comprising either simple gaps in the earthwork or an inturned rampart. Postholes revealed by excavation indicate the occasional presence of portal gateways while more elaborate features like overlapping ramparts and outworks are limited to only a few examples. Internal features included timber or stone round houses; large storage pits and hearths; scattered postholes, stakeholes and gullies; and square or rectangular buildings supported by four to six posts, often represented by postholes, and interpreted as raised granaries. Slight univallate hillforts are rare with around 150 examples recorded nationally. Although on a national scale the number is low, in Devon they comprise one of the major classes of hillfort. In other areas where the distribution is relatively dense, for example, Wessex, Sussex, the Cotswolds and the Chilterns, hillforts belonging to a number of different classes occur within the same region. Examples are also recorded in eastern England, the Welsh Marches, central and southern England. In view of the rarity of slight univallate hillforts and their importance in understanding the transition between Bronze Age and Iron Age communities, all examples which survive comparatively well and have potential for the recovery of further archaeological remains are believed to be of national importance.<br><br>The hillfort on Woodhouse Hill is one of a group of small hillforts in Cheshire. The site survives well in spite of a heavy overburden of woodland and bracken and significant erosion by footpaths and bridleways. The interior of this fort will retain much information about the nature of settlement and the domestic and agricultural economy of the area during the time of its construction and occupation.<br><br>Details<br>The monument includes a hillfort roughly rhomboid in shape on the crest of the sandstone |

ridge at Woodhouse Hill. The fort is univallate (one rampart) and is one of a number of hillforts on the sandstone outcrop which bisects the county from the Mersey estuary to the Welsh border near Wrexham. The defences on the south and west sides take advantage of the natural scarp overlooking the coastal plain. There are traces of a bank to reinforce the natural defence consisting of a slight scarp continuing the recurve of the northern rampart and slightly set back from the cliff edge on the west side. The rampart on the north and east sides is well defined and stands 0.5m to 2m high but is frequently interrupted by gaps. There is no trace of an external ditch. Excavation in 1949 showed that the bank had originally stood 3m high and 4m wide at the base, revetted on each side with dry stone walling. On the north west side a slight inturning of the sides of a gap in that corner may be the original entrance. The area of the interior of the fort is 1.52ha in extent.

MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 5 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 25694
Legacy System: RSM
Sources
Books and journals
Forde Johnston, J, 'Trans Lancs and Ches Arch Soc' in Woodhouse Hillfort, , Vol. 72, (1962), 17-19
Other
Cheshire SMR, (1994)

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| | |
|---|---|
| **Asset/Event Number** | 201 |
| **Asset/Event Name** | The Maiden's Cross, wayside cross 520m SSW of Four Lane Ends |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1013785 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 351436 |
| **Northing** | 373569 |
| **Parish** | Alvanley |
| **Council** | Cheshire West and Chester |
| **Description** | Wayside crosses are one of several types of Christian cross erected during the medieval period, mostly from the 9th to 15th centuries AD. In addition to serving the function of reiterating and reinforcing the Christian faith amongst those who passed the cross and of reassuring the traveller, wayside crosses often fulfilled a role as waymarkers, especially in difficult and otherwise unmarked terrain. The crosses might be on regularly used routes linking ordinary settlements or on routes having a more specifically religious function, including those providing access to religious sites for parishioners and funeral processions, or marking long-distance routes frequented on pilgrimages. Over 350 wayside crosses are known nationally, concentrated in south west England throughout Cornwall and on Dartmoor where they form the commonest type of stone cross. A small group also occurs on the North York Moors. Relatively few examples have been recorded elsewhere and these are generally confined to remote moorland locations. Outside Cornwall almost all wayside crosses take the form of a `Latin' cross, in which the cross-head itself is shaped within the projecting arms of an unenclosed cross. In Cornwall wayside crosses vary considerably in form and decoration. The commonest type includes a round, or `wheel', head on the faces of which various forms of |

cross or related designs were carved in relief or incised, the spaces between the cross arms possibly pierced. The design was sometimes supplemented with a relief figure of Christ and the shaft might bear decorative panels and motifs. Less common forms in Cornwall include the `Latin' cross and, much rarer, the simple slab with a low relief cross on both faces. Rare examples of wheel-head and slab-form crosses also occur within the North York Moors group. Most wayside crosses have either a simple socketed base or show no evidence for a separate base at all. Wayside crosses contribute significantly to our understanding of medieval religious customs and sculptural traditions and to our knowledge of medieval routeways and settlement patterns. All wayside crosses which survive as earth- fast monuments, except those which are extremely damaged and removed from their original locations, are considered worthy of protection.

The Maiden's Cross cross base has lost a shaft and has been tipped over on its side. The base survives in good condition and it is in its original location as both a wayside cross and a marker for the old boundary between Alvanley and Manley. Such a survival in Cheshire is rare.

Details
The monument includes a cross base known as the Maiden's Cross on the east side of the road from Simmonds Hill to Four Lane Ends and on the parish boundary separating Alvanley and Manley. The base is a large block of local sandstone with coarse pebble inclusions and has a square slot carved in the side facing west. This side used to be the top and so the slot forms the socket hole for a cross shaft. The block is buried to halfway across the socle and the measurements of the sides visible are 0.85m wide by 0.48m deep and 0.45m high. The socket measures 0.35m by 0.37m and is 0.34m deep. The original top of the block has chamfered edges 0.17m wide. The whole is worn but complete. The cross stands in its original location beside the road and on the parish boundary. The surface of the road is 1.3m to the west and is excluded from the scheduling although the ground beneath is included. The cross is Listed Grade II.

MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

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| **Asset/Event Number** | 202 |
| **Asset/Event Name** | Roman camp on Birch Hill 200m north west of Birchdale Farm |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1014114 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 352488 |
| **Northing** | 373881 |
| **Parish** | Manley |
| **Council** | Cheshire West and Chester |
| **Description** | Roman camps are rectangular or sub-rectangular enclosures which were constructed and used by Roman soldiers either when out on campaign or as practice camps; most campaign camps were only temporary overnight bases and few were used for longer periods. They were bounded by a single earthen rampart and outer ditch and in plan are always straight-sided with rounded corners. Normally they have between one and four entrances, although as many as eleven have been recorded. Such entrances were usually centrally placed in the sides of the camp and were often protected by additional defensive outworks. Roman camps are found throughout much of England, although most known examples lie in the midlands and north. Around 140 examples have been identified and, as one of the various types of defensive enclosure built by the Roman Army, particularly in hostile upland and frontier areas, they |

provide an important insight into Roman military strategy and organisation. All well-preserved examples are identified as being of national importance.

Although the site does not retain any upstanding remains, it is clearly visible on aerial photographs which show an almost complete ditch circuit on three sides. The site therefore retains significant remains below the topsoil, including debris from the earliest construction and use of the site in the fills of the ditch, and signs of the rampart and possibly preservation of an earlier soil level beneath it. The interior will have indications of the occupation pattern and pits for latrines as well as post holes where timber buildings may have been erected. The ground on the west corner is waterlogged providing a chance of good preservation of the remains in the fill of the ditch at this point. Overall, therefore, the monument will provide important information about the Roman military occupation of this region.

Details
The monument includes a Roman camp visible as a crop mark on aerial photographs in two fields on the south side of the road from Birchhill Cottages to Kingswood Lodge 200m north west of Birchdale Farm. No standing remains survive but the differential growth of crops over the fills of buried ditches is clearly visible on aerial photographs. The camp's enclosing ditch is visible as a crop mark and appears to be about 2m wide, traceable over the two longer sides of a rectangle and showing the characteristic curved profile at the east corner and the west corner. The ditches measure 150m along the longer sides running east-west and 120m along the shorter southern side. The northern side and corner have been interrupted by the road and the north corner has been destroyed by it. The south corner may have been damaged by the removal of a pylon and subsequent replacement of the topsoil at this point in the recent past. There are no visible traces of entrances in the ditch. The surface of the road and stone hedge foundations and a pylon situated 10m to the east of the monument on the south east side are excluded from the scheduling but the ground beneath these features is included.

MAP EXTRACT The site of the monument is shown on the attached map extract.

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| **Asset/Event Number** | 203 |
| **Asset/Event Name** | Duck decoy pond 200m south east of Marsh Bridge |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1014717 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 347809 |
| **Northing** | 382686 |
| **Parish** | Hale |
| **Council** | Halton |
| **Description** | Decoy ponds are artificially created or modified pools of water onto which wildfowl were lured to be trapped and killed for food and for feathers. They consist of a central pool off which lead a number of curving arms or ditches, known as pipes. Nets were constructed over the narrowing ends of these pipes towards which the birds were lured by the decoyman and his dog. Screens were erected along the sides of the pipes with carefully placed gaps so that the dog would be visible to the birds only when his appearance would lead the birds towards the nets at the ends of the pipes. Once at the ends the nets would be dropped and the decoyman was able to wring the birds' necks. The tradition of constructing such ponds appears to have begun in the medieval period, with the simplest designs indicating an early date. The more familiar decoy pond, however, is said to have originated in Holland and to have been introduced into England in the 17th century. The word `decoy' is said to derive from the Dutch `eendenkooi' meaning `duck cage'. Their greatest popularity came in the 18th and 19th centuries when large numbers were built, with a small number continuing in use until World |

War II. The ideal size for a decoy pond was between 1ha and 5ha with a depth of water of not more than a metre. The number of pipes varies from one to more than five, often arranged in symmetrical patterns around the central pool. Although once common features of lowland England (being particularly associated with the east and south east coasts), modern drainage has modified or destroyed all but a few examples. Most examples which survive in a near-complete state of preservation will be considered of national importance and worthy of protection.

The duck decoy at Hale survives remarkably well, retaining the ironwork which supported the nets for the pipes. The brick lined features are well preserved and the drains are cleaned out and functioning. The survival of working features of the site give important information on the original management and function of the decoy during the 17th century.

Details
The monument includes a pentagonal enclosure with an outer ditch, containing a pond with five regularly spaced curving pipes leading into the corners of the pentagon. There is also a boat dock on the north side of the pond bearing a date stone marked 1638. It was constructed as a duck decoy in which the birds were driven into the pipes which were covered over by nets stretched over a frame of iron hoops. This was an important source of food for the manor during the 17th and 18th centuries, yielding an average catch of 1000 birds in a season. The outside bank stands to a height of 2m above the marsh and averages 10m in width at the base. Each side is 120m long. The outside ditch is 5m wide and 2m deep. Inside the bank is a narrow path with drains taking overflowing water to an outfall on the east side. In the centre is a roughly pentagonal pond 90m across, and leading from each corner is a pipe 50m long, 8m wide and tapered at the end. These are still covered by the remains of the iron hoops which were to support the nets at the apex of the pipes. Each pipe was constructed of brick at the sides, with a clay bottom. On the north side of the pond is a small dock for a boat also constructed of brick, with a date stone marked RC 1638. The area enclosed is 1.8ha. A small brick-built hut on the island, which was an addition to the decoy, provided a shelter for those working the pond. On the north side of the decoy there is a modern swing footbridge over the moat which may occupy the position of an earlier bridge. The footbridge and its footings are not included in the scheduling, although the ground beneath is included.

MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

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| **Asset/Event Number** | 204 |
| **Asset/Event Name** | Roman fortlet at Ince, 150m north east of Hall Farm |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1014723 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 344873 |
| **Northing** | 377081 |
| **Parish** | Ince |
| **Council** | Cheshire West and Chester |
| **Description** | Roman fortlets are small rectangular enclosures with rounded corners defined by a fortified rampart of turf and earth with one or more outer ditches. The ramparts were originally revetted at the front and rear by timber uprights in shallow trenches and were almost certainly crowned with timber wall walks and parapets. Fortlets were constructed from the first century AD to at least the later fourth century AD to provide accommodation for a small detachment of troops generally deployed on a temporary basis of between one to two years and supplied by a |

fort in the same area. The function of fortlets varies from place to place; some were positioned to guard river crossings or roads, particularly at vulnerable points such as crossroads, whilst others acted as supply bases for signal towers. Roman fortlets are rare nationally with approximately 50 examples known in Britain, half of which are located in Scotland. As such, and as one of a small group of Roman military monuments which are important in representing army strategy and therefore government policy, fortlets are of particular significance to our understanding of the period and all surviving examples are considered nationally important.

The Roman fortlet at Ince is visible as a cropmark in aerial photographs and excavation has shown that it is well preserved beneath the topsoil. The interior will have much evidence of the form and function of the monument and the ditch bottoms will have evidence of the refuse discarded by the original inhabitants.

Details
The monument includes a double ditched enclosure to the north of the village of Ince identified as a Roman fortlet. The enclosure was first discovered by aerial photographs in 1994 and subsequent excavation has confirmed its form and established a date in the Roman period. The enclosure has two rock-cut ditches surrounding the site. These enclose an area of 0.48ha. Excavation has established that there are postholes for wooden buildings on the site, and that these buildings were in occupation during the time of the occupation of the Roman fortress at Chester. The area enclosed is rectangular with well rounded corners. The interior measures 80m by 60m, the ditches being 9m apart. The site commands a wide view of the estuary of the Mersey, being on a promontory overlooking the former channel of the river which used to flow beneath the cliffs. The fortlet is comparative with that near Castleshaw in Greater Manchester. Its function seems to have been the observation of sea traffic in the estuary. Buildings shown on the 1:10000 map to overlie the monument no longer exist.

MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 10 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 27589
Legacy System: RSM
Sources
Books and journals
Philpott, R, 'Cheshire Past' in Cheshire Past, (1995), 4
Other
Philpott, R, (1994)

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| **Asset/Event Number** | 205 |
| **Asset/Event Name** | Augustinian Abbey known as Norton Priory |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1015603 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 354916 |
| **Northing** | 382999 |
| **Parish** | Halton |
| **Council** | |
| **Description** | From the time of St Augustine's mission to re-establish Christianity in AD 597 to the reign of |

Henry VIII, monasticism formed an important facet of both religious and secular life in the British Isles. Settlements of religious communities, including monasteries, were built to house communities of monks, canons (priests), and sometimes lay-brothers, living a common life of religious observance under some form of systematic discipline. It is estimated from documentary evidence that over 700 monasteries were founded in England. These ranged in size from major communities with several hundred members to tiny establishments with a handful of brethren. They belonged to a wide variety of different religious orders, each with its own philosophy. As a result, they vary considerably in the detail of their appearance and layout, although all possess the basic elements of church, domestic accommodation for the community, and work buildings. Monasteries were inextricably woven into the fabric of medieval society, acting not only as centres of worship, learning, and charity, but also, because of the vast landholdings of some orders, as centres of immense wealth and political influence. They were established in all parts of England, some in towns and others in the remotest of areas. Many monasteries acted as the foci of wide networks including parish churches, almshouses, hospitals, farming estates and tenant villages. Some 225 of these religious houses belonged to the order of St Augustine. The Augustinians were not monks in the strict sense, but rather communities of canons - or priests - living under the rule of St Augustine. In England they came to be known as `black canons' because of their dark coloured robes and to distinguish them from the Cistercians who wore light clothing. From the 12th century onwards, they undertook much valuable work in the parishes, running almshouses, schools and hospitals as well as maintaining and preaching in parish churches. It was from the churches that they derived much of their revenue. The Augustinians made a major contribution to many facets of medieval life and all of their monasteries which exhibit significant surviving archaeological remains are worthy of protection.

The Augustinian abbey at Norton Priory is unusual in that it is the only example to have been the subject of recent extensive excavation. In addition, it has been located in its contemporary landscape through a survey of the medieval remains on the whole of the manor and a document survey of the total extent of its landholdings in Cheshire and elsewhere. Although there has been extensive excavation of the buildings which have been discovered so far, there remain buildings shown on a 16th century sketch plan which have not been explored. The remains of the buried moat and other water features will preserve important waterlogged remains and will give information about the domestic economy of periods of occupation from the 12th to the 18th century. The graveyard will have remains of the monastic community during the life of the monastery and will yield information about diet, disease and life expectancy of the brethren and their lay community. The quadrangular enclosure on the east side of the site may have important evidence of a monastery garden or orchard under the surface soil.

Details
The monument includes the remains of an Augustinian abbey with the ruins of the abbey church, cloister, chapter house, dormitory, refectory, kitchens, Abbot's lodgings, latrines, drains, guest house, an early church building, a bell pit, a tile kiln, the monastic cemetery and an extensive surrounding water feature designed to create a moated site for the complex of buildings. The priory was founded in 1133 by William Fitznigel, baron of Halton, for a community of Augustinian canons. In 1391 the priory was raised in status to become an abbey. The main buildings have been extensively explored by excavation in the period 1970-1985 and the surviving foundations laid out and consolidated for public display. To the west of the range of buildings a museum with an interpretation centre and restaurant with attendant offices has been erected. The site of the monastery was surrounded by a moat, visible on a 1757 estate map, now filled in. On the west side was a millpond taking water from a small stream flowing into the pond from the south. This feature has now been destroyed. In the south west corner of the site a sluice took water from the head of the millpond and fed a ditch or moat which ran eastwards for 150m, turned abruptly to the north for 70m and then headed east for 100m. The moat then turned north west and ran for 260m before turning south west for 140m and apparently terminating at a point on the road from Manor Farm to the north of the priory buildings. This northern sector of the moated platform has been destroyed by the building of the A558. In the south east corner of the area described by the moat was a quadrilateral enclosure also surrounded by ditches measuring approximately 70m by 100m. On the moated platform, apart from the abbey buildings, are a number of other features including an excavated bell pit on the western side of the old courtyard, a moated garden or orchard on the

south eastern side, a tile kiln and an extensive burial ground on the eastern side of the abbey buildings which ran as far as the moat ditch on the east side of the site. The abbey church is on the north side of the site. It was begun in c.1135 and shows six phases of construction and alteration. The final building consists of a nave, north aisle, north and south transepts, chancel, three chapels at the east end and a crossing for a central tower. The church is 86m long. It is built of local sandstone with ashlar facing blocks and rubble cored walls. Floor levels which survived included early 14th century floor tiles and above them a 15th century tiled floor in the choir. Within the building were stone coffins and a large number of burials. Some of the coffins are now laid out with the building foundations on display. To the south of the nave are the cloister, the Abbot's lodgings and, attached to the lodgings, the Abbot's tower. Little of the cloister remains. The garth was 17m square. It was surrounded by an ambulatory showing four phases of building commencing in the 12th century. During the mid-13th century the builders elaborated the buildings and added buttresses and projecting doorways on each side of the garth. Fragments of a fine arcade from this phase are now restored in the museum. After the Dissolution this area was levelled and used as a rubbish dump. The cellarer's range with the Abbot's lodgings are the only original buildings still standing on the site. The cellars have had a roof added by the restorers to protect the remains below. The entrance door on the west side is from c.1180 as is the quadripartite vaulted roof on plain columns within the building. On the north side is a passage with blind arcading which was revealed during the conservation of the building. During the 15th century a tower house, known as the Abbot's Tower, was built on the west side of this range. To the south of the choir was a sacristy and the original chapter house. The later chapter house was added to this building on the east side during the 13th century. To the south of the cloister and chapter house are the refectory range with a short passage to the dormitory range. On the south west side of the refectory were the kitchens and on the south east end of the complex was the T-shaped reredorter. The main drain for the abbey buildings ran across the south end of the site and was connected to the kitchens and the latrine block. This flowed to the east for 100m and connected with the moat ditch on the east side of the site. The millpond and mill, together with the moats which surrounded the site, are presumed to date from the medieval period. The moat ditch is shown on the estate map of 1757 and has now been filled in. The excavators traced its original extent on the south and east sides of the site and revealed that the ditch was 10m wide and about 2m deep. It will survive elsewhere as a buried feature. At the western end of the main drain was a building complex of some quality. This was a late construction and overlaid a small quarry pit, ditches and drains. It had painted window glass and the overall opulence of the construction led the excavators to believe that it had been the guest quarters for the abbey. Just to the north of this guest building the excavations revealed a series of timber buildings which were interpreted as the temporary lodgings for the monastery during the first phase of the buildings in stone in the 12th century. These were overlaid by the kitchens during the 13th century. Some foundations of an early building were also uncovered 5m to the north of the west end of the abbey church. These have been interpreted as the remains of an earlier church. At the time of the Dissolution the priory incorporated six manors or granges as well as the extensive lands of the manor of Norton. It was valued at 78 pounds 10 shillings 5 1/4 pence and this corresponds to the average holdings for an Augustinian house. The remains of the abbey buildings were incorporated into a Tudor mansion after the Dissolution. The church was allowed to fall down. A ground plan of the mansion in the 17th century shows that there were other, possibly medieval buildings on the west side of the site and flanking a mill pool which lay along the western boundary of the moated platform. The Tudor mansion was replaced by a Georgian country house built in about 1750. This was occupied until 1921 when the family moved to a more modern and convenient house near Worcester. The site and gardens were then left derelict until the 1970s when the archaeological investigation began. The modern museum buildings, the surface of paths and the post medieval garden features on the site, including structures, are excluded from the scheduling, although the ground beneath is included. The undercroft building, the only part of the medieval priory still standing, is included in the scheduling. The ruins are Listed Grade I.

MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 5 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 27608
Legacy System: RSM
Sources
Books and journals
Greene, J P, Norton Priory, (1989), passim
Greene, J P, Norton Priory, (1989), 122
Greene, J P, Norton Priory, (1989), 65-7
Greene, J P, Norton Priory, (1989), 26
Greene, J P, Norton Priory, (1989), 79-84
Greene, J P, Norton Priory, (1989), 105
Greene, J P, Norton Priory, (1989), 2
Greene, J P, Norton Priory, (1989), 32
Greene, J P, Norton Priory, (1989), 136-8
Greene, J P, Norton Priory, (1989), 118-22
Other
Cheshire SMR, Moat System at Norton Priory,
Norton Priory museum, (1996)
Norton Priory, (1986)

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| **Asset/Event Number** | 206 |
| **Asset/Event Name** | Halton Castle: a ruined shell keep castle on the site of an earlier motte and bailey |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1015606 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 353771 |
| **Northing** | 382048 |
| **Parish** | Halton |
| **Council** | |
| **Description** | A shell keep castle is a masonry enclosure, extending around the top of an earlier motte or castle ringwork, and replacing the existing timber palisades; there are a few cases where the wall is built lower down the slope or even at the bottom. The enclosure is usually rounded or sub-rounded but other shapes are also known. A shell keep is relatively small, normally between 15 and 25m diameter, with few buildings, and perhaps one tower only, within its interior. Shell keeps were built over a period of about 150 years, from not long after the Norman Conquest until the mid-13th century; most were built in the 12th century. They provided strongly fortified residences for the king or leading families and occur in both urban and rural situations. Shell keep castles are widely dispersed throughout England with a marked concentration in the Welsh Marches. The distribution also extends into Wales and to a lesser extent into Scotland. They are rare nationally with only 71 recorded examples. Considerable diversity of form is exhibited with no two examples being exactly alike. Along with other castle types, they are major medieval monument types which, belonging to the highest levels of society, frequently acted as major administrative centres and formed the foci for developing settlement patterns. Castles generally provide an emotive and evocative link to the past and can provide a valuable education resource, both with respect to medieval warfare and defence, and to wider aspects of medieval society. All examples retaining significant remains of medieval date are considered to be nationally important.<br><br>The present castle dates from the 13th century but it is clear from excavations that it supercedes a motte and bailey castle which occupied the north western side of the site. This form of castle was introduced by the Normans and consisted of a mound of earth capped by a timber fortification. A ditch was cut into the bedrock on the east side and the attached bailey occupied the rest of the crown of the hill. The ruins of the castle at Halton survive well despite |

the later insertion of a courthouse on the site of the gatehouse and the creation of a folly garden within the ruins. It has within the western half of the interior the buried remains of an extensive range of late medieval domestic buildings as well as the remains of six lock-ups from the 18th century refurbishment of the site as a courthouse and prison. Excavation during 1986-7 has revealed that much of the site retains buried deposits of the earlier phases of occupation of the castle. The castle is a prominent local landmark. When it is considered together with the priory and later abbey at Norton and the remains of the medieval village of Norton, it is clear that here are the vestiges of an extensive surviving medieval landscape. Many of the features of this landscape survive in an area of extensive 20th century development for the new towns of Widnes and Runcorn.

Details
The monument includes the ruined castle remains at Halton together with an area to the east of the castle which will retain buried deposits of midden material and the remains of secular settlement located immediately outside the castle. The castle stands on a prominent hill of red sandstone and overlooks the estuary of the River Mersey to the north and east and the low marshlands at the foot of the hill on the western and eastern sides. It is in a strategic position overlooking the Runcorn Gap. Halton is one of a series of castles built on the sandstone ridges of Cheshire including to the south Beeston Castle. The first castle on the site was a motte and bailey timber castle built by Hugh Lupus, Earl of Chester, in c.1070. This was formed by cutting off the highest part of the promontory on the north western side by a ditch 8m wide and utilising the natural platform on the rest of the hilltop as a bailey. The castle was occupied by Nigel, the first baron of Halton, who also founded the priory at Norton. In the subsequent three centuries the phases of building and rebuilding in stone are obscured since all rebuilding took place after scraping the previous phase off the bedrock and rebuilding on that foundation. Any surviving remains from these demolitions will lie at the bottom of the slope outside the curtain wall on the east, north and west sides. By c.1250 the curtain wall had been built, together with a square tower on the west side, over the ditch (which had been infilled), a round tower at the north end, and stone buildings in a range along the north western side. During this period, from the 11th to the 13th centuries, the ownership passed to the Lacy family, the Lords of Pontefract, who became Dukes of Lancaster in 1311. In the 15th century a gatehouse was constructed and a survey of 1476 mentions a number of buildings including a great chamber, a withdrawing room, a chapel, a hall and a number of lesser domestic buildings on the site. The castle was used as a prison for Roman Catholic recusants in 1579. It was besieged and captured by Sir William Broton in 1643 and partly demolished on Cromwells orders in 1644. The castle was depicted in a view by the Buck brothers in 1727 as a ruin. In 1738 the gatehouse was replaced by a new courthouse and prison and a series of small lock-ups built in the castle interior to the north of this building. Again the previous remains were cleared from the bedrock on the site and the new building erected on the platform. The site was investigated by excavation in 1986-7 and nine trenches were uncovered mainly in the north and west of the site. The standing remains are interpreted here in the light of these excavations. Nothing remains of the early timber phase of the buildings and the ditch of the early motte site was filled in in the 13th century. The curtain wall, which surrounded the castle platform, only survives as foundations with some courses of stone remaining on the north west side and the south side up to the west wall of the courthouse building. The best preserved section is to the west of the square tower remains on the north west wall. The rounded plan of the western end of the site suggest a stone built shell keep. The stone tower dates from the 13th century and measures 12m square at the base with walls up to 2.75m thick. Next to this tower are the foundations of a building which is interpreted as a kitchen range with a serving hatch in its east wall. Little of the buildings survives above ground. In the 18th century the walls of a folly were constructed to the east of the courthouse where they still form a castlellated feature. In the interior of the platform there is now a walled garden dating from the 19th century and the cells of the 18th century lock-ups have been incorporated in the east side of this enclosure. In addition, the eastern half of the enclosure was laid out as a bowling green in the 19th century levelling the interior and obscuring the remains of any earlier buildings. The castle ruins are Listed Grade I. Two concrete platforms for pavilions for the bowling green in the centre of the site are excluded in the scheduling, although the ground beneath them is included.

MAP EXTRACT The site of the monument is shown on the attached map extract.

Legacy
The contents of this record have been generated from a legacy data system.

Legacy System number: 27611
Legacy System: RSM
Sources
Books and journals
McNeil, R, Halton Castle a Visual Treasure, (1987)
McNeil, R, Halton Castle a Visual Treasure, (1987)
McNeil, R, Halton Castle a Visual Treasure, (1987), 27
McNeil, R, Halton Castle a Visual Treasure, (1987), 21
Ormerod, , History of Cheshire, (1882)
Ormerod, , History of Cheshire, (1882)

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| **Asset/Event Number** | 207 |
| **Asset/Event Name** | Dovecote at the site of Aston Old Hall, 40m east of Gamekeepers Cottage |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1018703 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 355314 |
| **Northing** | 378042 |
| **Parish** | Aston |
| **Council** | Cheshire West and Chester |
| **Description** | Dovecotes are specialised structures designed for the breeding and keeping of doves as a source of food and as a symbol of high social status. Most surviving examples were built in the period between the 14th and the 17th centuries, although both earlier and later examples are documented. They were generally freestanding structures, square or circular in plan and normally of brick or stone, with nesting boxes built into the internal wall. They were frequently sited at manor houses or monasteries. Whilst a relatively common monument class (1500 examples are estimated to survive out of an original population of c.25,000), most will be considered to be of national interest, although the majority will be listed rather than scheduled. They are also generally regarded as an important component of local distinctiveness and character.<br><br>The dovecote at Aston Old Hall is important as it is one of the few double dovecotes in England. The design and construction of the building suggest that it was the work of master builders. It provides evidence of the importance attached to this method of food production and provision of manure during the 17th century, documentary evidence for which is provided by the Aston Papers, stored at Aston Lodge.<br><br>Details<br>The monument includes a dovecote attached to the southern end of a barn in the grounds of Gamekeepers Cottage. The dovecote, which is Listed Grade II, was originally free-standing and has a date stone, with the year 1691 carved into it, set into the wall above the bricked up west doorway. The building formed part of the refurbishment of the Old Hall by the Aston family after the Civil War. The hall has been pulled down and is now represented by a moated platform among the trees at the east side of the dovecote. The dovecote, which is now roofless, is large in comparison to other examples and stands on a plinth of sandstone blocks measuring 11m by 5.4m. It is built of brick, 12m high at the gables, with a plain brick band halfway up the wall and no other embellishment. The blocked doorway in the west wall has sandstone quoins and lintel. Two entrances at the rear are without stonework and are probably more recent. The dovecote was originally divided into two chambers by a wall up to |

the roof. This has been removed but the toothing is still visible. The nest boxes are constructed with an alighting ledge made of two courses of brick of which the lower course has the bricks set diagonally to support the course above. The original design would have thus provided about 1300 nest boxes. In the northern wall is a window opening with a stone mullion, now blocked up, which originally provided an entrance for the stock. There are now no traces of the wooden ladders nor of the potence which would have provided access to the boxes, but a large squared stone block with a socket hole, leaning against the wall at the rear of the bulding, may have been part of this machinery.

MAP EXTRACT The site of the monument is shown on the attached map extract.

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| | |
|---|---|
| **Asset/Event Number** | 208 |
| **Asset/Event Name** | Heavy Anti-aircraft gunsite, 400m west of Sutton Fields Farm |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1019849 |
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 354907 |
| **Northing** | 379358 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | Although of comparatively recent date, 20th century military sites are increasingly seen as historic survivals representing a defining episode in the history of warfare and of the century in general; as such they merit careful record and, in some cases, preservation. One of the more significant developments in the evolution of warfare during this period was the emergence of strategic bombing in World War II, and this significance was reflected by the resources invested in defence, both in terms of personnel and the sites on which they served. During the war, the number of people in Anti-aircraft Command reached a peak of 274,900 men, additional to the women soldiers of the ATS who served on gunsites from summer 1941, and the Home Guard who manned many sites later in the war. A national survey of England's Anti-aircraft provision, based on archive sources, has produced a detailed record of how many sites there were, where they were and what they looked like. It is also now known from a survey of aerial photographs how many of these survive. Anti-aircraft gunsites divide into three main types: those for heavy guns (HAA), light guns (LAA) and batteries for firing primitive unguided rockets (so called ZAA sites). In addition to gunsites, decoy targets were employed to deceive enemy bombers, while fighter command played a complementary and significant role. Following the end of World War II, 192 HAA sites were selected for post-war use as the Nucleus Force, which was finally closed in 1955. The HAA sites contained big guns with the function of engaging high flying strategic bombers, hence their location around the south and east coasts, and close to large cities and industrial and military targets. Of all the gunsites, these were the most substantially built. There were three main types: those for static guns (mostly 4.5 and 3.7 inch); those for 3.7 inch mobile guns; and sites accommodating 5.25 inch weapons. These were all distinct in fabric, though they could all occupy the same position at different dates, or simultaneously by accretion. As well as the four or eight gun emplacements, with their holdfast mountings for the guns, components will generally include operational buildings such as a command post, radar structures including the radar platform, on-site magazines for storing reserve ammunition, gun stores and generating huts, usually one of the standard Nissen hut designs. Domestic sites were also a feature of HAA gunsites, with huts, ablutions blocks, offices, stores and amenities drawn from a common pool of approved structures. Sites were often also provided with structures for their close defence; pillboxes are the most common survivals, though earthwork emplacements were also present. The layout of HAA gunsites was distinctive, but changed over time, for example to accommodate the introduction of radar from December 1940, women soldiers from summer 1941, and eight gun layouts from late 1942. Nearly 1,000 gunsites were |

built during World War II, and less than 200 of these have some remains surviving. However, at only around 60 sites are these remains thought sufficient to provide an understanding of their original form and function. This includes 30 of the 192 examples which continued in use until 1955. Surviving examples are therefore sufficiently rare to suggest that all 60 well preserved examples are of national importance.

The Heavy Anti-aircraft gunsite 400m west of Sutton Fields Farm is exceptionally well-preserved. The operational core of the original plan survives as standing concrete and brick buildings with few additions or demolished structures. The details include electrical fittings and the hardboard wall linings of the command post and wooden racks for the shells in the four standing gun emplacements. The concrete stanchions for the perimeter fence also survive.

Details
The monument includes the standing, earthwork and buried remains of the World War II Heavy Anti-aircraft (HAA) gunsite at Sutton Weaver. In official army records this site is called Station H18 or Sutton. The site includes the core functional buildings, consisting of five gun emplacements, a command post, two garages with maintenance bays adjacent to them and a generator building. Billeting for the staff was in huts to the south of the present complex and these have not survived. Station H18 was first mentioned in February 1940. In June 1942 it was armed with four 3.7in guns supported by GL MkII radar and manned by units of the Home Guard. It was not one of the 192 HAA gunsites to be retained as part of the post-war Nucleus Force after 1945. The gun emplacements are arranged in an arc around the south eastern and south western sides of the central command post. The defence focus was therefore the Weaver Navigation and the Manchester Ship Canal. Four of the emplacements survive as concrete octagonal open pens, measuring approximately 7.5m across with two opposing open facets. There are no hinge bolts for steel blast doors in these buildings. Inside each, attached to four of the six remaining walls there are concrete roofed boxes which served to store ammunition and offer shelter for the gun crews when they were not in action. Wooden racking for the shells survives in some of these boxes. On two of the outside walls of each gunpit there is also a concrete roofed shelter, which served as a shelter and store for equipment. These four emplacements survive to their original height. A fifth emplacement is represented by a circular concrete plate set into the ground to the east of the command post. The rest of this emplacement has been levelled. To the north of the emplacements and occupying the centre of the site is a concrete roofed command post with its centre open to the sky. This would have held offices, a predictor and a telescope for identifying target aircraft. This complex is partly below ground level. In these buildings electrical fittings, the original hardboard wall lining and even cardboard fire regulation notices survive. The radar was probably situated 20m to the north on a brick revetted platform. To the north west and north east of the command post are two brick-built open bays, approximately 8m square with open sides facing into the centre of the complex. The walls are approximately 2m high and the structures are unroofed. Each is associated with a concrete garage. Some 40m to the north of the command post is a large concrete roofed building with garage bay doors on the eastern side and steel louvre grills on the south wall. This was for a heavy generator to provide power for the complex independent of the national electricity supply. The site is surrounded by its original concrete posts which used to support a wire-mesh fence and two rows of barbed wire at the apex. Several items are excluded from the scheduling. These include: all modern fences and gates, more recent doors and wooden attachments to the original buildings, permanent and semi-permanent outbuildings and caravans. The ground beneath these features, however, is included.

MAP EXTRACT The site of the monument is shown on the attached map extract. It includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

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|---|---|
| **Asset/Event Number** | 209 |
| **Asset/Event Name** | Daresbury |
| **Type of Asset/Event** | Scheduled Monument |
| **Listing No./NRHE Number** | 1417593 |

# Gazetteer of Heritage Assets and Event

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|---|---|
| **HER Number** | |
| **Status** | Scheduled Monument |
| **Easting** | 354163 |
| **Northing** | 378503 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | The remains of a Mersey Flat sailing barge known as DARESBURY situated within the west end of Sutton stop lock on the Weaver Navigation, near the village of Sutton Weaver.<br><br>Reasons for Designation<br>The remains of Daresbury, an C18 Mersey Flat, are scheduled for the following principal reasons: * Rarity: Daresbury represents the only known pre-1840 survival of a once widespread regional sailing vessel; * Survival: despite deterioration as a result of neglect and weathering, the wreck of the Mersey Flat Daresbury survives reasonably well and retains a number of her key characteristics; * Potential: the survival of a number of characteristic features means that Daresbury has considerable potential for providing an insight into late 18th century boat construction techniques; * Documentation: the importance of the vessel is considerably enhanced by abundant contemporary documentation; * Historic: the Mersey Flat was a key link in the distribution process of commercial expansion of the North Atlantic trade.<br><br>History<br>The flat (Mersey flat and Weaver flat) was the inland and coastal barge of the North West. It was built and operated from the Dee Estuary to as far north as Whitehaven and was a key link in the distribution process of commercial expansion of the North Atlantic trade. The biggest concentration was on the Mersey and its linking navigable waterways, including the River Weaver opened in 1732. They were built in large numbers from the early 18th century and were used to transport goods from Manchester, the Cheshire Salt towns and local coal fields. Large numbers survived into the 20th century but they were abandoned as inland waterway traffic dwindled.<br><br>The essentials of the flat, whether at sea or inland, were an apple cheeked bow, pointed or transom stern, very little sheer, especially in the case of canal boats, and a flat bottom. It was typically about 60ft to 65ft long and 15ft beam. Flats were very strongly built, of carvel construction with a huge keelson to compensate for the wide hold openings. Some, like the Daresbury, remained afloat for over a century. Some had a single mast, with a fore and aft rig, while some had an additional mizzen mast. Steering was by a huge rudder with a long curved tiller controlled with the help of a tackle. Steam towage was regularly used on the Mersey from the 1830s and many of the inland flats lost their sails as a result. Most of the Mersey flats had been converted to dumb barges by the end of the 19th century, which were towed by horses or by steam tugs.<br><br>Detailed records survive in the archives of the River Weaver Navigation, and these were studied in the 1950s in relation to the Daresbury by John H Scholes, the Curator of Historic Relics for the British Transport Commission. His findings are summarised in a letter of 20th October 1958. Mr Scholes was also able to study the vessel while she was still afloat and his findings are also summarised in the above letter and these form the basis of the following account, up until 1958. The records document the construction of the Daresbury in the latter part of 1772 by a Samuel Edwards, boat builder. In 1792 and 1796 she is recorded as being owned by the Weaver Navigation Trust employed in carrying coals. On 7th April 1802 an account of £4.4s was settled for dry-docking the Daresbury while at much the same time a William Holland was employed to lengthen an un-named flat by 8 feet. Studies of Daresbury by John Scholes established that the surviving vessel was about 8 feet longer than the original build and it seems safe to conclude that the Daresbury was lengthened in the early 1800s. The documents contain no evidence to support a claim by a worker on the Weaver Navigation that Daresbury was built at Leftwich in 1864 and it seems likely that this was the date at which the vessel was converted to a floating derrick, which is how she spent the latter part of her working life. |

There are records of further repairs in 1926 and 1934, while a photograph shows her still afloat at Northwich in 1956, at the time of John Scholes' study. In 1985 Daresbury joined the graveyard of other waterways craft at Sutton Locks on the River Weaver, it being sunk in the smaller of the two disused locks. Notwithstanding this, plans were underway to recover and restore it. The Daresbury Plate, designed and manufactured by Wedgewood and still on sale at the Waterways Museum, was produced as part the campaign to raise the necessary funds. In 1986 divers from HMS Eagle inspected the hull and found it in relatively good condition and the keel sound. The intention was that the vessel would be raised as a training exercise for the Royal Engineers and conveyed on a low loader to the museum at Ellesmere Port. A re-evaluation of the issues involved led to this plan being abandoned.

Details
Daresbury is grounded and largely submerged within standing water of unknown depth, with the upper parts of her hull surviving above the present water line (October 2013). The vessel is of carvel-built timber construction and measures 17.5m long by 4.88m wide. She lies towards the west end of the small lock, closer to its south side than the north. The stern is at the west end and, hence, the vessel appears to have been 'parked' facing upstream. The vessel has a flat, or transom, stern and although the upper part survives in a fragmentary fashion, a substantial upright timber might be part of the rudder arrangement. Some of the planks forming the deck of the stern section are visible within the hull. Although the exact position of the stern cannot be established, the slightly inward curving sections of the hull exhibited several square sectioned baulks of timber projecting above the line of the gunwales. These are considered to be the remains of a low, 'safety', rail commonly provided around the stern of flats, vessels being steered from this part of the deck. Similar 'safety' rails can be seen on the C19 flats at the Ellesmere Port Museum.

A prominent feature about 4.5m from the stern is an upright baulk retaining traces of a cleat for attaching a rope on the side facing the stern. This features in the earlier photographs of Daresbury afloat at Northwich; lying alongside it appears to be the recumbent boom of the derrick and it is considered that the surviving upright baulk is related to the use of the derrick. Forward from the stern deck section is the hold, now full of water. This is about 9m long, and the horizontal ceiling planks that lined the inside of the hold are visible. This planking is fixed to the inside face of the ribs that formed the main structural elements of the hull, the carvel strakes being fitted to the outer face of the ribs and visible on the port side. In three places on the starboard side these ribs project above the line of the gunwales and in each case they exhibit a horizontal, metal peg fitted through them, forming a mooring cleat or bollard.

The bow section, beyond the hold, was also planked over to provide a working deck; a single plank remains visible, but iron knees, for supporting the deck, are visible on both the port and starboard quarters. About 9m beyond the conjectured position of the bow several large metal items and a baulk of timber are visible within the lock. Partly submerged, their identification is uncertain but one at least appears to be a cogged wheel. Photographs of the Daresbury afloat, show a substantial winch mechanism mounted on the foredeck as part of the arrangements for raising and deploying the derrick.

Extent of Scheduling: the scheduling comprises a rectangular area a maximum of 37m by 7m, and includes the full extent of Sutton Lock in order to ensure that any hull fragments and associated fixtures which may have become detached from the vessel are included; the area has been drawn within the lock walls on the north and south sides.

Sources
Books and journals
MacGregor, D R, Merchant Sailing Ships 1850-1875, (1984), 234
Mannering, J , The Chatham Directory of In-shore Craft: Traditional Working Boats of the British Isles, (1997), 210
Stammers, M, Mud Flats Archaeology in Intertidal and Inland Waters Around the Mersey Estuary, (1999), 6
Stammers, M K, 'The International Journal of Nautical Archaeology' in The Archaeology of the Mersey Estuary: Past Work and Future Potential, (1994), 27-33
Websites
Hulk Assemblages: Assessing the national context, accessed from

http://archaeologydataservice.ac.uk/archives/view/hulk_2012/index.cfm
The Daresbury on the Weaver Navigation, accessed from http://www.bbc.co.uk/arts/yourpaintings/paintings/the-daresbury-on-the-weaver-navigation-103402
Wrecks on the River Weaver!, accessed from http://www.canaljunction.com/news/info12.htm
Other
D4048: Letter from Mr John H Scholes Esq. (Curator of Historical Relics at The British Transport Commission) detailing his observations on the origins and alterations to Daresbury. National Waterways Museum Archive, Ellesmere Port.,

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|---|---|
| **Asset/Event Number** | 210 |
| **Asset/Event Name** | Halton Village |
| **Type of Asset/Event** | Conservation Area |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Conservation Area |
| **Easting** | 353780 |
| **Northing** | 381844 |
| **Parish** | |
| **Council** | |
| **Description** | DESIGNATED_DATE 25 SEPT 1970<br><br>Halton Borough Council. 2008. HALTON VILLAGE CONSERVATION AREA APPRAISAL AND MANAGEMENT PLAN PUBLIC CONSULTATION DRAFT 2008. Available at: https://moderngov.halton.gov.uk/documents/s6399/Appendix%201%20-%20Halton%20Village%20Conservation%20Area%20Appraisal%20and%20Management%20Plan.pdf |

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|---|---|
| **Asset/Event Number** | 211 |
| **Asset/Event Name** | Higher Runcorn |
| **Type of Asset/Event** | Conservation Area |
| **Listing No./NRHE Number** | |
| **HER Number** | |
| **Status** | Conservation Area |
| **Easting** | 350805 |
| **Northing** | 382100 |
| **Parish** | |
| **Council** | |
| **Description** | DESIGNATED_DATE 21 JULY 1975 |

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|---|---|
| **Asset/Event Number** | 212 |
| **Asset/Event Name** | 53, HOLLOWAY |

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|---|---|
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1104841 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350792 |
| **Northing** | 382196 |
| **Parish** | Halton |
| **Council** | |
| **Description** | 5/78 No. 53 (formerly listed as House to 7.12.65 north west of the Elms)<br><br>II House 1779 brown brick with slate roof 2 storeys 2 bay stone plinth and quoins. Pedimented stone doorcase with architrave and pulvinated frieze. Studded entrance door. Near flush casements with lintels marked as voussoirs. |

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|---|---|
| **Asset/Event Number** | 213 |
| **Asset/Event Name** | RUNCORN TOWN HALL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1104859 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351904 |
| **Northing** | 382101 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Mansion in private park by Charles Verelst (formerly Reed) 1853-6, now Council Offices. Rendered with slate roof. Two storey Italianate Villa with belvedere tower rising to four storeys. Three bay facade plus tower. The centre bay has Tuscan portico with open balustrade above. Bay between tower and portico has triple round headed window with console keystones supporting balcony with open balustrade. Rusticated quoins and tower fully rusticated to first floor level. Heavy modillion eaves cornice taken across face of the tower at main building eaves level. The tower has triple openings flanked by pilasters on all faces at upper level. Windows are double casements at ground floor, sashes above some with decorative semi-circular features to heads. Interior: Entrance Hall has geometrical staircase with cast iron balusters, large window glazed in a Venetian arrangement, Ionic columns to internal doorway and large console bracket cornice. The Council Chamber, Meeting Room and Members' Room have good plaster cornices and wall treatment. |

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|---|---|
| **Asset/Event Number** | 214 |
| **Asset/Event Name** | BROOKFIELD FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1105640 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |

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|---|---|
| **Easting** | 350854 |
| **Northing** | 382129 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Farm House 1691 (carved on doorhead) stone with brick gable and machine tile roof. 2 storeys 3 bays with wing to north. Moulded string course at first floor level. An original stone mullion window at ground floor in west gable. Sash windows to facade ground floor, modern casements in front gabled dormer and at first floor in west gable. Original entrance filled in over which is date and initials TPP, and new entrance provided. The east gable is in brick. Stacks extended in brickwork above original stone chimneys. |

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|---|---|
| **Asset/Event Number** | 215 |
| **Asset/Event Name** | VILLAGE FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1115509 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353647 |
| **Northing** | 382004 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Farm house now cottage early C17 with alterations and additions, sandstone with slate roof. 2 storey 1 bay, coursed rubble walls, mullion windows with leaded lights. String courses at first floor level and above first floor window. Later section north, in random rubble with casement windows, of no interest. |

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|---|---|
| **Asset/Event Number** | 216 |
| **Asset/Event Name** | THE CASTLE HOTEL PUBLIC HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1115543 |
| **HER Number** | |
| **Status** | Listed Building- Grade II* |
| **Easting** | 353763 |
| **Northing** | 382016 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Former Duchy of Lancaster Court House now a Public House. 1737 with later alterations, Henry Sephton, Undertaker. Red sandstone with slate roof. 2 storeys 7 bays with 2 bay projections each side. First floor entrance to Court Room, approached up stone staircase, consists of double door with six raised panels in stone doorcase surmounted by Royal Arms. Outer bays have projecting weathered plinth midway up ground floor windows. Upper windows have moulded stone bracketed sills, architraves, and heads marked with triple keystones. Moulded eaves cornice and hipped roof with sandstone hip and ridge tiles. Interior: Courtroom now |

adapted for catering but still contains tablet with inscription and date.

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|---|---|
| **Asset/Event Number** | 217 |
| **Asset/Event Name** | THE PARISH LIBRARY |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1115560 |
| **HER Number** | |
| **Status** | Listed Building- Grade II* |
| **Easting** | 353776 |
| **Northing** | 381887 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Library now Committee Room for the new linked Church Hall. 1730 for Sir John Chesshyre, stone with slate roof 1 storey 2 bays. Entrance door with 4 fielded panels in stone doorcase with Ionic columns and triangular pediment with raised segmental apex. Arched windows with glazing bars. Cornice and solid parapet, stone gables and chimney. Interior of no interest following alterations and repairs in 1975. |

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|---|---|
| **Asset/Event Number** | 218 |
| **Asset/Event Name** | 125 AND 127, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130423 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353950 |
| **Northing** | 381728 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Cottages early C17 sandstone and brick nogged timber framing with machine tile roof. 2 storeys 3 bays with added wing east. Sandstone up to first floor moulded string course, exposed timber in small framing above. Boarded doors and altered casement windows. Interior: Moulded beams. |

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|---|---|
| **Asset/Event Number** | 219 |
| **Asset/Event Name** | THE TRICORN PUBLIC HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130425 |
| **HER Number** | |
| **Status** | Listed Building- Grade II* |

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|---|---|
| **Easting** | 354058 |
| **Northing** | 380792 |
| **Parish** | Halton |
| **Council** | |
| **Description** | 23.4.70 II* Mansion for Sir John Chesshyre circa 1710 is now a public house. Brown brick and stone with slate roof, 2 storeys and attic 5 bays, gabled. 3 bay return. Stone quoins of constant width and floor band. Stone pedimented doorcase with Doric pilaster and 6 panel door. Recessed sash windows with glazing bars, gable pediment with window in tympanum. Interior: Staircase with cut and elaborately carved bracketed string, spiral turned balusters and moulded rail. Fine oak doorcases with fluted pilasters, fielded panelling and pulvinated frieze. Some original stone mantels. |

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|---|---|
| **Asset/Event Number** | 220 |
| **Asset/Event Name** | THE TRICORN PUBLIC HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130426 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 354053 |
| **Northing** | 380797 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Former stables to Hallwood, circa 1710 now altered and part of licensed premises. Sandstone with slate roof 1½ storeys 8 bays of varying width. 5 giant Doric pilasters, 2 broken pedimented doorways, 5 sashes with moulded stone architraves, 2 large windows openings with Gothic heads, one now containing a double door, and 6 oval windows at high level. There is a band at pediment level and an eaves cornice. |

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|---|---|
| **Asset/Event Number** | 221 |
| **Asset/Event Name** | THE ELMS |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130442 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350814 |
| **Northing** | 382169 |
| **Parish** | Halton |
| **Council** | |
| **Description** | This list entry was subject to a Minor Amendment on 10/03/2016<br><br>SJ 58 SW 5/82<br><br>FORMER RUNCORN U.D. Higher Runcorn, WESTON ROAD (North Side), The Elms |

(Formerly listed as No.4 (Just The Elms) WESTON ROAD (North Side))

7.12.65

II

Town House now four flats. Mid C18, red brick with slate roof. 2 storeys 5 bays flanked by lower 2 storey single bay wings. Moulded plinth, rusticated quoins. Segmental pedimented Doric doorcase with fluted pilasters and triglyphs containing six panel door with fielded panels. Ground floor windows altered to recessed casement doors. First floor windows are sash with glazing bars and moulded stone sills. Stone bracketed cornice. The large slates which formerly covered the roof have been replaced by smaller slates. Interior staircase with closed string and turned balusters.

Listing NGR: SJ5056881079

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|---|---|
| **Asset/Event Number** | 222 |
| **Asset/Event Name** | THE NOOK |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130443 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350761 |
| **Northing** | 382138 |
| **Parish** | Halton |
| **Council** | |
| **Description** | House mid C18 Roughcast stone and brickwork with slate roof. 2 storeys 6 bays. Stone doorcase with moulded architrave and stone segimental arch with key. Six panel door with fielded upper panels and radial bar fanlight. Sash windows with glazing bars but some openings built up. Exposed stonework at the rear. The roof has a sandstone ridge. |

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|---|---|
| **Asset/Event Number** | 223 |
| **Asset/Event Name** | GATE PIERS AND SURROUNDING WALL TO LIBRARY |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130459 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353776 |
| **Northing** | 381897 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Gate piers in wall fronting entrance to Library circa 1730, red sandstone squared blocks on projecting moulded plinth with moulded caps and ball finials on truncated cone support. The finials have round projecting discs to four faces and top. The piers are set in ashlar wall with |

slightly overhanging half round coping.

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|---|---|
| **Asset/Event Number** | 224 |
| **Asset/Event Name** | HALTON CASTLE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130460 |
| **HER Number** | |
| **Status** | Listed Building- Grade I |
| **Easting** | 353751 |
| **Northing** | 382056 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Ruinous Castle circa 1070 for Nigel first Norman Baron of Halton. Red sandstone almost eliptical on plan sitting on top of high sandstone and earth mound and dominating the surrounding plain. Roughly squared sandstone inner and outer faces with corework infilling. A few high standing sections of the walls contain the remains of windows with tracery which suggests a late medieval alteration. High standing remains within the walls South East were built C1800 to make the Castle an eyecatcher from Norton Priory. Scheduled Ancient Monument. |

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| **Asset/Event Number** | 225 |
| **Asset/Event Name** | THE OLD HALL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130461 |
| **HER Number** | |
| **Status** | Listed Building- Grade II* |
| **Easting** | 353926 |
| **Northing** | 381925 |
| **Parish** | Halton |
| **Council** | |
| **Description** | House 1693 with alterations. Sandstone with slate roof 2 storeys and attic 3 bays, with 2 storey 1 bay wing added to north. Centre bay of three bay section set forward. Moulded string at first floor and matching drip moulds to first floor and attic window heads. Mullion windows, studded entrance door. Gables have corbels and copings. Brick stacks with double reeded feature on all faces. Interior: Ovolo moulded beams, Jacobean style staircase with flat shaped balusters and 8 panel C17 doors. |

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|---|---|
| **Asset/Event Number** | 226 |
| **Asset/Event Name** | 88, 90, 92 AND 94, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130462 |

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|---|---|
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353926 |
| **Northing** | 381755 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Row of four cottages 1827 (in tablet at first floor level). Red brick with slate roof 2 storeys 4 bays with gable projections both ends. Sandstone plinth and sills and heads with stepped labels. Side entrances to both end cottages have stone bracketed canopies whereas the canopies to the centre cottages are supported on wide projecting edge moulded stone cheeks. Three light casement windows, one original boarded door. Gable apex feature of three projecting courses with. middle course set point forward. This feature is repeated in the caps of the diagonally set clustered chimneys. Lead ridge, old slates and very narrow Gable barge boards. |

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|---|---|
| **Asset/Event Number** | 227 |
| **Asset/Event Name** | HALTON HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130463 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353684 |
| **Northing** | 382106 |
| **Parish** | Halton |
| **Council** | |
| **Description** | House 1779, brown brick with sandstone slate roof. 2 storeys three bays. Rusticated stone quoins. Stone doorcase with eared architraves, keystone cutting pulvinated frieze and pediment with inscribed tympanum, six panel door. Windows have screwback rusticated heads with keystones, stone sills and recessed sashes. Gable chimneys. Wooden eaves cornice altered to accept an eaves gutter. |

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|---|---|
| **Asset/Event Number** | 228 |
| **Asset/Event Name** | HOLLY BANK HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130464 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353652 |
| **Northing** | 381941 |
| **Parish** | Halton |
| **Council** | |
| **Description** | House early C18 rendered brick with slate roof 2 storeys and attic 5 bays, including blank bay |

over entrance. Moulded stone plinth and rusticated quoins. Stone doorcase with Ionic pilasters, pulvinated frieze and swan-neck pediment with cartouche in the tympanum. A roundel with festoon formerly occupied the blank space over the entrance. Recessed sash windows with glazing bars.

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|---|---|
| **Asset/Event Number** | 229 |
| **Asset/Event Name** | MANCHESTER SHIP CANAL MAGAZINE BUILDING, INCE BANKS |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1138825 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 347480 |
| **Northing** | 377860 |
| **Parish** | |
| **Council** | Cheshire West and Chester |
| **Description** | ELLESMERE PORT AND NESTON;MANCHESTER SHIP CANAL SJ 47 NE Magazine building, (47477787) Ince Banks 4/1 II Building for storing explosives; probably just prior to 1888. Built by the Manchester Ship Canal Company well away from canal workings and areas of population for safety reasons. Now used on casual basis by wild-fowlers and bird watchers. Red brick with slate roof. Single storey raised on piers, divided into 3 bays x 2 bays by the piers which continue up as pilasters on the main elevation. The piers support semi-circular arches and there are angle buttresses to the corner piers which also continue upwards as pilasters. All pilasters join a deep projecting brick band below eaves level which gives the impression of construction in large sunk brick panels. The south-east elevation contains a central door opening under a segmental arch and window openings are narrow slots at high level. Hipped roof with blue clay tiles. The raised floor is both a precaution against seasonal flooding and a blast reducing measure. |

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|---|---|
| **Asset/Event Number** | 230 |
| **Asset/Event Name** | DOVECOTE AT SITE OF ASTON OLD HALL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253143 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 355315 |
| **Northing** | 378043 |
| **Parish** | Aston |
| **Council** | Cheshire West and Chester |
| **Description** | ASTON BY SUTTON C.P. ASTON LANE SJ 57 NE South West of 3/41 Dovecote at site of Aston Old Hall. GV II Dovecote 1691 of Flemish bond brown brick on weathered plinth of large buff sandstone blocks. Now roofless. 3-course plain brick band at mock 1st floor; stone-coped end gables with kneelers; moulded stone eaves cornice. Recessed blocked doorway above plinth at front has flush sandstone quoins and lintel with 1691 incised. Wide central entry and narrower entry to right, both at rear, inserted or altered under plain oak lintels. Interior. Formerly divided into two chambers by full-height wall from front to back, now wholly removed but |

toothing visible. 13 rows of nesting boxes below eaves; 6 rows in each gable - more than 800 boxes in all, probably 1300-1400 when central wall existed. Brick platform of 2 courses, the lower course diagonally set, at the base of each row of boxes. High level opening in left end inserted, from loft of adjoining coach-house. A splendid example, regrettably partly decayed. Its use is documented in the Aston papers at Aston Lodge; the eggs, the birds and their lime for manure were all valued.

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| **Asset/Event Number** | 231 |
| **Asset/Event Name** | COACH HOUSE AT SITE OF ASTON OLD HALL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253144 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 355324 |
| **Northing** | 378055 |
| **Parish** | Aston |
| **Council** | Cheshire West and Chester |
| **Description** | ASTON BY SUTTON C.P. ASTON LANE SJ 57 NE South West of 3/42 Coach-house at site of Aston Old Hall. GV II Coach-house adjoining Dovecote (q.v.), probably early C19. Flemish bond brown brick; roof replaced in corrugated asbestos. 3 recessed basket-arched coach doorways with hinge-stones. Boarded double doors. Interior Ceiled at eaves level. Included for group value only. |

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|---|---|
| **Asset/Event Number** | 232 |
| **Asset/Event Name** | WING OF FORMER ASTON OLD HALL NOW GAMEKEEPER'S COTTAGE AND STORE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253145 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 355280 |
| **Northing** | 378052 |
| **Parish** | Aston |
| **Council** | Cheshire West and Chester |
| **Description** | ASTON BY SUTTON C.P. ASTON LANE SJ 57 NE South West of 3/43 Wing of former Aston Old Hall, now Gamekeeper's Cottage and store. GV II Gamekeeper's cottage and store, formerly a wing of Aston Old Hall, later C16 altered. Pebbledash above rendered brick flush plinth; indications of oak-framed structure beneath pebbledash. Graded grey slate roof, formerly thatched. 2 storeys, 4 windows. Round-arched central opening and 2 doorways with boarded doors, one apparently old (broad boards on shaped wrought iron hinges) at front; 7 small-pane horizontally sliding sashes and 1 replaced 3-pane casement. The left structural bay is of longer span than the others. Each gable end has a curved surface, out of plumb, suggesting warped oak frame beneath pebbledash. The right gable is jettied above an oriel window now masked in pebbledash. A watercolour in the Aston papers at Aston Lodge shows Aston Old Hall with Elizabethan framing comprising the present gamekeeper's house and a main wing linking it to the Dovecote (q.v.). |

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|---|---|
| **Asset/Event Number** | 233 |
| **Asset/Event Name** | RING O BELLS INN |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253190 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352096 |
| **Northing** | 377247 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. BELLEMONTE ROAD SJ 57 NW (West Side) 2/53 Ring O' Bells Inn. GV II Inn, probably C17, altered. Pebbledash. Graded grey slate roof. 2 storeys; 3 windows; roofs have 2 ridges parallel with front; the rear roof of wider span and later. Replaced 6-panel door; 9.-pane casements to lower storey, lower 6-pane casements to upper storey. Axial ridge chimney left of centre; flush gable chimney right. Interior: Low ceilings; some beams; altered inglenook; retains some small rooms of a true "public house". |

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|---|---|
| **Asset/Event Number** | 234 |
| **Asset/Event Name** | BROOK FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253191 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353388 |
| **Northing** | 376785 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. BRADLEY SJ 57 NW 2/55 Brook Farmhouse. II Farmhouse, probably late C18. Brown brick; graded grey slate roof. 2 storeys; 3 windows; straight joint between central and left windows. Door in outshut against right gable end,3-pane casements in openings with skewback cambered arches to lower storey and plain cambered arches to upper storey. Flush gable chimneys and one on former left gable, of brick. Interior: not inspected.<br><br>Listing NGR: SJ5338876785 |

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|---|---|
| **Asset/Event Number** | 235 |
| **Asset/Event Name** | CHURCH OF ST LAWRENCE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253193 |
| **HER Number** | |

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|---|---|
| **Status** | Listed Building- Grade I |
| **Easting** | 352122 |
| **Northing** | 377293 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. CHURCH ROAD SJ 57 NW (North Side) 2/61 Church of St Lawrence. 8/1/70 GV I Church, late C12 with earlier fragments, alterations various dates and restoration by Bodley and Garner 1883. Red sandstone. West tower; nave of 3 1/2 bays with aisles under separate ridges; north and south porches; chancel of 3 bays with 2-bay north and south chapels; crypt vestry west of tower. 3-stage tower has low ramp roof to cellar vestry on west side; diagonal west and square east buttresses; 3-light panel-tracery west window; clock on north and south faces; 2-light bell openings; crenellated parapet. Decorated west window to south aisle; 3-light west window with intersecting tracery to north aisle. North gabled porch, 1724, has plinth, round archway and cornice at impost level. South gabled porch, 1715 has Tuscan pilasters, round archway and ball finials. North aisle has two 3-light curvilinear windows, north chapel two 4-light Tudor-arched panel-tracery windows. South windows rebuilt 1880-83. Small Romanesque clearstorey windows. Perpendicular window to each side of east bay of chancel; 7-light panel-tracery east window. 5-light panel-tracery east window to north chapel (now organ chamber) and 5-light ogee tracery east window to south chapel. Crenellated parapets. Much exterior stonework renewed by Bodley and Garner 1880-83. Interior: Tower has tall blank arches north and south, a fragment of Norman zig-zag moulding and 2 mid C11 figures. Romanesque arcades, restored, with round columns and one octagonal column, square abaci and single-stepped arches; terminating in narrow arches by Bodley and Garner against chancel wall. Chancel arch dies into side walls. 4-centred arches between chancel and chapels. Good oak: reredos in north chapel (now between chapel and organ chamber) with 2 Corinthian columns and 2 pilasters, circa 1700. Communion rail circa 1700 with barleysugar balusters. Organ case by John Oldrid Scott. Late C19 and C20 glass in chancel and chapels. Oak chest; oak communion tables. Principal features of interest are the Cll/C12 work, rare in Cheshire, and the north chapel reredos. |

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| **Asset/Event Number** | 236 |
| **Asset/Event Name** | ROW OF 4 BOUNDARY STONES ON NORTH BANK OF WATER MEADOW |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253196 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353865 |
| **Northing** | 378382 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. FRODSHAM CUT (River Weaver) SJ 57 NW 5390 7836 (North Side) 2/69 Row of 4 boundary stones on north bank of water meadow. Gv II Row of 4 standing boundary stones, 177(?), sandstone. About 50cm above ground and 20-25cm rectangular section. The 2nd stone from west inscribed JW on west face and 177(?) on top. The stones, survivors from a larger number, marked the boundaries of farmers' rights to strips of the water meadow. See also item 68. |

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|---|---|
| **Asset/Event Number** | 237 |

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|---|---|
| **Asset/Event Name** | BRADLEY HALL FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253215 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353220 |
| **Northing** | 377068 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. BRADLEY SJ 57 NW 2/54 Bradley Hall Farmhouse. 26/9/1974 II Farmhouse,circa 1820. Flemish bond brown brick; grey slate roof. 3 storeys, 3 windows, symmetrical. 6-panel door in round-arched plaster case with simple imposts and keystone; fanlight with 3 radial bars. 12-pane recessed sashes under plaster wedge lintels to lower 2 storeys; 6-pane sashes immediately under eaves. Flush gable chimneys. Interior not inspected. |

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| **Asset/Event Number** | 238 |
| **Asset/Event Name** | SUNDIAL 9 METRES SOUTH OF SOUTH PORCH OF ST LAWRENCE'S CHURCH |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253280 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352110 |
| **Northing** | 377274 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. CHURCH ROAD SJ 57 NW (North Side) 2/62 Sundial 9 metres south of south porch of St Lawrence's Church. GV II Sundial, 1790. Copper dial and gnomon on sandstone base and stem. Base of 3 round steps. Square stem with frieze and cornice. Dial inscribed S(?) Cooke: R Cheeseman (?) Church Wardens: 1790. |

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|---|---|
| **Asset/Event Number** | 239 |
| **Asset/Event Name** | ROW OF 4 BOUNDARY STONES ON SOUTH BANK OF WATER MEADOW |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253304 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353784 |
| **Northing** | 378234 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |

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|---|---|
| **Description** | FRODSHAM C.P. FRODSHAM CUT (River Weaver) SJ 57 NW 5385 7822 (North Side) 2/68 Row of 4 Boundary stones on south bank of water meadow. GV II Row of 4 standing boundary stones, circa 1770, sandstone. About 50 cm above ground and 20-25 cm rectangular section. The second stone from west inscribed JW in bold capitals on west face. The stones, survivors from a larger number, marked the boundaries of farmers' rights to strips of the water meadow. See also item 69. |

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|---|---|
| **Asset/Event Number** | 240 |
| **Asset/Event Name** | 56, HILLSIDE ROAD |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253312 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352128 |
| **Northing** | 377151 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | No. 56 (formerly listed as Flower Cottage). II Cottage, probably early C17, altered. Oak frame and sandstone, partly rendered; corrugated asbestos roof over thatch. 1 storey plus attic; 5 windows. Long and narrow in plan, but partly extended to rear. Replaced boarded door in moulded frame; 2 wooden Gothick casements left of door and 1 right. 2 small small-pane casements far right. Axial ridge chimney of a 2 flues opposite door; chimney just in front of ridge towards right; projecting left gable chimney in front of ridge. Rendered sandstone left gable wall contains a blocked recessed mullioned window of 2 lights to ground floor and one of 3 lights (partly masked by chimney) to attic; mid C20 casement in right end gable. Small framing exposed at front and rear. Interior altered. Some small framing. |

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| **Asset/Event Number** | 241 |
| **Asset/Event Name** | FIVE CROSSES FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253313 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352895 |
| **Northing** | 376404 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. KINGSLEY ROAD SJ 57 NW East side 2/75 Five Crosses Farmhouse. II Farmhouse circa 1700 refronted and extended to left circa 1830: Brown brick with rendered front and left gable-end. 2 storeys plus attic; 3 windows; attic windows in gable ends. Flush gable chimneys and chimney at drop in roof level between central and left windows. Small canted 1-storey bay window at centre, probably replacing doorway. 16-pane recessed sashes. Interior: Ingle-nook (altered) against right gable wall, with blank lobby in right front corner suggests a former lobby-entrance plan, since altered. Painted oak newel stair with wavy splat balusters; doors of 2 and 3 fielded panels in upper storeys; oak-framed spine partition and oak |

purlins in attic. Cellar, partly brick barrel-vaulted.

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|---|---|
| **Asset/Event Number** | 242 |
| **Asset/Event Name** | WAR MEMORIAL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253363 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351762 |
| **Northing** | 377049 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. OVERTON HILL SJ 57 NW 2/107 War Memorial. II War Memorial 1919, sandstone. Podium of 3 steps; square plinth inscribed with names of the dead; capped with vermiculated unmoulded pediment to each side; upper plinth; obelisk recessed near top in 3 successive rebates. A landmark, about 11 metres high, on a prominent hilltop.<br><br>Listing NGR: SJ5176277049<br><br>This List entry has been amended to add sources for War Memorials Online and the War Memorials Register. These sources were not used in the compilation of this List entry but are added here as a guide for further reading, 26 January 2017. |

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| **Asset/Event Number** | 243 |
| **Asset/Event Name** | THE OLD VICARAGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253364 |
| **HER Number** | |
| **Status** | Listed Building- Grade II* |
| **Easting** | 352295 |
| **Northing** | 377208 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM c.P. VICARAGE LANE SJ 57 NW (South Side) 2/110 The Old Vicarage. II* House, early C18, altered early C19 and extended at front and largely refaced, probably by John Douglas 1872. Stone-dressed brick; tiled roofs. 2 storeys plus attic. Jacobean. Cross-gable right; octagonal entrance turret with spire (coved plaster eaves); recessed, lower, service wing left with cross-gable at end. Mullioned windows of stone and brick; leaded glazing; oak door in stone surround, mid C20 to wall behind turret; panelled brickwork; plastered gables with brick diapering. A well-composed vernacular revival reworking of an older house; the expression and materials strongly suggest John Douglas as architect. Interior. Amongst many later C19 features of good quality, with some C20 modifications which fully maintain the character, an early C18 oak-panelled room and the open-well oak stair with 3 turned balusters per step and oak dado |

panelling are major items.

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|---|---|
| **Asset/Event Number** | 244 |
| **Asset/Event Name** | FOLLY TOWER SOUTH WEST OF FOX HILL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253442 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350756 |
| **Northing** | 375083 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | Roofless chamber in form of small tower on hilltop, probably mid Cl9. Red sandstone concave batter to walls of rock-faced masonry; the stones diminish towards top. 2 monolithic steps to doorway with barred iron gate surmounted by circular opening; rectangular barred opening in each other side, all with chamfered arrises. Corbel table carries mock parapet of 1 course. |

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|---|---|
| **Asset/Event Number** | 245 |
| **Asset/Event Name** | FRODSHAM WEIR WITH SLUICE GATES |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253445 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353796 |
| **Northing** | 378661 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. WEAVER NAVIGATION SJ 57 NW 2/110A Frodsham Weir, with Sluice Gates 1/9/1980 II Weir, 1785, altered. Coursed stone. The main weir, circa 45 metres wide, is curved. 2 sluices at south end of weir, each circa 5 metres wide, have stone piers with semicircular cutwaters and stone abutment. Wooden gangway on I-beams and plain square columns, probably cast iron, with diagonal braces crosses weir and sluiceways. The weir provides the outfall from the Weaver Navigation to the River Weaver. The fall is approximately 1 metre. |

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|---|---|
| **Asset/Event Number** | 246 |
| **Asset/Event Name** | WRIGHTS COTTAGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253454 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |

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|---|---|
| **Easting** | 349696 |
| **Northing** | 375881 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | HELSBY C.P. BATES LANE SJ 47 NE (East Side) 1/112 No. 25 (Wrights Cottage). II Cottage and former barn, probably early C18, much altered. Whitewashed brick and sandstone; corrugated iron roof, formerly thatched, Cottage 2 storeys, 1 window, with gable to lane. Flush quoins. Boarded door in skewback cambered opening. Small-pane casement under similar arch. Small-pane horizontal sliding sash to front bedroom and in gable end to rear bedroom. Large, low, battered sandstone buttress left of door. Cyma kneelers to gable; brick chimney immediately behind gable coping. High stone wing wall to side of road at rear. Barn has 1 metre flush stone plinth at rear, with brown brickwork above; double doors under timber lintel; 2 rows of 3 loophole vents. There are stated to be no internal features of special interest. Cottage under same roof to rear of barn is not included in this item. |

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| **Asset/Event Number** | 247 |
| **Asset/Event Name** | SHIPPON AND BARN 10 METRES NORTH WEST OF ROSE FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253455 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 348965 |
| **Northing** | 375728 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | HELSBY C.P. CHESTER ROAD SJ 47 NE (North Side) 1/114 Shippon and barn 10 metres north west of Rose Farmhouse. GV II Farm building formerly barn, shippon, stable and probably stye, early C19; brown brick with graded grey slate roofs. 2 storeys; L-shaped. Left wing with stable and shippon has divided doors, small-pane casements, 2 loading doors to hayloft and small brick vents; dentil courses at eaves. Rear wing has driftway in corner with 1 storey to right with small windows, small brick vents and dentil courses at eaves. Groups well with farmhouse. Listed for group value. |

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|---|---|
| **Asset/Event Number** | 248 |
| **Asset/Event Name** | BANK HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253456 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 349141 |
| **Northing** | 375882 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |

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|---|---|
| **Description** | HELSBY C.P. CHESTER ROAD SJ 47 NE (North Side) 1/116 Bank House. II House, probably 1820 s. Brown brick, Flemish bond to front with pale headers; grey slate roof. 2 storeys; 3 windows. Replaced part-glazed 3-panel door under radial bar fanlight in projecting flat-roofed porch of wood, probably circa 1900. Plain stone plinth. 16-pane recessed sashes with wedge lintels. Almost pyramidal roof with lead-roll hips and very short ridge. 1 flush brick chimney on each end wall. Former outbuildings converted to dwellings are not included in the item. Interior not inspected. |

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|---|---|
| **Asset/Event Number** | 249 |
| **Asset/Event Name** | CHURCH OF ST PAUL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253457 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 349266 |
| **Northing** | 375859 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | HELSBY C.P. CHESTER ROAD SJ 47 NE (South Side) 1/117 Church of St Paul. II Church 1868-70 by John Douglas, south aisle (and transept?) added 1909 by Douglas and Minshull. Coursed rock-faced yellow sandstone; graded green Westmorland slate roofs. Nave with towerless slate west spire; catslide roof of shallower pitch over south aisle; transepts; apsidal chancel. Paired lancets and very simple plate tracery. Externally the steep roofs, with the splay-footed octagonal spire seeming to float above two great bell-louvres around its base, are a powerful feature, architecturally very advanced. Interior. Nave of 5 bays; beam on octagonal stone piers carries simply-framed aisle roof; wide arch-braced nave roof; corbelled piers carry nave and chancel arches, very simple; chamfered unmoulded transept arches; lofty chancel roof with no principal rafters but hammer-posts to common rafters; deeply splayed embrasures; glass in porch, chancel and south transept. A satisfying interior. |

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|---|---|
| **Asset/Event Number** | 250 |
| **Asset/Event Name** | LYCHGATE TO ST PAUL'S CHURCHYARD |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253458 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 349277 |
| **Northing** | 375883 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | GV Lychgate, 1911, oak framed on low stone plinth; roof of small green slates. Camber beam trusses, the outer one inscribed A:1911:D: I am the Resurrection and the Life. Shaped brackets; ornate bargeboards with finials. Listed for group value. |

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|---|---|
| **Asset/Event Number** | 251 |
| **Asset/Event Name** | RAKE HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253459 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 348871 |
| **Northing** | 375718 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | HELSBY C.P. LOWER RAKE LANE SJ 47 NE (East Side) 1/119 Rake House. 23/7/1975 II Farmhouse, now house, 1807; Flemish bond brown brick; graded grey slate roof. 2 storeys, 3 windows; formerly 2 windows but 2-storey 1-room bay added to left, probably early C19. Wide half-glazed door with margin panes and fielded lower panels in moulded case with corner roses, central in right portion. 16-pane sashes, recessed in right portion, flush in left portion. Left portion has pale headers. Slightly cambered gauged brick window arches, those in left portion more sharply curved. Stone over door inscribed E.H.1807. 3 diminishing chimneys of brick. Taller later C19 rear wing has no visible features of special interest. Interior not inspected. Attached farm buildings (dated EH 1826 and converted to dwellings) are not included in this item. |

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|---|---|
| **Asset/Event Number** | 252 |
| **Asset/Event Name** | FORMER STATIONMASTER'S HOUSE AND MAIN RAILWAY STATION BUILDING HELSBY STATION |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253460 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 348692 |
| **Northing** | 375629 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | HELSBY C.P. STATION AVENUE SJ 47 NE 1/120 Former Stationmaster's House and main Railway Station building Helsby Station. GV II Railway station building/former stationmaster's house, now office, 1849 for the Birkenhead, Lancashire and Cheshire Junction Railway Company. Coursed rock-faced red sandstone with grey slate roofs. Cross-gable and right wing (as seen from forecourt), to house of 2 storeys and single-storey wing left; Jacobethan. Shaped gables; added half-glazed porch with 4-panel door in corner of cross-wing; station door and windows blocked; mullioned windows, some shoulder-arched; 3 diminishing chimneys. Front to platform expressed similarly to forecourt front. Wing-wall to forecourt and 2 cast iron columns with raised strapwork and wing-wall to platform for canopies, now removed. |

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|---|---|
| **Asset/Event Number** | 253 |
| **Asset/Event Name** | SUTTON HALL |

# Gazetteer of Heritage Assets and Event

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|---|---|
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253572 |
| **HER Number** | |
| **Status** | Listed Building- Grade I |
| **Easting** | 354486 |
| **Northing** | 379081 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | SUTTON C.P. ASTON LANE SJ 57 NW South West Side 2/136 Sutton Hall. 8/1/1970 GV I Hall, now farmhouse, late C15 or early C16, extended late C17 and early C19. Brown brick; roof replaced in cement tiles. 2 storeys plus attics. The earliest part, left, 2 storeys with gable to front, contains late medieval oak framed great halls of unusual type, cased in brown brick, Flemish bond to front, with 2 large lateral stone chimneys rebuilt in brick above eaves; late C17 right wing of 2 storeys plus attics has sandstone plinth, 2-course brick bands at 1st and attic floors, flush gable chimney and partly leaded cross-casement to stair; cross-wing at rear of great halls is partly Tudor and partly 1805 with 2 storey 2 window face to garden in Flemish bond brickwork with pale headers and recessed small-pane sashes. Miscellaneous windows, some altered, mostly under flat gauged-brick arches; 2 doors on garden front of C17 wing, of tapered boards. Interior. Only the principal rooms accessible at time of survey (1984) are described. Two superimposed great halls, both equally rich and forming part of the late C15 or early C16 structure are the feature of unique interest. Lower storey: passage behind entrance; parlour to left has jowled corner posts, moulded oak beam structure with original boards between moulded joists laid flat, cross-beam against front wall, Tudor fireplace now concealed and door of 5 raised and fielded panels in massive frame with raised strapwork; lower great hall (behind parlour) has rebuilt left wall with parts of 2 moulded oak posts with heavily moulded brackets on attached octagonal colonettes with belled-out caps, and, probably inserted, Tudor fireplace of stone opened out to form window embrasure, 3 complete moulded oak posts on right side, massive oak framing with an intermediate rail, fine ceiling structure of moulded oak beams, window with closely-spaced hollow.-moulded oak mullions (now giving onto passage), graffito of male figure in courtly dress (side view) scratched in plaster panel, looking C15, and (in cross-wing rear, left) a smaller Tudor stone fireplace. The moulded principal posts to the lower and upper great halls are continuous through both storeys with integral brackets carved from the stumps of branches of the trunks at 1st floor and truss-springs, all closely matched in height and section, a remarkable feature, showing that the lower and upper halls were parts of the original structure, with the moulded faces of the posts standing proud of the wall faces. Late C17 open-well oak stair has solid panelled newels, heavy moulded rails and no balusters. Upper storey: The upper hall has (probably C18) replaced boarded floor; the lower part of the moulded post-faces cut away, probably during reflooring; 2 fine trusses with deeply moulded arched tie-beams, canted collars and moulded posts between, good roses, moulded roof-panels with quatrefoil windbraces; doorway with ogee head cut into beam at front of hall, in massive oak framing with an intermediate rail; a Tudor stone fireplace and another in alcove to left at rear (in cross-wing). The mouldings, colonettes and brackets on the principal posts are similar to those in the lower hall. Oak framing in parts of the building not inspected in detail suggest that the lower and upper great halls have been shortened. The timber structure cannot be dated precisely without further investigation. The marriage of Sir John Warburton, who possessed the Hall, to Joan, daughter of Sir William Stanley of Holt "the richest commoner in England" and chamberlain at Henry VII's court could have provided the money and incentive for an innovative plan admirably executed during the 1470s/80s, but Sir John's family built a similarly rich great hall with some parallel features at Dutton nearby in 1539-42, and intermediate floors in great halls are more commonly C16. B Coward The Stanleys 1385-1672 Chetham Society 1983; photographs of Dutton Hall (since demolished) The Duttons of Dutton, 1901 Cheshire Record Office L1462; G Ormerod History of Cheshire vols 1 and 2, 2nd Edition; William Webb's itinerary of Cheshire 1622-3 published in King's Vale Royal of England 1656 refers to Sutton hall as "an antient manour house". C.f. moulded posts of great hall of Adlington Hall, Cheshire, finished 1505. |

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|---|---|
| **Asset/Event Number** | 254 |
| **Asset/Event Name** | THE COTTAGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253573 |
| **HER Number** | |
| **Status** | Listed Building- Grade II* |
| **Easting** | 354460 |
| **Northing** | 379494 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | II* GV Cottage, early C17 altered with C16 or earlier internal features. Pebbledash stated to be on oak frame with sandstone plinth; thatched roof with slate catslide roof on sandstone rear outshut: C19 brick rear wing with roof of very small slates. The front has cross-gable right, long wing with 2 windows, C20 timber and glass porch and gabled dormer with 3-light, formerly leaded, window having centre light set lower than side lights. Brick ridge chimney immediately left of doorway; flush chimney on left gable, both brick. Interior. Baffle-entrance with inglenook behind; tapered oak bressumer; altered inglenook against left gable; chamfered oak beams; replaced stair behind inglenook. Moulded arched beams upstairs, one with arch braces has damaged rose with raised fleur-de-lys on each face, probably indicating a C16 or earlier open hall converted to 2 storeys early C17-large timbers in partition wall framing. There is some wattle and daub. Moulded cambered tie beam and parts of moulded posts are in right gable. The roof beams are of special interest, indicating a well-finished open hall in a dwelling of modest size. |

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| **Asset/Event Number** | 255 |
| **Asset/Event Name** | BARN AND SHIPPON AT SUTTON HALL |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253612 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 354543 |
| **Northing** | 379115 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | SUTTON C.P. ASTON LANE SJ 57 NW South-West Side 2/137 Barn and Shippon at Sutton Hall. GV II Former barn, stable and shippon, late C17, brick with graded grey slate roof. 2 storeys plus attics. L-shaped: left shippon and stable wing has boarded doors and casements to lower storey, rectangular loading doors and loophole vents to upper storey and 3 oak-framed gabled dormers to attic; right wing (formerly barn) has altered 3/4-height threshing porch with leanto slate roof, stone plinth and some flush quoins, stone-coped gables, inserted hopper casements under cambered arches, 2 boarded loading doors to upper storey, one upper part of threshing porch, and loophole vents. |

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| **Asset/Event Number** | 256 |

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|---|---|
| **Asset/Event Name** | BARN 10 METRES NORTH WEST OF NUMBER 51 |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253619 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 354443 |
| **Northing** | 379489 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | SUTTON C.P. CHESTER ROAD SJ 57 NW (North Side) 2/140 Barn 10 metres north west of No. 51. GV II Barn, now storage building, early C17 altered. Brick-nogged oak small framing, partly rebuilt in brick; some wattle and daub; corrugated asbestos roof, formerly thatched. Full-height central opening with boarded door right and wood casement left; loading door in right end gable. |

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|---|---|
| **Asset/Event Number** | 257 |
| **Asset/Event Name** | MARSHGATE FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253624 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353552 |
| **Northing** | 378884 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | SUTTON C.P. CHESTER ROAD SJ 57 NW (South Side) 2/142 Marshgate Farmhouse. GV II Farmhouse, early C17 altered later C17-mid C19. Brick-nogged oak frame partly rebuilt in brown brick; graded grey slate roof. 2 storeys. Cross-wing right has front circa 1830 with a wood casement to lower storey and a horizontal sliding sash to upper storey; gable ends (to which front is not bonded) rebuilt in sandstone and brick, apparently by degrees, C17-18; flush gable chimney left. Long oak-framed wing, partly rebuilt in brick, has small-framing of heavy timbers; jowled corner posts in gable end and large cambered tie-beam; braces beneath eaves. Casements probably C19. Interior not inspected. |

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|---|---|
| **Asset/Event Number** | 258 |
| **Asset/Event Name** | BARN 20 METRES EAST OF MARSHGATE FARM |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1253630 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353575 |
| **Northing** | 378891 |

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|---|---|
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | SUTTON C.P. CHESTER ROAD SJ 57 NW (South Side) 2/143 Barn 20 metres east of Marshgate Farm. GV II Barn, now also used as farm store. Probably early C18. Brown brick; grey slate roof; coped gables with kneelers. Pentice-roofed 3/4 full-height porch to former threshing floor. Boarded door; boarded loading-door to loft. Door and small openings to ground floor, 2 arched, in right gable and 2 loading doors under wedge lintels to loft. Gable vents in diamond and split-diamond patterns. Interior altered. |

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|---|---|
| **Asset/Event Number** | 259 |
| **Asset/Event Name** | WRIGHT TOMB 1 METRE EAST OF SOUTH PIER OF WEST GATE TO ST LAWRENCE'S CHURCHYAR |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1254500 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352090 |
| **Northing** | 377291 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. CHURCH ROAD SJ 57 NW (North Side) 2/63 Wright Tomb 1 metre east of south pier of west gate to St Lawrence's churchyard. GV II Monument circa 1806. Grey stone. A truncated obelisk on a panelled square plinth. A raised oval panel on each side of obelisk. East panel inscribed "Beneath are deposited the Remains of John son of John and Sarah Wright of Norley who died February 28 1810, aged 32 years". South panel inscribed "BENEATH are deposited the Remains of Sarah wife of John Wright of Norley who died December 3 1806 aged 55". The west panel inscribed "ALSO the mortal Remains of Elizabeth 2nd Wife of the said John Wright who died March 21st 1832 Aged 80 years. |

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| **Asset/Event Number** | 260 |
| **Asset/Event Name** | BOATMAN'S SHELTER ON EAST BANK OF WEAVER NAVIGATION |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261700 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353523 |
| **Northing** | 378883 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | SUTTON C.P. CHESTER ROAD (South Side) Boatman's Shelter on east bank of Weaver Navigation. II Boatman's shelter, disued, mid Cl9. Red-brown brick; slate pyramidal roof, felted. Boarded door under tooled sandstone lintel. Boarded-up windows, 1 each to front, back and sides, under cambered skewback arches. Left front corner and the head to rear window rebuilt in blue brick. Listed primarily for historic interest; during the Cl9 the Weaver Navigation was a major commercial waterway for boats carrying salt. |

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|---|---|
| **Asset/Event Number** | 261 |
| **Asset/Event Name** | CIRCULAR FEEDING TROUGH IN FARMYARD OF SUTTON HALL FARMSTEAD |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261738 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 354529 |
| **Northing** | 379109 |
| **Parish** | Sutton Weaver |
| **Council** | Cheshire West and Chester |
| **Description** | SUTTON C.P. ASTON LANE . SJ 57 NW South-West Side 2/138 Circular Feeding Trough in Farmyard of Sutton Hall Farmstead. GV II Feeding trough, probably C19, of red stone. Circular, massive, fashioned from a single stone. Almost 2 metres in diameter and 1 metre high. |

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| **Asset/Event Number** | 262 |
| **Asset/Event Name** | SHELTER ON ISLAND PLATFORM AT HELSBY RAILWAY STATION |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261746 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 348664 |
| **Northing** | 375634 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | HELSBY C.P. STATION AVENUE SJ 47 NE 1/121 Shelter on island platform at Helsby Railway Station. GV II Platform shelter on island platform, 1849 for the Birkenhead Lancashire and Cheshire Junction Railway Company. Coursed rock-faced red sandstone with grey slate roofs. 1 storey, small-scale, Jacobethan. Cross-wing and long wing, detailed as former stationmaster's house and main station building, q.v. |

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|---|---|
| **Asset/Event Number** | 263 |
| **Asset/Event Name** | ROSE FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261759 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 348997 |
| **Northing** | 375737 |

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| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | HELSBY C.P. CHESTER ROAD SJ 47 NE (North Side) 1/113 No. 255 (Rose Farmhouse). GV II Farmhouse, probably late C17, altered. Cement rendered brick; patches of sandstone; graded grey slate roof. 2 storeys; cross-gable right and 3-window wing left. 1 small-pane casement to each storey of cross-gable and of inner face of cross-wing. Replaced door in main wing near junction with cross-wing. 2 small-pane casements left of door and three 4-pane casements to upper storey. Brick chimney on ridge just left of doorway; lateral chimney right. Interior not inspected. |

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| **Asset/Event Number** | 264 |
| **Asset/Event Name** | 265, CHESTER ROAD |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261760 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 349054 |
| **Northing** | 375781 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | HELSBY C.P. CHESTER ROAD SJ 47 NE (North Side) 1/115 No. 265. II Cottage, late C17; sandstone and brick, painted; corrugated iron over thatch. 1 storey plus attic in roof. 2 windows. Replaced door; iron lattice casements (mid C19), 1 to each side of door and 2 in dormers. Right gable-end of stone has plinth and 2 upper windows: 1 of 2 lights with flush chamfered mullion (1 light blocked), the other of 1 light in a square chamfered opening, containing a horizontal sliding sash). Flush brick chimney on each gable. Interior. 2 rooms plus later outshut at back. Broad-board oak doors; oak cupboards of C17 type at each side of chimney-breast in right room; winder stair behind rear cupboard (there had been 2 stairs, that in left room removed); chamfered oak beams; sawn oak joists; oak-framed partition wall visible in bedrooms; oak truss indicates a formerly very steep roof-pitch. |

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| **Asset/Event Number** | 265 |
| **Asset/Event Name** | LOWER RILEYBANK FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261781 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351660 |
| **Northing** | 375828 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MANLEY ROAD SJ 57 NW (West Side) 2/104 Lower Rileybank Farmhouse (formerly listed as Mickledale). 8/1/1970 GV II Farmhouse, probably early C17, altered. English garden wall bond small brown bricks to front, sandstone to back; roof of grey slates, some |

large. 2 storeys; 6 windows. 3 boarded doors indicate a longhouse-derivative plan. Former chapel, now calf-shed, form cross-wing left, largely of coursed red sandstone and with blocked chamfered mullioned window in rear gable. Casements in main block, with cambered arches in lower storey. Interior Large, long oak beam in main room with nick-stopped chamfers. Lobby-entrance plan with inglenook in right room and former ingle nook later converted to fireplace (formerly with bread oven) in left room. Oak purlins. Carved sandstone panel in former chapel; fleur-de-lys with a cross to each side.

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|---|---|
| **Asset/Event Number** | 266 |
| **Asset/Event Name** | HAND PUMP AT FRONT OF LOWER RILEY BANK |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261828 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351658 |
| **Northing** | 375827 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. MANLEY ROAD (West Side)<br><br>Hand pump at front of Lower Riley Bank Farmhouse.<br><br>II GV Handpump, late C19, cast iron. Fluted chamber with plate "Appleby and Co: Renishaw Ironworks: Chesterfield". Fluted domed cap. Stone trough. Listed for group value.<br><br>Listing NGR: SJ 51658 75827 |

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|---|---|
| **Asset/Event Number** | 267 |
| **Asset/Event Name** | OVERTON HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261829 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352200 |
| **Northing** | 377210 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. SCHOOL LANE SJ 57 NW (South East Side) 2/108 Overton House. GV II House, mid C18. Flemish bond brown brick; grey slate roof. 3 storeys plus basement. Basement walls (left of doorway) painted sandstone and brick; sandstone plinth; painted stone rusticated quoins, cornice, keystone-and-voussoir lintels and plain projecting cills; 6-panel door in eared architrave under early C20 green slate leanto porch roof on wooden brackets; 4-pane C19 replaced sashes. Coped gables with flush chimneys. Interior not inspected. |

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|---|---|
| **Asset/Event Number** | 268 |
| **Asset/Event Name** | GODSCROFT HALL FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261843 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350324 |
| **Northing** | 376740 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. GODSCROFT LANE SJ 57 NW (East Side) 2/70 Godscroft Hall Farmhouse. II Farmhouse probably early C18 (with some earlier reused materials), cased in sandstone and extended to right circa 1830 (datestone DW 1746 on brick farm building not included in this item). Coursed sandstone rubble; grey slate roofs. 2 storeys;4 windows. Left part has 4-panel door (flush lower panels) in simple classical case with panelled reveals and soffit; two 12-pane recessed sashes to each storey left of door; stump of large stone chimney (now disused) at rear opposite doorway. Right portion (about 1 metre taller than left portion) has 2 12-pane recessed sashes to each storey; flush brick gable chimney at junction of wings. C19 rear wing (ridge parallel with front) has no features of special interest. Interior: Ovolo oak beam in central front room; reused chamfered oak beam in left front room. 1-flight open string stair, circa 1830, has shaped brackets, turned balusters and curtail. Back stair, probably oak but painted, of early C18 type has tapered chamfered newels, swept rail and stick balusters. 1 ovolo and 1 chamfered oak beam upstairs. Broad-board softwood doors on H-L hinges. The farm is on the site of Godscroft cornmill; a long earth dam survives. |

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| **Asset/Event Number** | 269 |
| **Asset/Event Name** | CHURCH HOUSE FARMHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261907 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352222 |
| **Northing** | 377280 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. CHURCH ROAD SJ 57 NW (North Side) 2/64 Church House Farmhouse. GV II Farmhouse, now house, probably late C17 altered. Brown brick (irregular bond); graded grey slate roof. 2 storeys plus attic with windows and end gables. 3 windows; symmetrical. Replaced door. 2 3-light wooden casements to each storey; small 1-pane casement above door. 4-flue brick chimney at centre of ridge. Basket-arched casement in right gable; 2 basket-arched window-heads of brick in left gable-end, 1 blocked; blocked openings at rear. Mid C20 1-storey rear extension. Interior: Chamfered oak beams with oak joists over left and right rooms in both storeys. Ingle-nook altered in lower right room, blocked in lower left room. 2 enclosed stairs (against rear wall) from left and right meet at central rear landing on 1st floor; thence stair to attic with windows and splat balusters at head. |

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| **Asset/Event Number** | 270 |
| **Asset/Event Name** | FRODSHAM LOCK AND WEIR |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261908 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353690 |
| **Northing** | 378232 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | FRODSHAM C.P. FRODSHAM CUT (River Weaver) SJ 57 NW 5369 7824 2/67 Frodsham Lock and Weir. 1/9/1980 II Lock and sluice, 1781, to plans by Robert Pownall and George Leigh, modified 1830 and subsequently. Brick and squared stone walls below basin. Derelict double lock gates of timber. Stones below lower dock gates inscribed XIII:XIV and, in separate column XI:XII:XIII:XIV. Mid C20 sluice gear of steel and concrete. |

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| **Asset/Event Number** | 271 |
| **Asset/Event Name** | CIRCULAR HORSE TROUGH IN YARD BETWEEN GAMEKEEPER'S COTTAGE AND DOVECOTE AT SIT |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1261931 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 355292 |
| **Northing** | 378048 |
| **Parish** | Aston |
| **Council** | Cheshire West and Chester |
| **Description** | ASTON BY SUTTON C.P. ASTON LANE SJ 57 NE South West of 3/44 Circular Horse Trough in yard between Gamekeeper's Cottage and Dovecote at site of Aston Old Hall. GV II Horse Trough, probably early C19, stone, circa 2 metres in diameter and 1 metre high, circular, carved from a single block of red sandstone. |

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| **Asset/Event Number** | 272 |
| **Asset/Event Name** | CHRIST CHURCH AND CHURCHYARD RAILINGS |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1271140 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 349406 |
| **Northing** | 381579 |
| **Parish** | Halton |

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| **Council** | |
| **Description** | Church and churchyard railing. 1841, by Edmund Sharpe of Lancaster for the Weaver Navigation Trustees. Chapel of ease to the church at Weston. Tooled ashlar, with ashlar dressings and Welsh slate roofs with coped gables. Early English style. Plinth and buttresses throughout. Cruciform plan, with chancel, transepts, nave, south porch, and west tower with spire. Windows are pointed arched, with hood moulds and mainly simple tracery. Chancel, single bay, has angle buttresses. Traceried east window, 3 lights, with shafts. Above it, a cusped trefoil. Transepts, single bay, have angle buttresses. Gables have 3-light windows with trefoils above. East and west sides have single 2-light windows. Nave, 4 bays, has 2-light windows separated by buttresses. Gabled south porch has chamfered and moulded pointed arched doorway with hood mould, under a coped gable. Door blocked. Single lancets in each side, also blocked. West tower, 3 stages, has gabled angle buttresses. String courses to each stage. Lower stage has blind trefoils to north and south, with segment headed door to north. To west, a pair of single lights, blocked. Middle stage has trefoil to south, and single-light windows to north and south. Bell stage has 2-light pointed arched bell openings on each side, that to south with inserted clock. Octagonal broach spire has 3 tiers of gabled lucarnes, finial and cross. INTERIOR: Not accessible at time of survey. East window has flanking blind arcades, all under linked hoodmould. Nave and chancel have chamfered and moulded arches, that to the nave with hood mould and impost band. Nave and transepts have strutted kingpost roofs, intersecting at the crossing. South transept has organ and screen forming vestry. Some original seating in north transept. OUTSIDE: rectangular plot with chamfered corners, enclosed by a spiked wrought iron railing with curved supports. Pair of matching gates on south side. |

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| **Asset/Event Number** | 273 |
| **Asset/Event Name** | HALE HEAD LIGHTHOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1320324 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 347192 |
| **Northing** | 380904 |
| **Parish** | Hale |
| **Council** | |
| **Description** | Disused small lighthouse on top of cliff at Hale Head. Early C20 whitened brickwork circular tapering with metal roof. Metal entrance door with semi-circular arch above. Single window to Keeper's Room. Light chamber has metal plate riser and riveted hemispherical roof with weather vane, also an external catwalk with flag pole. Now forms part of a residential holding associated with modern bungalow built near the base of the lighthouse. |

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|---|---|
| **Asset/Event Number** | 274 |
| **Asset/Event Name** | 6, 8 AND 10, CASTLE ROAD |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1320343 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353807 |

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|---|---|
| **Northing** | 381869 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Row of 3 cottages early C18 with alterations, sandstone with slate roof, 2 storey 1 bay in squared coursed stone with dressed heads, sills and broad surrounds to doors. Three light horizontal sliding sashes with glazing bars Old slate roof with diminished courses, one chimney stack of stone. Listed for group value. |

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|---|---|
| **Asset/Event Number** | 275 |
| **Asset/Event Name** | THE LODGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1320383 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 354107 |
| **Northing** | 381718 |
| **Parish** | Halton |
| **Council** | |
| **Description** | A former lodge to Norton Priory now a private dwelling early to mid C19 with alterations and additions. Red sandstone with slate roof, single storey 2 bay. 2 light mullion windows filank door opening, now built-up, with pulvinated stone architrave. Cast iron lattice casements, stone bracketed eaves cornice, hipped roof of large slates with lead rolls. Stone chimney stack. |

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| **Asset/Event Number** | 276 |
| **Asset/Event Name** | 31, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1320385 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353698 |
| **Northing** | 382114 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Former stables to Halton House, now a dwelling, late C18, red sandstone with slate roof 2 storeys 5 bays. Squared rubble walls, three Gothic windows to ground floor with rendered surrounds, stone sills and cast iron lattice casements. Six panel door with narrow rendered surround. Square pitch hole at first floor level blocked internally and filled with unglazed pair of lattice casements. Sandstone copings to gables. |

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| **Asset/Event Number** | 277 |

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|---|---|
| **Asset/Event Name** | THE VICARAGE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1320399 |
| **HER Number** | |
| **Status** | Listed Building- Grade II* |
| **Easting** | 353777 |
| **Northing** | 381918 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Vicarage 1739 (on parapet tablet). Sandstone with slate roof 2 storeys 5 bays Rusticated quoins. Centre entrance bay flanked by giant pilasters. Six panel door with four fielded and two glazed panels in Doric parch. Rusticated surrounds to ground floor windows including heads with keystone, sash windows with glazing bars. Eaves cornice with solid parapet, pedimented over centre bay. Interior: South ground floor room has panelling with fluted pilasters, those which flank the mantel have Corinthian caps. Staircase with cut and bracketed string and turned newels. |

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| **Asset/Event Number** | 278 |
| **Asset/Event Name** | 59, 61 AND 63, MAIN STREET |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1320414 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353692 |
| **Northing** | 381841 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Row of three houses, early C19. Red brick with slate roof, 2 storeys and attic 7 bays. Tuscan column doorcases with eliptical fanlights and rubbed arches, four panel doors with raised panels approached up three stone steps. Stone plinth, rectangular apron with wide margin sinking below ground floor windows. Recessed sash windows with stone sills and skewback lintels. Ground floor and first floor windows missing from south end bay but first floor lintel remains. Stone eaves cornice, roof of small slates, south end and party wall stacks. The stack at the north end has been removed and the gable set back to the inner face. |

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| **Asset/Event Number** | 279 |
| **Asset/Event Name** | ROCKFIELD |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1326281 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350710 |

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|---|---|
| **Northing** | 382132 |
| **Parish** | Halton |
| **Council** | |
| **Description** | SJ 58 SW FORMER RUNCORN U.D. WESTON ROAD (South Side) Higher Runcorn 5/84 No.7 (Rockfield)<br><br>7.12.65 II<br><br>House late C18 rendered brickwork with slate roof. 2 storeys 5 bays. Stone Doric doorcase with open pediment. Six panel door with fielded panels and radial bar fanlight. Stone band at first floor will level and architrave to centre first floor window. Sashes set back in reveals. |

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| **Asset/Event Number** | 280 |
| **Asset/Event Name** | 12, 14 AND 16, CASTLE ROAD |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1330343 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353806 |
| **Northing** | 381888 |
| **Parish** | Halton |
| **Council** | |
| **Description** | SJ 58 SW HALTON CASTLE ROAD (East Side) 5/23 Nos. 12, 14 & 16 GV II<br><br>Row of 3 cottages early C19 with alterations, brown brick with slate roof 2 storeys 1 bay, stone plinth, quoins, and first floor level sill band. Ground floor windows are three light horizontal sliding sashes with turning pieces and arches, those at first floor level are two light casements also with shallow arches. Roof of small slates with plain brick stacks. Listed for group value. |

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| **Asset/Event Number** | 281 |
| **Asset/Event Name** | CHURCH OF ST MARY |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1330344 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353729 |
| **Northing** | 381908 |
| **Parish** | Halton |
| **Council** | |
| **Description** | 23.4.70 II Parish Church 1851 by Sir G.G.Scott. Red sandstone with slate roof. Lofty 4 bay nave with side aisle and chancel roof at lower level. Bell-turret to nave east gable. Squared snecked rubble walls with angle buttresses to chancel and corner buttresses to nave. Main Gothic entrance in south aisle. Windows curvilinear to chancel and nave, trefoil to clerestorey have |

drip moulds with stops carved as faces. All have stained glass. The octagonal bell-turret has trefoil openings surmounted by gablets and there are gablet kneelers to the gables. Interior Gothic aisle arcades supported on clusters of four shafts. Organ chamber and Memorial Chapel flank the chancel north and south. Good alabaster reredos and oak chapel screens. Boarded waggon roof to _ chancel and similar roof with exposed rafters to nave, trusses carried on corbels carved as faces. Oak benches with simple poppyheads.

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| **Asset/Event Number** | 282 |
| **Asset/Event Name** | FORMER ROCK FARM HOUSE |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1330345 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 353838 |
| **Northing** | 381779 |
| **Parish** | Halton |
| **Council** | |
| **Description** | This list entry was subject to a Minor Amendment on 10/03/2016<br><br>SJ 58 SW 5/32<br><br>HALTON, MAIN STREET (East Side), Former Rock Farm House (Formerly listed as Still Rock Farm House.<br><br>Previously listed as Rock Farm House and Barn)<br><br>27.2.73<br><br>II<br><br>Former farm house now social club offices. Late C17 with C19 alterations. Sandstone and red brick with slate roof. 2 storeys 6 bays including two gabled projections. Original portion west of sandstone with mullion windows. East the red brick section "U" shaped on plan, is built off old sandstone walls averaging 5 courses above ground level. Arched porch entrance in west gabled projection with modern door, windows east of this are two light casements with arch turning pieces and glazing bars. Plain gable barge boards and lead valleys. Interior: Bevelled beams. |

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|---|---|
| **Asset/Event Number** | 283 |
| **Asset/Event Name** | Former Anti-Aircraft Operations Room, Frodsham |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1411745 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351965 |
| **Northing** | 376592 |
| **Parish** | Frodsham |

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| **Council** | Cheshire West and Chester |
| **Description** | An Anti-Aircraft Operations Room built c1951 for the Ministry of Defence to a design drawn up by the Ministry of Works.<br><br>Reasons for Designation<br>The Former Anti-Aircraft Operations Rooms at Frodsham, Cheshire, completed in 1951, is listed at Grade II for the following principal reasons:<br><br>* Intactness: a substantially intact early 1950s anti-aircraft operations room which has experienced only minor alteration since being built, with good survival of original internal fittings and fixtures. * Historic interest: it represents the early transition of Cold War British defence policy developing from Second World War practices but taking into account the use of jet aircraft and atomic bombs. The later use of the structure reflects the different phases of civil defence and emergency planning during the Cold War;<br><br>* Architectural interest: a building which expresses through its monumental and robust form the threat posed by the atomic bomb and the necessary measures to protect its occupants from the effects of nuclear attack. The plan illustrates the needs and functions of the tactical command of radar controlled anti-aircraft defences, as envisaged during the late 1940s. The structure is representative of design thinking before the introduction of the Hydrogen Bomb in the mid-1950s;<br><br>* Rarity: one of only four Anti-Aircraft Operations Rooms surviving in England that were built on the surface, but protected from blast, heat and the initial radiation burst by being set back into the slope of a hill.<br><br>History<br>Anti-Aircraft Operations Rooms (AAOR) formed an integral part of the United Kingdom's anti-aircraft defences during the early 1950s and are a physical representation of early Cold War defence based upon the command and control experience gained during the Second World War. Thirty-two gun defended areas (GDA) were established in the United Kingdom, of which 23 were in England. Each GDA was commanded by an anti-aircraft operations room that controlled the automated gun sites built around the periphery of major conurbations, ports, and centres of armament production. It was an integrated defence system designed to counter the threat posed by manned Soviet bombers carrying free-fall atomic bombs. By the mid-1950s, advancing technology and the threat of long-range ballistic missiles, rendered the system obsolete. Government policy shifted from one of ‘point-defence’ to one of nuclear deterrent, and following the publication of the 1956 Defence White Paper that announced the change in policy, Anti-Aircraft Command was abolished.<br><br>The former Anti-Aircraft Operations Room (AAOR) at Beacon Hill, Frodsham was one of twenty-eight purpose-built examples constructed for the Royal Artillery between 1950 and 1951. It was under the command of 4 Group, 79 Brigade and controlled the gun sites in the Mersey Gun Defended Area. The operations room received long-range radar reports of the approach of hostile aircraft from the RAF’s Master Radar Stations. A trial Yellow Yeoman (Type 82) tactical control radar associated with the AAOR would then pick up and track the targets before they were allocated to the automated gun sites within their GDA.<br><br>Their role was short lived, and following the abolition of Anti-Aircraft Command in 1956, the bunker was acquired by Cheshire County Council in 1961 which converted it into a Civil Defence Training Centre. This new use was also short lived as the Civil Defence Corps was disbanded seven years later in 1968. Having stood empty for some time, the building was refurbished in 1986/87 and became the Cheshire County Standby Emergency Centre and the Cheshire Fire Brigade County Standby Control Centre; the main control being at Winsford.<br><br>Details<br>An Anti-Aircraft Operations Room built c1951 for the Ministry of Defence to a design drawn up by the Ministry of Works.<br><br>MATERIALS: it is built of reinforced concrete, fitted with steel blast doors and ventilators. |

PLAN: it is square in plan and comprises a two-storey semi-sunken reinforced concrete structure with a central operations/plotting room surrounded on both floors by a circulating corridor, with control cabins, offices, communications rooms, plant rooms, latrines and dormitories.

EXTERIOR: since the building was designed to resist the effects of a nuclear explosion, there are no windows and the only openings in the structure are the two entrances, ventilator grilles, the stand-by generator exhaust and a protruding ventilation flue on the roof above the plant rooms. The main entrance situated centrally in the south-east elevation is at ground level, while a second entrance in the north-west elevation is at the upper-floor level and is approached by a flight of concrete steps set into the slope of the hill. The two entrances have double steel blast-doors that are protected by open-sided concrete blast wall porches. Three round, steel ventilator grilles protected by plain projecting concrete drip moulds are situated to either side of the entrance in the north-west elevation.

INTERIOR: it is entered at the lower-floor level in the south-east elevation and the entrance leads into a lobby that functioned as the reception/security room. A dog-leg circulatory corridor gives access to a number of rooms built around the centrally positioned full height former operations room. All of these rooms bar the boiler, air conditioning, and generator rooms have been given different functions over time; their original functions included the tactical radar control room, radio-telephony room, telephone-frame room, Other Ranks (OR) and Women's Royal Army Corps (WRAC) rest rooms. The well of the operations room is entered from the circulatory corridor by two doorways on opposing sides of the room. It is overlooked by viewing galleries at first floor level, supported on plain tubular steel columns. The galleries are accessed from the upper floor, and on the northern and southern sides are occupied by cabins which retain their curving anti-reflection Perspex windows. The blank south-eastern wall would originally have had situation tote and map boards displayed on it.

The upper floor corridor is accessed externally from the north-west entrance, doorway and internally from the lower floor by a total of five stairways protected by painted galvanised tube and steel mesh balustrades. As with the lower-floor, a series of rooms surround the operations room; including latrines, rest rooms, a NAFFI, civil servants' room, switchboard, and various offices. Some of the original partition walls have subsequently been removed and an open dining area occupies most of the south-western side of the upper floor, while the former WRAC latrines have been converted to a kitchen. The original positions of walls are visible as witness marks on the Marley-tiled concrete floors. Most of the rooms on both floors retain their original plain wooden doors; the original box ducting for the ventilation system remains intact throughout. The original air conditioning plant and filtration system is intact, although the boiler and the stand-by generator have both been replaced by modern equipment.

Sources
Books and journals
Cocroft, W D, Thomas, R J C, Cold War - Building for Nuclear Confrontation 1946-1989, (2003)
Other
Cocroft and Thomas, Survey Report - The Beacons, Frodsham, Cheshire, (1997)

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|---|---|
| **Asset/Event Number** | 284 |
| **Asset/Event Name** | Helsby Junction Signal Box |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1412057 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 348685 |
| **Northing** | 375656 |

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|---|---|
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | London North Western Railway Type 4 signal box built 1900. |

Reasons for Designation
Helsby Junction Signal Box is listed at Grade II for the following principal reasons: * Representative: a good example of the typical form of the London and North Western Railway Type 4 signal box * Interior: for the retention of the original lever frame * Group value: with the Grade II listed station buildings and waiting shelter.

History
From the 1840s, huts or cabins were provided for men operating railway signals. These were often located on raised platforms containing levers to operate the signals and in the early 1860s, the fully glazed signal box, initially raised high on stilts to give a good view down the line, emerged. The interlocking of signals and points, perhaps the most important single advance in rail safety, patented by John Saxby in 1856, was the final step in the evolution of railway signalling into a form recognisable today. Signal boxes were built to a great variety of different designs and sizes to meet traffic needs by signalling contractors and the railway companies themselves.

Signal box numbers peaked at around 12,000-13,000 for Great Britain just prior to the First World War and successive economies in working led to large reductions in their numbers from the 1920s onwards. British Railways inherited around 10,000 in 1948 and numbers dwindled rapidly to about 4000 by 1970. In 2012, about 750 remained in use; it was anticipated that most would be rendered redundant over the next decade.

The London and North Western Railway initially employed the signalling contractors Saxby and Farmer for signalling equipment including signal boxes. From 1874, provision of new signalling was taken in-house using the company's main engineering works at Crewe. The first design (now known as the LNWR Type 3) was quickly replaced by the Type 4 by 1876: this standardised design being built in large numbers in various sizes up until about 1904. Helsby Junction Signal Box is a late example of the design, built in 1900 to replace an 1870s signal box on a slightly different site. The signal box is on the island platform at Helsby Station, to the north-east of the station building and waiting shelter both date to 1849 and are listed Grade II. Helsby Junction Signal Box was extensively renovated in circa 2003, winning a National Railway Heritage Award in 2004.

Details
Railway signal box, 1900, by and for the London and North Western Railway, Type 4 design of 1876, extensively renovated circa 2003.

MATERIALS: brick base with timber upper floor with horizontal weatherboarding; uPVC windows replicating the original pattern; Welsh slate roof.

EXTERIOR: the signal box appears to be single storey with a half basement, the floor of the lower, locking room being below the level of the surrounding station platform. At the south-western end of the box there is a small annex which, although of matching construction, is a later addition, providing a staff toilet and a porch to the entrance to the operating room. The timber structure of the upper, operating room is slightly set back from the brick wall face of the locking room below. The locking room is lit by four, segmentally arched windows to front and back, with a single window to the north-eastern end. The operating room is accessed via a short, modern steel staircase rising into the porch from the south-eastern side. Glazing on this side of the signal box is continuous with eleven 4-pane sashes arranged 2-2-3-2-2, most being fixed, but some horizontally sliding. Glazing on the north-western side is similar being nearly continuous with 10 sashes with a single central gap. The north-eastern end is also nearly continuously glazed except for a single, sash-sized gap. The roof is gabled to a shallow pitch, finished with timber spiked finials set into plain bargeboards.

INTERIOR: the signal box retains its original 45 lever London and North Western Railway Tumbler frame.

Sources
Books and journals
The Signalling Study Group, , The Signal Box: A Pictorial History and Guide to Designs, (1986), 148-152

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|---|---|
| **Asset/Event Number** | 285 |
| **Asset/Event Name** | Runcorn Signal Box |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1412067 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350906 |
| **Northing** | 382522 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Signal box opened 1940, designed by the London Midland Scottish railway to Air Raid Precaution specifications. |

Reasons for Designation
Runcorn Signal Box is listed at Grade II for the following principal reasons: * Representative: as a good, characteristic example of a Air Raid Precaution specification signal box, designed to minimise blast damage from aerial bombing; * Preservation: the signal box retains its original, distinctive metal framed windows; * Date: opened January 1940, Runcorn is believed to have been one of the first operational ARP signal boxes; * Architecture: as a good illustration of the LMS's adoption of Modernist architecture for its ARP signal boxes.

History
From the 1840s, huts or cabins were provided for men operating railway signals. These were often located on raised platforms containing levers to operate the signals and in the early 1860s, the fully glazed signal box, initially raised high on stilts to give a good view down the line, emerged. The interlocking of signals and points, perhaps the most important single advance in rail safety, patented by John Saxby in 1856, was the final step in the evolution of railway signalling into a form recognisable today. Signal boxes were built to a great variety of different designs and sizes to meet traffic needs by signalling contractors and the railway companies themselves.

Signal box numbers peaked at around 12,000-13,000 for Great Britain just prior to the First World War and successive economies in working led to large reductions in their numbers from the 1920s onwards. British Railways inherited around 10,000 in 1948 and numbers dwindled rapidly to about 4000 by 1970. In 2012, about 750 remained in use; it was anticipated that most would be rendered redundant over the next decade.

With the deteriorating international situation in the late 1930s, railway companies began to prepare themselves for the prospect of aerial bombing. Many existing signal boxes were fitted with removable steel shutters and had their locking room windows bricked up. Some were given blast protection walls and a few particularly vulnerable boxes were rebuilt to Air Raid Precaution (ARP) specifications. A number of completely new boxes were also built to serve new lines and sidings built for the war effort. Some, but not all of these were also built as ARP boxes. Such signal boxes were designed to resist blast damage rather than direct hits and were typically built with 14 inch thick brickwork, flat 12 inch reinforced concrete roofs and metal framed windows, with the use of timber kept to a minimum to limit the risk of fire damage. Over 50 ARP signal boxes were built to the standardised design used by the London Midland

Scottish Railway between 1939 and 1950 with around a hundred built by other companies elsewhere nationally. The example at Runcorn is a typical example of a LMS designed APR box and was opened in January 1940 to replace an earlier timber built box sited on a raised gantry.

Details
Railway signal box, 1940, by and for the London Midland Scottish Railway. Air Raid Precaution (ARP) specification design.

MATERIALS: red brick laid in English bond on a flush plinth of blue engineering bricks; steel framed windows set in concrete surrounds; reinforced concrete roof.

EXTERIOR: two-storey signal box with a blind ground-floor locking room and a first-floor operating room of five windows overlooking the tracks to the east. The windows are square with plain, slightly projecting concrete surrounds, being steel framed divided into eleven panes, the slightly larger central pane being an opening casement that is surrounded on all sides by fixed panes. The northern and southern ends of the signal box each has a further similar window continuous to those of the front elevation. Below the windows, at floor level, are two, flush-faced bands of blue engineering bricks set on end, the bands divided by three courses of red brickwork. The concrete roof is flat and projects to all sides. Entry to the signal box is via modern steel steps at the northern end with the doorway to the operating room being segmentally arched; the door is a modern replacement. Adjacent to this, at the top of the steps, there is a modern, plastic-clad toilet cubicle.

INTERIOR: the operating room has a reinforced concrete floor and retains its original lever frame of 46 levers. This frame is sited at the rear of the box facing away from the tracks.

Sources
Books and journals
The Signalling Study Group, , The Signal Box: A Pictorial History and Guide to Designs, (1986), 201
Websites
ARP Signal Boxes, accessed from http://www.pillbox-study-group.org.uk/index.php/other-wwii-defensive-structures/arp-sgnal-box/
Runcorn (photo of earlier signal box and text about the ARP replacement box), accessed from http://www.flickr.com/photos/ingythewingy/6915957290/

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| | |
|---|---|
| **Asset/Event Number** | 286 |
| **Asset/Event Name** | Helsby War Memorial |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1437912 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 349298 |
| **Northing** | 375886 |
| **Parish** | Helsby |
| **Council** | Cheshire West and Chester |
| **Description** | First World War memorial, 1920, with later additions for the Second World War. |

Reasons for Designation
Helsby War Memorial, which stands in the churchyard of the Church of St Paul, is listed at Grade II for the following principal reasons: * Historic interest: as an eloquent witness to the tragic impact of world events on the local community, and the sacrifice it made in the conflicts of the C20; * Architectural interest: an intricately carved cross in the Celtic style; * Group value:

with the Church of St Paul (Grade II) and the lychgate to St Paul's churchyard (Grade II).

History
The aftermath of the First World War saw the biggest single wave of public commemoration ever with tens of thousands of memorials erected across England. This was the result of both the huge impact on communities of the loss of three quarters of a million British lives, and also the official policy of not repatriating the dead, which meant that the memorials provided the main focus of the grief felt at this great loss. One such memorial was raised at Helsby as a permanent testament to the sacrifice made by the members of the local community who lost their lives in the First World War.

The memorial was unveiled by J Taylor JP and dedicated by Reverend EW Evans on 25 April 1920, commemorating 20 local servicemen who died in the First World War. The memorial, designed by RH Lockwood and made by W Heswall and Son, was funded by the parishioners at a cost of £350. Following the Second World War the names of 17 men who died in that conflict were added. In 2005-6 the war memorial was conserved with the help of grant aid from War Memorials Trust and in 2015 the memorial was refurbished by the local authority.

RH Lockwood was also responsible for designing the war memorial at Upton by Chester, and the panels in Chester Town Hall commemorating the c800 men of Chester who died in the First World War.

Details
The war memorial stands in the churchyard of the Grade II-listed Church of St Paul, overlooking the A56 and close to the Grade II-listed lychgate. The c5m tall sandstone memorial takes the form of a Celtic cross with a broad tapering shaft. The wheel-head and shaft are decorated with complex vine patterns carved in relief. The shaft stands on a pedestal, rectangular on plan, raised on a three-stepped base. The whole stands on a platform above the level of the churchyard wall.

The principal dedicatory inscription is recorded on the front face of the cross shaft, at its foot, incised into the stone and painted in black ink, reading ERECTED BY THE/ PARISHIONERS OF HELSBY/ IN PROUD AND/ GRATEFUL REMEMBRANCE/ OF THE MEN OF HELSBY/ PARISH WHO DIED FOR THEIR/ KING AND COUNTRY/ IN THE GREAT WARS/ 1914 - 1918 1939 - 1945. Below this on the front face of the pedestal the commemorated names are incised in two columns, one of the 20 First World War combatants and the other of the 17 Second World War names.

Sources
Websites
St Paul's Church, Helsby, accessed 20/07/2016 from
http://www.stpaulhelsby.org.uk/visitors.html
War Memorials Online, accessed 26 January 2017 from
https://www.warmemorialsonline.org.uk/memorial/120412
War Memorials Register, accessed 20/07/2016 from
http://www.iwm.org.uk/memorials/item/memorial/2155
War Memorials Trust, Grants Showcase, accessed 20/07/2016 from
http://www.warmemorials.org/search-grants/?gID=618

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|---|---|
| **Asset/Event Number** | 287 |
| **Asset/Event Name** | Runcorn War Memorial |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1437933 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 350899 |

| | |
|---|---|
| **Northing** | 382090 |
| **Parish** | Halton |
| **Council** | |
| **Description** | First World War memorial, 1920 by James Wilding LRIBA, with additions for later conflicts. |

Reasons for Designation
Runcorn War Memorial, which stands in the memorial garden, is listed at Grade II for the following principal reasons: * Historic interest: as an eloquent witness to the tragic impact of world events on the local community, and the sacrifice it has made in the conflicts of the C20 and C21; * Architectural interest: a tall and imposing memorial cross standing on a wide platform designed for ceremonial use defined by a memorial wall to the rear.

History
The aftermath of the First World War saw the biggest single wave of public commemoration ever with tens of thousands of memorials erected across England. This was the result of both the huge impact on communities of the loss of three quarters of a million British lives, and also the official policy of not repatriating the dead, which meant that the memorials provided the main focus of the grief felt at this great loss. One such memorial was raised at Runcorn as a permanent testament to the sacrifice made by the members of the local community who lost their lives in the First World War.

The memorial was unveiled on 14 November 1920 by the Lord-Lieutenant of the County of Chester, Colonel William Bromley Davenport, and the Chairman of Runcorn Urban District Council, RH Posnett. It was designed by James Wilding: the original intention was for a bronze memorial but Wilding argued that this would not stand the atmosphere, so it was decided that the memorial would be made of granite supplied by Kit Hill Quarry, Callington (Cornwall). The memorial commemorates 361 local servicemen who died in the First World War. It was re-dedicated on 7 November 1948 following the addition of more name panels to commemorate those 119 who died in the Second World War.

On 3 August 2014, a bronze statue (not listed) of Thomas Alfred Jones VC DCM (1880-1956) was erected in the memorial garden opposite the monument as part of the First World War Centenary Commemoration.

James Wilding LRIBA (1863-1932), who lived and worked in Runcorn, was also responsible for Runcorn Victoria Hospital, the Carnegie Library (Grade II-listed), and the Runcorn Baths.

Details
The memorial stands in a garden to the south of the junction of Moughland Lane, Weston Road and Greenway Road and is approached from the roadway by a set of steps. The cross takes the form of a three-stepped octagonal base supporting a plinth, upon which stands a Latin cross, the shaft of which stands c3.5m tall. The foot of the cross shaft is clasped by scrolled brackets.

The dedication inscribed on the front face of the plinth reads FOR/ OUR/ SAKE. The inscription on the face of the plinth to the immediate left of the front face reads 1914: the inscription on the face of the plinth to the immediate right reads 1918. The inscription on the front face of the upper-most step reads 1939-1945.

The memorial cross stands on a broad paved platform, in front of a coursed and coped stone wall bearing plaques that record the commemorated names from the First World War. The plaque to the extreme left reads MORE THAN CONQUERORS THROUGH HIM THAT LOVED US/ (NAMES). The plaque left of centre reads OBEYING THEIR COUNTRY'S CALL, SERVING HUMANITY, THESE GAVE THEIR LIVES/ FOR THE CAUSE OF TRUTH, OF JUSTICE AND FREEDOM IN THE GREAT WAR/ (NAMES). The central plaque continues THESE, AT THE CALL OF KING AND COUNTRY, LEFT ALL THAT WAS DEAR/ TO THEM, ENDURED HARDNESS, FACED DANGER, AND FINALLY PASSED/ OUT OF THE SIGHT OF MEN BY THE PATH OF DUTY AND SELF-SACRIFICE,/ GIVING UP THEIR OWN LIVES THAT OTHERS MIGHT LIVE IN FREEDOM/ LET THOSE WHO CAME AFTER SEE TO IT THAT THEIR NAMES ARE NOT FORGOTTEN/ (NAMES). The plaque right of centre reads THEY SOUGHT THE GLORY OF THEIR COUNTRY/ AND FOUND THE GLORY OF

THEIR GOD/ (NAMES) and the plaque to the extreme right reads AS DYING AND BEHOLD WE LIVE/ (NAMES).

Plaques recording the Second World War names have been added to the wall piers. A further dark granite stone has been inset into the pavement in front of the memorial cross, reading IN REMEMBRANCE/ OF THOSE/ FALLEN IN OTHER CONFLICTS under which seven men are listed with the theatre in which they died

This List entry has been amended to add the source for War Memorials Online. This source was not used in the compilation of this List entry but is added here as a guide for further reading, 26 January 2017.

Sources
Websites
War Memorials Online, accessed 26 January 2017 from https://www.warmemorialsonline.org.uk/memorial/145530
War Memorials Register, accessed 21/07/2016 from http://www.iwm.org.uk/memorials/item/memorial/58
Other
Collection D5944/1 “Records Relating to Runcorn War Memorial” held at Cheshire Archives
Legal

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|---|---|
| **Asset/Event Number** | 288 |
| **Asset/Event Name** | Frodsham War Memorial Gates and Railings |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1442701 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 351903 |
| **Northing** | 376817 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | War memorial, gates and railings, erected 1921, dismantled and re-erected in c1946. |

Reasons for Designation
Frodsham War Memorial Gates and Railings, first erected 1921 are listed at Grade II for the following principal reasons: * Historic interest: as an eloquent witness to the tragic impacts of world events on this community, and the sacrifices it made in the conflicts of the C20; * Architectural interest: the wrought-iron gates and railings are made to a high standard, and provide an elegant and sweeping entrance to the memorial land and a fitting tribute to the Fallen of the town from both World Wars; * Group value: they benefit from both a spatial and historic group value with the Grade II-listed Frodsham War Memorial.

History
Frodsham War Memorial is situated on the crest of Overton Hill and was unveiled by Colonel W Bromley Davenport on 24 October 1921. Unfortunately the choice of site did not meet with the approval from some members of the community, as most of the men killed had come from Frodsham and not Overton; consequently, there is a second war memorial in St Lawrence's Churchyard. The land for the memorial on Overton Hill was given in Trust to Frodsham Parish Council by a number of local landowners, who stipulated that it was given in memory of the men of Frodsham, who gave their lives in the Great War, and that the land should be an open

space for the use and enjoyment of the people of Frodsham for evermore. The memorial and the adjacent land on which it stands is accessed from Bellmonte Road and the SE extent of the land is delineated by iron memorial railings and gates, the cost of which was paid by subscription. It is believed that the railings were first erected in 1921, that they were dismantled during the Second World War and re-erected c1946; it is unclear how much of the original structure survives today, although the gates are considered to be original features, the attached wreaths which originally read 1914 - 1918, have been altered or replaced to read 1914 / 1918 and 1939 / 1945.

Details
War memorial, gates and railings, erected 1921, dismantled and re-erected in c1946. Materials: cast and wrought iron gates and railings, concrete dwarf walls.

The War Memorial Gates and Railings provide a dignified screened entrance to an avenue approach to the Frodsham War Memorial, which is situated on the crest of Overton Hill. The railings are split into two sections by a pair of principal gates flanked by smaller pedestrian gates; the E section has a curved alignment and the W section has a straight alignment. The E section has eight railing panels, grouped into four pairs, and the W section has 12 railing panels grouped into six pairs. Each panel is stepped in height and rises with the fall of ground from W to E; the pairs of panels are separated by intermediate railing posts with triple shafts and a square framed laurel wreath panel, and each end terminates against a hollow square section terminal post, with a square framed laurel wreath panel on each of the four faces. The opposite ends of the railing sections terminate against a three-shaft railing panel that is attached to the W and E pedestrian gate posts. The rectangular pedestrian gates are shorter and narrower than the square principal gates. The gates have wrought-iron stile and rail frame construction, with intermediate rails, supporting and holding in place square-profile railing shafts. The interstices between the railing shafts in the lower pair of rails are filled by additional miniature railing shafts. The upper rail of each gate forms a coping, beneath which a further rail forms a rectangular frame; the open frame in the pedestrian gates has a central quatrefoil pierced panel, while the panels in the principal gates contain moulded framed panels that read: THEIR NAME LIVETH / FOR EVER MORE. Open square panels formed within the four gates contain laurel wreaths; each wreath contains a dedication, reading from left to right across the gates: BELLUM / 1914 1918 / 1939 1945 / PAX. The gates are closed by boxed lever latches with ring handles, the principal gates have a decorative drop-bolt and can be held open by weighted ground catches. The entrance from the W pedestrian gate into the park is flanked by a pair of railing screen panels that project at a right-angle. The gates are supported by stylised classical-style hollow bolted cast-iron panel gate-posts, with moulded pedestals, plain capitals and depressed square conical finials. A cast-iron stench pipe with a hinged vane is attached to the rear of the E principal gate post.

Sources
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Frodsham War Memorial, Overton Hill, Frodsham, Cheshire, England - Non-specific veteran memorials on Waymarking.com, accessed 6 January 2017 from http://www.waymarking.com/waymarks/WME3VY_Frodsham_War_Memorial_Overton_Hill_Frodsham_Cheshire_England
Overton Hill War Memorial, accessed 6 January 2017 from http://www.pmsa.org.uk/pmsa-database/5107/
War Memorial trust - Cheshire Shared Services Website & Email, accessed 6 January 2017 from parish.cheshire.gov.uk/frodsham/cur_docs/war_mem_maint.doc
War Memorials Online, accessed 6 January 2017 from https://www.warmemorialsonline.org.uk/memorial/120403

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|---|---|
| **Asset/Event Number** | 289 |
| **Asset/Event Name** | War memorial cross in the churchyard of St Laurence's Church |

# Gazetteer of Heritage Assets and Event

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|---|---|
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1451843 |
| **HER Number** | |
| **Status** | Listed Building- Grade II |
| **Easting** | 352104 |
| **Northing** | 377274 |
| **Parish** | Frodsham |
| **Council** | Cheshire West and Chester |
| **Description** | The war memorial in the churchyard of St Laurence's Church, Frodsham, is listed at Grade II for the following principal reasons:<br><br>Historic interest:<br><br>* As an eloquent witness to the tragic impact of world events on the local community, and the sacrifice it made in the conflicts of the C20.<br><br>Architectural interest:<br><br>* An elegant memorial cross sculpted by Alec Miller of the Guild of Handicraft.<br><br>Group value:<br><br>* With the Church of St Laurence (Grade I) and churchyard structures listed at Grade II.<br><br>History<br>The aftermath of the First World War saw the biggest single wave of public commemoration ever with tens of thousands of memorials erected across England. This was the result of both the huge impact on communities of the loss of three quarters of a million British lives, and also the official policy of not repatriating the dead which meant that the memorials provided the main focus of the grief felt at this great loss.<br><br>One such memorial was raised at St Laurence's Church, Frodsham, as a permanent testament to the sacrifice made by 105 members of the local community who lost their lives in the First World War. Paid for by public subscription, the memorial was sculpted by Alec Millar who was also involved in producing the memorial at Chester Cathedral Close (Grade II) and several other listed war memorials including those at Millom (Cumbria), Saintbury (Gloucestershire), and Lickinge (Oxfordshire) (all Grade II). The architect was Harold S Rodgers of Oxford, who also designed a number of war memorial tablets and screens, and the masons were Messrs Unsworth and Rutter. The design incorporating a crucifixion was not without controversy, but a design having been displayed in the church during 1918, the memorial was dedicated in 1921 by the Bishop of Chester. Later, a further 31 names were added to the war memorial of those who had been killed in the Second World War.<br><br>Alec Miller (1879-1961). An Arts and Crafts designer, Miller trained as a woodcarver in Glasgow apprenticed to Miss CP Anstruther, later joining CR Ashbee's Guild of Handicraft in 1902, just as it moved from London to Chipping Campden in Gloucestershire. He stayed in Campden after the failure of the Guild, widening his activities to include carving, sculpting and other elements of design and craftsmanship, in particular portrait sculpture. Miller emigrated to California around 1929.<br><br>Details<br>The memorial stands in the churchyard of the Church of St Laurence (Grade I), in close proximity to the Grade II-listed sundial and Wright tomb. It takes the form of a tall sandstone cross. The cross head, with trefoils at the interstices of the cross arms forming a pierced wheel, bears the figure of Christ crucified. The cross head rises from a moulded collar on a plain octagonal shaft, which stands on an octagonal plinth with a slightly projecting cornice. |

The front and rear faces of the plinth are recessed, in which blind arcading is ornamented with a shield, charged with a Latin cross, appearing to be suspended from the arcading by a buckled strap. The remaining six sides of the plinth carry slate plaques bearing the names of the fallen, arranged in alphabetical order. Around the base of the plinth is the dedicatory inscription, starting on the front face and reading 1914 – 1918/ IN MEMORY/ OF ALL THE/ MEN OF THIS/ PLACE WHO/ GAVE THEIR/ LIVES IN THE/ GREAT WAR.

The plinth stands on a three-stepped octagonal base with slightly projecting treads. The front riser of the upper step is inscribed with the dates of the Second World War, 1939 – 1945, with the names of those who lost their lives in the Second World War recorded on a slate plaque fixed below in the riser of the middle step. An inscription carved into the front riser of the lowest step records details of the memorial's erection, reading ERECTED 1921/ ARCHITECT H.S. ROGERS OXFORD/ SCULPTOR A. MILLER CHIPPING CAMPDEN/ ERECTED BY F. UNSWORTH FRODSHAM/ ASSISTANT MASON J. RUTTER FRODSHAM.

Sources
Websites
War Memorials Online, accessed 24 October 2017 from https://www.warmemorialsonline.org.uk/memorial/194617/
War Memorials Register, accessed 24 October 2017 from http://www.iwm.org.uk/memorials/item/memorial/10024
Other
'Frodsham War Memorial', Chester Chronicle, 11 May 1928, p2
'Alec (Alexander) Miller', Mapping the Practice and Profession of Sculpture in Britain and Ireland 1851-1951, University of Glasgow History of Art and HATII, online database 2011 [http://sculpture.gla.ac.uk/view/person.php?id=msib6_1232987006, accessed 24 October 2017]

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|---|---|
| **Asset/Event Number** | 290 |
| **Asset/Event Name** | REMAINS OF NORTON PRIORY |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1130433 |
| **HER Number** | |
| **Status** | Listed Building- Grade I |
| **Easting** | 354866 |
| **Northing** | 383061 |
| **Parish** | Halton |
| **Council** | |
| **Description** | Remains of Augustinian Priory founded by the Baron of Halton circa 1115, the Priory was raised to abbey status in 1391, affected by the dissolution of 1536,became the site of a Tudor house for Sir Richard Brooke in 1545 which was, in 1730, replaced by a Georgian house. The Georgian building was altered by James Wyatt in 1775, altered again C19 and demolished in 1928. Sandstone walls and corework and some C19 ashlar work remain, important areas covered by asbestos cement slate monopitch roof. A Norman vaulted undercroft remains and this contains a high quality doorway of 1180 and a Victorian copy,2 blind arcades on slender shafts and good vaulted areas; in addition, extensive monastic ruins a few feet high remain. Of the houses only the entrance porch of 1868 remains, single storey with rustications, keystones and cornice which gives access to the undercroft. The most important monastic remains in the County. Scheduled Ancient Monument. |

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|---|---|
| **Asset/Event Number** | 291 |
| **Asset/Event Name** | CHURCH OF ST PETER |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1138491 |
| **HER Number** | |
| **Status** | Listed Building- Grade I |
| **Easting** | 355584 |
| **Northing** | 378464 |
| **Parish** | Aston |
| **Council** | Cheshire West and Chester |
| **Description** | ASTON BY SUTTON C.P. ASTON LANE SJ 57 NE South West Side 3/27 Church of St. Peter, 8/1/1970 GV I Church, chancel circa 1695, nave finished 1736, both on ground plan as in 1635, of red sandstone ashlar; roofs of small grey slates, that to nave graded. Nave with west cupola belfry and north and south porches; chancel. 4-bay nave has porches on 2nd bay from west and round-arched windows in architraves with moulded cills, capitals and keystones. Moulded plinth; plain pilasters facing north and south at corners carry plain frieze touching window keystones; moulded cornice; parapet with projecting panel at each corner and at centre of north and south sides, and raised (with consoles) over south porch to contain sundial surmounted by winged angel. Nailed oak boarded doors in round-arched porches with coped gables, 1736 inscribed on north porch gable. Bell cupola projects from west end, with circular window to choir gallery, clock in upper stage and consoles bearing octagonal belfy with stone cupola. Chancel has plain rectangular plinth and rusticated quoins; cornice and parapet; blank north face contains nailed boarded oak door in Roman Doric pedimented case; south side has 3 round-arched windows with reeded arrises to reveals and no imposts or keystones. Circular east window has niche to each side with raised panel below and recessed panel above. Interior. Choir gallery (organ installed 1906) with stair (2 turned balusters per step on each side, moulded rails and robust curtails) and panelled soffits. Oak pews with panelled backs and panelled doors on H hinges; oak pulpit of C17 character. Deep segmental chancel arch with archivolts on imposts and panelled intrados. Oak dado of C17 character to sides and east end of chancel. Chancel rail of oak with turned balusters; C17 altar table, vigorously expressed, with deep ovolo faces and shaped diagonally-set legs. Light moulded plaster ceiling with oval-ended central panel. Fine set of tablets in chancel to Aston family, 1635-1839, notably Thomas (died 1635), Magdalen (died 1635), Sir Willoughby Aston 1641-1702, Dame Rebecca 1737, Sir Thomas Aston (by Nost) and his brother John erected by their heir 1697. In the nave a good plaque to Thomas Hibbert, steward to Sir Willoughby Aston, and C19 tablets. A most pleasing late C17/early C18 church, inside and out, damaged by bombs during the 2nd World War and subsequently carefully restored and reglazed. Raymond Richards Old Cheshire churches: Pevsner and Hubbard The Buildings of England; Cheshire |

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|---|---|
| **Asset/Event Number** | 292 |
| **Asset/Event Name** | MANOR HOUSE OF ABBEY OF ST WERBURGH CHESTER, INCLUDING OLD HALL AND MONASTER |
| **Type of Asset/Event** | Listed Building |
| **Listing No./NRHE Number** | 1138810 |
| **HER Number** | |
| **Status** | Listed Building- Grade I |
| **Easting** | 344933 |
| **Northing** | 376548 |
| **Parish** | Ince |

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|---|---|
| **Council** | Cheshire West and Chester |
| **Description** | ELLESMERE PORT & NESTON MARSH LANE SJ 4476 (west) 8/40 Manor House of Abbey of 26.9.63 St Werburgh Chester, (including Old Hall and Monastery Cottages (the latter were formerly listed.)) GV I Remains of Manor House of Abbey of St Werburgh. 2 rectangular blocks in roughly worked coursed sandstone forming 2 sides of courtyard. At least 5 phases of masonry, late C13th onwards. THE HALL: Modern pitched slate roof to three-quarters of building. W elevation - segmental arched doorway with hood mould; crenel slits. Horizontal coved moulding below segmental arched coving on E elevation and projecting below 2 cove-moulded arches on S elevation. Inserted post-Dissolution rectangular 4 light mullion and transom windows with bossed heads and hood mounds, some converted to doors or blocked. N wall largely rebuilt after late Cl9th fire. INTERIOR: Internal wall passage and stairs with Caernarvon arch coving within west and part of north and east walls. Windows set in splayed recesses with segmental arched heads. Arched doorways, some blocked, to internal passages. Temporary corrugated sheeting north wall to end of roofing. MONASTERY COTTAGES: Roofless. Formerly range of four, 2- storey late C13th-C14th lodgings, converted to 2 cottages, now derelict. 2- storey remains of tower at west end, with 1st floor room over projecting ground floor lobby. Steeped buttresses integral to building on south and north elevations. Arched round-head, pointed and ogee-head doorways. Crenel and small rectangular windows. Inserted or altered rectangular doorways and windows. Additional one storey coursed sandstone building at east end; for- merly identical block to west. INTERIOR: Within tower, internal stair, now blocked, with Caernarvon arch coving, leading from lobby to possible garderobe at 1st floor. Freestanding partition wall with pointed-arch doorway at 1st floor. Deep splayed corbelled window recesses. Additional inserted openings. Stone corbels to 2nd storey floor. C17th or later fireplace with heavy beam over, to easternmost cottage. Coursed sandstone boundary wall with stone coping, connecting Hall to Monastery cottages. |

# Appendix 13.1 – Noise Impact Assessment

Noise & Vibration Consultants Ltd.

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Nottingham
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Tel No: [redacted]
e-mail: nvc.acoustics@btopenworld.com

# Noise Impact Assessment For Solar Photovoltaic Array & Battery Energy Storage System (BESS) Development

**at**

**Frodsham Solar**
**Frodsham Marsh**
**Frodsham**

**For**

**Axis**
**on behalf of**
**Frodsham Solar Ltd**

**Report No.: R23.0205/DRK**
**Date: 4th April 2023**

**Consultant: D.R. Kettlewell MSc MAE MIOA I.Eng**

**Noise & Vibration Consultants Ltd**

**Member of Institute of Acoustics**
**Member of Association of Noise Consultants**
**Member of Academy of Experts**

**Report prepared by:**
**D R Kettlewell MSc MIOA MAE I.Eng – Principal Consultant:**

[redacted]

**Date: 4th April 2023**

**Summary**

1. Frodsham Solar Ltd ("the Applicant") is proposing to construct and operate a solar photovoltaic array and battery energy storage system ("BESS") installation at Frodsham Marsh, Frodsham.

2. At the request of Axis acting on behalf of the Applicant, Noise & Vibration Consultants Ltd ("NVC") were commissioned to undertake a noise assessment to assess the impact and advise (where appropriate) on noise mitigation measures to meet planning guidance and noise standards.

3. Following a study of the local area the nearest sensitive receptors (NSR) were determined.

4. Baseline sound monitoring was carried out over a typical weekend period to determine the representative background and residual sound levels.

5. The assessment has used ISO9613-2 prediction methodology and CadnaA noise modelling software for producing noise contours of the highest likely generated noise with all plant operating.

6. An assessment of the resultant impacts has been undertaken by reference to empirical data taken from solar PV and BESS projects as provided by technology providers and applying noise limits established from appropriate and relevant guidance and standards.

7. To ensure protection of amenity we have proposed that during daytime periods, the rating level should not exceed the background sound level during daytime and night-time periods at NSR to ensure no adverse impacts would occur.

Conclusions

8. Following analysis of noise survey results our conclusions are as follows:

   (i) The results of existing background sound measurements taken at the fixed monitoring positions indicate that representative

background sound levels during the weekday and weekend daytime period (0700-2300 hours) vary between 60dB and 64dB $L_{A90}$. During night-time periods (2300-0700 hours) the background levels were shown to vary between 52dB and 54dB $L_{A90}$ and during sunrise hours (0500-0700 hours during Summer months) a background level of 54dB and 57dB $L_{A90}$.

(ii) Typical site operating noise levels have been established from empirical data obtained from technology providers who supply battery storage, transformer and inverter plant at other sites in the UK. This provided input data for the noise model.

(iii) Proposed noise limits to achieve a low impact according to BS4142:2014+A1:2019 include a rating level that does not exceed the representative background sound level (LA90) when measured in terms of $LAeq_{,1hr}$ daytime and $LAeq_{,15mins}$ during night-time.

(iv) The predicted noise contribution from the Proposed Development using ISO9613-2 methodology and CadnaA noise modelling software shows noise levels from the Site to range between 40dB and 46dB $L_{Aeq,1hr}$ during maximum site operations during daytime and sunrise hours at NSR and a range between 31dB and 40dB $L_{Aeq,15mins}$ during night-time.

(v) The results show that the noise contribution from maximum site operations would be below the representative background sound level during daytime periods. According to BS4142: 2014+A1:2019 the resultant assessment would conclude that noise from the site would result in a **low impact**.

(vi) For night-time periods or sunrise periods, according to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate a **low impact** magnitude at sensitive residential receptors.

(vii) In relation to absolute levels during night-time periods (2300-0500 hours), the maximum noise levels generated by the BESS plant

at sensitive residential receptors are below sleep disturbance limits (i.e. BS8233:2014 guidelines within bedrooms of 30dB $L_{Aeq8hrs}$) and predicted levels within sensitive rooms with an open window (advised as a 15dB(A) drop in BS8233) would be between 16dB and 25dB $L_{Aeq}$. This level is significantly lower than guidance limits provided within BS8233: 2014.

(viii) The results show that the site noise contribution at NSR during night-time operating periods would be below typical residual sound levels of 56dB to 60dB $L_{Aeq}$ established during the baseline study survey.

(ix) Predictions of construction noise at residential NSR would indicate **no significant impacts** and `best practicable means' would be applied in accordance with BS5228-1:2009+A1:2014.

(x) Prediction calculations relating to the temporary impact of changes in road traffic movements during the construction phase works at the nearest receptors, would indicate that this would be a **negligible impact** and **not significant** in accordance with Government advice and guidance.

(xi) Maximum vibration levels during peak construction activities are predicted to be below perceptible levels of vibration at residential NSR. The peak activities do not normally occur over long periods and best practical means would be employed to minimise vibration being generated and therefore **not significant.**

(xii) In terms of ecological NSR along the River Weaver, the impact from construction activity noise would be **not significant** with the application of appropriate mitigation measures by applying a `best practicable means' approach.

(xiii) During the use of vibratory plant at the closest approach to ecological NSR during the construction phase of the Proposed Development, vibration levels would be just above perceptible levels during the highest likely conditions and therefore a **slight** impact and **minor effect**, which is **not significant**.

9. The assessment concludes that the Proposed Development has been designed to operate such that it complies with all appropriate and relevant noise standards and guidance.

## CONTENTS

## 1.0 INTRODUCTION

1.1 Frodsham Solar Ltd ("the Applicant") is proposing to construct and operate a solar photovoltaic array and battery energy storage system ("BESS") installation referred to as Frodsham Solar at Frodsham Marsh, Frodsham.

1.2 At the request of Axis acting on behalf of the Applicant, Noise & Vibration Consultants Ltd ("NVC") were commissioned to undertake a noise assessment to assess the impact and advise (where appropriate) on noise mitigation measures to meet planning guidance and noise standards.

1.3 The study benefits from a baseline sound survey to determine typical background sound levels in the vicinity of nearest sensitive receptors to the Proposed Development. Monitoring was carried out over a weekend period (i.e. Friday to Monday) to determine the representative background sound levels.

1.4 Following a study of the local area the nearest sensitive residential receptors (NSR) were determined.

1.5 Typical site operating noise levels have been established from empirical data obtained from technology providers who provide battery storage, transformer and inverter plant. The assessment has used ISO9613-2 prediction methodology and CadnaA noise modelling software for producing noise contours of the highest likely generated noise with all plant operating.

*Sources of Information*

1.6 Information used in this assessment has been obtained from the following sources:

- Ordnance Survey maps of the local area;
- Information relating to the site layout was provided by Axis;
- Overarching National Policy Statement for Energy (EN-1)[1] July 2011;

[1] *Department of Energy & Climate Change: Overarching National Policy Statement for Energy (EN-1) (July 2011).*

- Draft National Policy Statement for Renewable Energy Infrastructure[2] (EN-3) March 2023;
- Cheshire West & Chester Council – Local Plan (Part One) Strategic Policies: January 2015[3];
- Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies: July 2019[4]
- BS 7445: 2003[5] Description and measurement of environmental noise;
- BS4142: 2014+A1:2019[6] `Methods for rating and assessing industrial and commercial sound';
- BS 5228:2009+A1:2014[7] Part 1 Noise & Part 2 Vibration `Code of practice for noise and vibration control on construction and open sites'
- Guidelines for Community Noise – World Health Organisation: April 1999[8];
- Night Noise Guidelines for Europe: 2009[9] – World Health Organisation
- BS8233: 2014[10] `Guidance on sound insulation and noise reduction for buildings';
- National Planning Policy Framework – July 2021[11];
- National Planning Practice Guidance – June 2021[12];
- Noise Policy Statement for England (NPSE) – March 2010[13]: Department for Communities and Local Government; and
- Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11)[14].

[2] Department for Energy Security and Net Zero: Draft National Policy Statement for Renewable Energy Infrastructure (EN-3).
[3] Cheshire West & Cheshire Council Local Plan (Part One) Strategic Policies adopted January 2015.
[4] Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies: July 2019.
[5] BS 7445: 2003 Description and measurement of environmental noise.
[6] BS4142: 2014+A1:2019 `Methods for rating and assessing industrial and commercial sound'.
[7] BS 5228:2009+A1:2014 Part 1 Noise & Part 2 Vibration `Code of practice for noise and vibration control on construction and open sites'.
[8] World Health Organisation: April 1999 - Guidelines for Community Noise.
[9] Night Noise Guidelines for Europe: 2009[9] – World Health Organisation.
[10] BS8233: 2014 `Guidance on sound insulation and noise reduction for buildings'.
[11] National Planning Policy Framework – July 2021.
[12] National Planning Practice Guidance – June 2021.
[13] Noise Policy Statement for England (NPSE) – March 2010[13]: Department for Communities and Local Government.
[14] Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11).

### *Assessment Methodology*

1.7 The aim of the survey was to provide information and advice on the following:

- provide information on typical operating noise levels from the solar transformers and inverters, and from battery storage plant, inverters and transformer plant;
- provide information on background and residual noise levels at the nearest sensitive receptors during the most sensitive periods of proposed operation; and
- advise on any operations that are shown to exceed appropriate and relevant noise criteria and where appropriate provide recommendations for further mitigation.

1.8 Appendix 1 provides details of technical terms within the report, for ease of reference. There is also a chart showing typical everyday noise levels to assist in understanding the subjective level of noise in terms of decibels.

1.9 The Proposed Development would produce renewable electricity obtained directly from the sun using photovoltaic technology. It would also store electricity generated from the solar array or from the local grid during periods of low demand, and export electricity during periods of high demand.

1.10 The development would comprise the following components:

- Photovoltaic panels and associated supporting frames and ground mounting;
- Solar panel inverters and transformers;
- Battery storage containers, inverters and transformers;
- Cabling linking battery containers and inverter and transformer stations to the on-site substation;
- Perimeter fencing and CCTV (invisible infra-red illumination at night, only pointing into the site);
- DNO Substation including transformer;
- Client Substation (Switchgear Building);
- Control and Storage Rooms;
- Internal service roads;

- Scheme of landscaping;
- Temporary Compound & set down area.

## 2.0 SITE DESCRIPTION

### 2.1 Location

2.1.1 The location of the Proposed Development is illustrated on Figure 1.

2.1.2 The western half of the Solar Array Development Area forms part of the Frodsham Wind Farm and is located on former Manchester Ship Canal Dredging Deposit Grounds. The eastern half comprises an area used by Frodsham Wildfowlers (a shooting club), agricultural land and a former lagoon that was used to deposit dredging's from the Weaver Navigation.

2.1.3 The access route to the Solar Array Development Area will be from the west, connecting to the adopted highway at the roundabout between Pool Lane and Grinsome Road. There will be no access during construction or operation from roads / tracks linking directly to Frodsham to the south of the Site.

2.1.4 The project will include a Battery Energy Storage System (BESS) and will connect to the local district network operator (DNO) substation, both of which are located to east of the solar array area, on the north bank of the River Weaver.

2.1.5 There would be an underground or an Over Head Line (OHL) connection to facilitate the crossing of the River Weaver. The application will also include a direct wire connection to the INEOS Inovyn's Runcorn Site to the north of the River Navigation, this could be below ground or an OHL. An underground private wire connection to Protos would also be provided.

### 2.2 Site Operation Noise Sources

2.2.1 In terms of noise generated by this type of development, the assessment has considered the following noise sources:

- Noise from the operation of solar inverters, transformers and switchgear.
- Noise from the operation of the battery storage plant (i.e. inverters and transformers).
- Noise from the operation of cooling systems for enclosed battery plant.

## 2.3 Site Plant and Operation Hours

2.3.1 Solar Farms are inherently quiet installations with the PV panels not producing any noise due to the fact that there are no moving parts. The associated plant used to convert the DC current to AC at the correct voltage involves the use of inverters and transformers which do generate some noise.

2.3.2 Transformers are not particularly noisy plant and generate a low level `hum' at relatively close distances driven by the mains frequency. By its nature the solar array is only operational during daylight hours, however during peak generation periods over the summer months (i.e. under conditions of high temperatures) there may be occasional periods when the operation of the inverters and transformers occurs after sun rise (i.e. around 0500-0700 hours), but this would not be at full capacity and noise levels are likely to be reduced.

2.3.3 The battery storage plant would be available for operation 24hrs/day and would provide energy when required.

## 2.4 Nearest Receptors

*Residential Receptors*

2.4.1 Based on distance relative to the Proposed Development, the NSR are generally located to the south to southwest of the Site. The closest residential receptors to the Solar Array Development Area are located to the south in Frodsham off Williams Way (circa 230m), Hawthorn Road and Wayford Mews (crica 140m) and Waterside Drive (290m).

2.4.2 There are other receptors located at greater distance than the above, with NSRto the northeast at a distance of 760m (off Cholmondley Road in Clifton) and to the north off Cavendish Farm Road at Weston at circa 840m. As the impact would be

lower compared to the NSR described above, these receptors are not included in the assessment but are included in the noise contour mapping results. The NSR are indicated on Figure 1 together with the application site position.

2.4.3 We are not aware of any other future receptors proposed within existing planning developments that would be of greater sensitivity than those considered in this assessment.

2.4.4 Figure 2 attached shows the draft layout used for the noise assessment. For the purposes of this assessment the location of the main compound and the BESS has been assumed to be in a 'worst case' position in relation to the NSR, as other potential locations being considered for the BESS are at greater distances from the NSR and ecological receptors. It has also been assumed that centralized inverter/transformer stations are used. Again this is a worst case assumption. If string inverts were used the noise levels would be less than that predicted by the model.

# 3.0 NOISE POLICY, STANDARDS AND GUIDANCE

## 3.1 Introduction

3.1.1 Noise has been defined as sound that is unwanted by the recipient. The effects of noise on the neighbourhood are varied and complicated, including such things as interference with speech communication, disturbance of work, leisure or sleep. A further complicating factor is that in any one neighbourhood some individuals will be more sensitive to noise than others.

## 3.2 National Planning Guidance

***Overarching National Policy Statement for Energy (EN-1) July 2011***

3.2.1 Section 5.11 of the Policy covers the statement on Noise and Vibration includes the following points:

*"5.11.2 Noise resulting from a proposed development can also have adverse impacts on wildlife and biodiversity. Noise effects of the proposed development on ecological receptors should be assessed by the IPC in accordance with the Biodiversity and Geological Conservation section of this NPS.*

*5.11.3 Factors that will determine the likely noise impact include:*

*● the inherent operational noise from the proposed development, and its characteristics;*
*● the proximity of the proposed development to noise sensitive premises (including residential properties, schools and hospitals) and noise sensitive areas (including certain parks and open spaces);*
*● the proximity of the proposed development to quiet places and other areas that are particularly valued for their acoustic environment or landscape quality; and*
*● the proximity of the proposed development to designated sites where noise may have an adverse impact on protected species or other wildlife. Applicant's assessment*

*5.11.4 Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:*

*● a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;*
*● identification of noise sensitive premises and noise sensitive areas that may be affected;*
*● the characteristics of the existing noise environment;*
*● a prediction of how the noise environment will change with the proposed development;*
*● in the shorter term such as during the construction period;*
*● in the longer term during the operating life of the infrastructure; 136*

*http://www.defra.gov.uk/environment/quality/noise/npse/ Overarching National Policy Statement for Energy (EN-1) 104*
*● at particular times of the day, evening and night as appropriate.*
*● an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and*
*● measures to be employed in mitigating noise. The nature and extent of the noise assessment should be proportionate to the likely noise impact.*

*5.11.5 The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered.*

*5.11.6 Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards137 and other guidance. Further information on assessment of particular noise sources may be contained in the technology-specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards138 and other guidance which also give examples of mitigation strategies.*

*5.11.7 The applicant should consult EA and Natural England (NE), or the Countryside Council for Wales (CCW), as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account. IPC decision making*

*5.11.8 The project should demonstrate good design through selection of the quietest cost-effective plant available; containment of noise within buildings wherever possible; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission.*

*5.11.9 The IPC should not grant development consent unless it is satisfied that the proposals will meet the following aims:*
*● avoid significant adverse impacts on health and quality of life from noise;*
*● mitigate and minimise other adverse impacts on health and quality of life from noise; and*
*● where possible, contribute to improvements to health and quality of life through the effective management and control of noise. 137 For example BS 4142: BS 6472 and BS 8233. 138 For example BS 5228. Overarching National Policy Statement for Energy (EN-1) 105*

*5.11.10 When preparing the development consent order, the IPC should consider including measurable requirements or specifying the mitigation measures to be put in place to ensure that noise levels do not exceed any limits specified in the development consent.*

*Mitigation*

*5.11.11 The IPC should consider whether mitigation measures are needed both*

*for operational and construction noise over and above any which may form part of the project application. In doing so the IPC may wish to impose requirements. Any such requirements should take account of the guidance set out in Circular 11/95 (see Section 4.1) or any successor to it.*

*5.11.12 Mitigation measures may include one or more of the following:*
*● engineering: reduction of noise at point of generation and containment of noise generated;*
*● lay-out: adequate distance between source and noise-sensitive receptors; incorporating good design to minimise noise transmission through screening by natural barriers, or other buildings; and*
*● administrative: restricting activities allowed on the site; specifying acceptable noise limits; and taking into account seasonality of wildlife in nearby designated sites.*

*5.11.13 In certain situations, and only when all other forms of noise mitigation have been exhausted, it may be appropriate for the IPC to consider requiring noise mitigation through improved sound insulation to dwellings."*

***Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) March 2023***

3.2.3 At section 2.5 under the heading `Consideration of good design for energy infrastructure' at paragraph 2.5.2. it states:

*"Proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity, opportunities for co-existence/co-location with other marine uses, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage.."*

3.2.4 At section 3.10 under the heading `Solar photovoltaic generation impacts: construction including traffic and transport noise and vibration' and at paragraph the NPS states:

" *3.10.111 Modern solar farms are large sites that are mainly comprised of small structures that can be transported separately and constructed on-site, with developers designating a compound on-site for the delivery and assemblage of the necessary components.*

*3.10.112 Many solar farms will be sited in areas served by a minor road network. Public perception of the construction phase of solar farm will derive mainly from the effects of traffic movements, which is likely to involve smaller vehicles than typical onshore energy infrastructure but may be more voluminous.*

*3.10.113 Generic traffic and transport impacts are covered Section 5.14 of EN1.*

In respect of `Secretary of State decision making' the statement advises:

*"3.10.152 Once solar farms are in operation, traffic movements to and from the site are generally very light, in some instances as little as a few visits each month by a light commercial vehicle or car. Should there be a need to replace machine components, this may generate heavier commercial vehicle movements, but these are likely to be infrequent.*

*3.10.153 The Secretary of State is unlikely to give any more than limited weight to traffic and transport noise and vibration impacts from the operational phase of a project."*

## 3.3 Local Planning Policy

***Cheshire West & Chester Council – Local Plan (Part One) Strategic Policies***

3.3.1 The Cheshire West and Chester Local Plan (Part One) Strategic Policies was adopted in January 2015 to provide the overall vision, strategic objectives, spatial strategy and strategic planning policies for the borough to 2030. The Local Plan (Part One) relates to policies for planning applications and is supported by Part Two which relates to Land Allocations and Detailed Policies Plan.

3.3.3 Policy ENV 7 `Alternative energy supplies' will support renewable and low carbon energy proposal where there are no unacceptable impacts from a number of issues including noise.

***Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies***

3.3.4 Policy DM30 relates to Noise and states:

*"In line with Local Plan (Part One) policy SOC 5, development must not give rise to significant adverse impacts on health and quality of life, from noise. Development which generates noise or is sensitive to it will only be permitted*

*where it accords with the development plan and does not have an unacceptable adverse impact on human health or quality of life. Unless it can be demonstrated that a significant adverse impact on residential amenity arising from construction and demolition is unlikely it is expected that demolition and construction works shall be carried out during normal working hours. The Council must be satisfied that the proposed location of any construction/demolition site compound will minimise the noise impact on neighbouring residential uses."*

***National Planning Policy Framework – July 2021 (NPPF)***

3.4.5 Chapter 15 of the National Planning Policy Framework (NPPF) relates to 'Conserving and enhancing the natural environment'.

3.4.6 Paragraph 174 e) refers directly to noise and states that: *"e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;"*

3.4.7 Paragraph 185 also states: *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

*a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
*b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
*c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

3.4.8 The Noise Policy Statement for England (NPSE) was published in March 2010. It

specifies the following long-term vision in policy aims:

*"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life."*

3.4.9 The NPSE introduced three concepts to the assessment of noise, which includes:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

3.4.10 The above categories are however, undefined in terms of noise levels and for the SOAEL the NPSE indicates that the noise level will vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research is therefore required to establish what may represent an SOAEL. It is acknowledged in the NPSE that not stating specific SOAEL levels provides policy flexibility until there is further evidence and guidance.

3.4.11 The NPSE indicates how the LOAEL and SOAEL relate to the three aims listed above. The first aim of NPSE requires that:

*"significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development."*

3.4.12 The second aim of the NPSE (mitigating and minimising adverse impacts on health and quality of life) refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate adverse effects on health and quality of life whilst also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.

3.4.13 The third aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

***Planning Practice Guidance – June 2021***

3.4.14 In October 2014, the Ministry of Housing, Communities & Local Government updated the Planning Practice Guidance ("PPG"), which provides guidance on the planning process. The main section of PPG was also updated in July 2019 and consultation and pre-decision matters updated in June 2021.

3.4.15 The PPG refers to the NPSE documents and under the heading 'How can noise impacts be determined?' it states:

*"Plan-making and decision taking need to take account of the acoustic environment and in doing so consider:*

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved."*

3.4.16 At paragraph 004 the PPG includes a table summarising the noise exposure hierarchy, based on the likely response. Under the heading of 'example of outcome' the '*present and not intrusive*' assessment of noise is defined as '*noise can be heard, but does not cause any change in behaviour, attitude or*

*physiological response. Can slight affect the acoustic character of the area but not such that there is a change in the quality of life*'. The increasing effect level under these conditions is deemed to be '*no observed adverse effect*' and '*no specific measures are required'.*

3.4.17 The PPG explains this by stating:

*"At the lowest extreme, when noise is not perceived to be present, there is by definition no effect. As the noise exposure increases, it will cross the 'no observed effect' level. However, the noise has no adverse effect so long as the exposure does not cause any change in behaviour, attitude or other physiological responses of those affected by it. The noise may slightly affect the acoustic character of an area but not to the extent there is a change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.*

*As the exposure increases further, it crosses the 'lowest observed adverse effect' level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).*

*Increasing noise exposure will at some point cause the 'significant observed adverse effect' level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused.*

*At the highest extreme, noise exposure would cause extensive and sustained adverse changes in behaviour and / or health without an ability to mitigate the effect of the noise. The impacts on health and quality of life are such that*

*regardless of the benefits of the activity causing the noise, this situation should be avoided."*

3.4.18 The PPG includes a table summarising the noise exposure hierarchy, based on the likely average response. Table 3.1 below provides the perception, example of outcome, effect and action required relative to noise.

**Table 3.1: Noise Exposure Hierarchy**

| Response | Examples of Outcomes | Increasing Effect Level | Action |
|---|---|---|---|
| Not present | No Effect | No Observed Effect (NOEL) | No Specific Measures Required |
| Present and not intrusive | Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life. | No Observed Adverse Effect (NOAEL) | No Specific Measures Required |
| Lowest Observed Adverse Effect Level (LOAEL) | | | |
| Present and intrusive | Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life. | Observed Adverse Effect | Mitigate and reduce to a minimum |
| Significant Observed Adverse Effect Level (SOAEL) | | | |
| Present and disruptive | The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area. | Significant Observed Adverse Effect | Avoid |
| Present and very disruptive | Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/ awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory | Unacceptable Observed Adverse Effect | Prevent |

***Guidance & Standards***

***BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'***

3.4.19 BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' is based on the measurement of background sound using $L_{A90}$ noise measurements, compared to source noise levels measured in $L_{Aeq}$ units. Once any corrections have been applied for source noise tonality, distinct impulses etc., the difference between these two measurements (i.e. known as the 'rating' level) determines the impact magnitude.

- Typically, the greater the difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact (although this can be dependent on the context).
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is, relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact (although this can be dependent on the context).

3.4.20 In order to establish the rating level, corrections for the noise character need to be taken into consideration. The Standard states that when considering the perceptibility:

*"Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention."*

3.4.21 The subjective method adopted includes the following character corrections:

**Table 3.2: BS4142:2014+A1:2019 Character Corrections**

| Level of Perceptibility | Correction for Tonal Character dB | Correction for Impulsivity dB | Correction for Intermittency dB | Correction for other character dB |
|---|---|---|---|---|
| Not Perceptible | 0 | 0 | 0 | 0 |
| Just perceptible | +2 | +3 | 0 | 0 |
| Clearly perceptible | +4 | +6 | +3* | +3* |
| Highly perceptible | +6 | +9 | +3* | +3* |

*Standard defines this should be readily distinctive against the residual acoustic environment, it is interpreted therefore to be either clearly or highly perceptible as a character. If characteristics likely to affect perception and response are present in the specific sound, within the same reference period, then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant to the exclusion of the others, then it might be appropriate to apply a reduced or even zero correction for the minor characteristics.

3.4.22 The assessment of noise from the fixed plant at the NSR is considered and our expert opinion is provided below:

a) In terms of tonality, given the separation distance, predicted noise levels, residual sound levels and proposed mitigation measures any tonal noise from transformers and cooling systems would not be perceptible at the NSR and no penalty correction would be required.

b) In terms of impulsivity this is unlikely to be a characteristic of solar farms, battery storage and transformers installations and is therefore not deemed to be applicable.

c) In terms of intermittency the plant would work for reasonable long periods of time once demand requires use of its power and by its nature it does not tend to operate intermittently. The intermittency is therefore highly unlikely to be distinctive.

3.4.23 In conclusion, in view of the noise contribution from the Proposed Development, residual sound levels and design approach to provide suitable mitigation measures, we would advise that a noise character penalty is not appropriate to add to the calculated noise contribution from the fixed plant.

***BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'***

3.4.24 The British Standard BS8233 provides additional guidance on noise levels within buildings. These are based on the WHO recommendations and the criteria given in BS8233 for unoccupied spaces within residential properties.

3.4.25 The guidance provided in section 7.7 of BS8233 provides recommended internal ambient noise levels for resting, dining and sleeping within residential dwellings. Table 3.3 provides detail of the levels given in the standard.

**Table 3.3: BS8233: 2014 Indoor ambient noise levels for dwellings**

| ***Activity*** | ***Location*** | ***07:00 to 23:00*** | ***23:00 to 07:00*** |
|---|---|---|---|
| Resting | Living Room | 35 dB $L_{Aeq,16hours}$ | - |
| Dining | Dining room/area | 40 dB $L_{Aeq,16hours}$ | - |
| Sleeping (daytime resting) | Bedroom | 35 dB $L_{Aeq,16hours}$ | 30 dB $L_{Aeq,8hours}$ |

3.4.26 For a partially open window the standard refers to a reduction of approximately 15dB (Ref. Annex G: G.1). This would therefore indicate a noise level outside the window of approximately 50dB $L_{Aeq,16hours}$ for living rooms during daytime and 45dB $L_{Aeq,8\ hours}$ during night-time outside bedrooms.

***World Health Organisation (WHO) Guidelines for Community Noise: April 1999***

3.4.27 This document provides further updated information on noise and its effects on the community. The document for noise `*In Dwellings'* states "*The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30dB $L_{Aeq}$ for continuous noise and 45dB $L_{Amax}$ for single sound events. Lower noise levels may be disturbing depending upon the nature of the noise source."*

3.4.28 The WHO document also states "*To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35dB $L_{Aeq}$. To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB*

*$L_{Aeq}$ on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB $L_{Aeq}$. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development."*

3.4.29 In 2009, the WHO published: 'Night Noise Guidelines for Europe', which it describes as an extension to the WHO 'Guidelines for Community Noise' (1999). It concludes that: *"Considering the scientific evidence on the thresholds of night noise exposure indicated by $L_{night,outside}$ as defined in the Environmental Noise Directive (2002/48/EC), an $L_{night,outside}$ of 40dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. $L_{night,outside}$ value of 55dB is recommended as an interim target for those countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach."*

## 3.5 Survey Techniques

3.5.1 The background sound survey monitoring has been carried out in accordance with appropriate measurement conditions as defined in BS4142: 2014+A1:2019.

## 3.6 Guidance on Construction Noise

*BS 5228-1:2009+A1:2014 `Code of practice for noise and vibration control on construction and open sites'*

3.6.1 BS 5228 refers to *"the need for the protection against noise and vibration of persons living and working in the vicinity of, and those working on, construction and open sites. It recommends procedures for noise and vibration control in respect of construction operations and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners."*

3.6.2 Part 1 deals with noise in terms of background legislation and gives recommendations for basic methods of noise control relating to construction and

open sites where significant noise levels may be generated. The guidance is aimed at giving advice on achieving `best practice' in controlling noise and vibration from construction and open sites. There is an example of noise limits given in Annex E, which sets out cut-off limits between 65dB(A) and 75dB(A) or 5dB(A) above the ambient noise, whichever is the greater. Part 2 of BS 5228 deals specifically with vibration control and provides the legislative background to the control of vibration and recommendations for controlling vibration at source and management controls (e.g. liaison with communities, supervision, preparation and choice of plant etc.)

*Road Traffic Noise*

3.6.3 Vehicular access to the Proposed Development during the construction phase would be from the west, connecting to the adopted highway at the roundabout between Pool Lane and Grinsome Road. There will be no access during construction and operation from roads/tracks linking directly to Frodsham to the south of the Site.

*Construction Phase*

3.6.4 Section 5.0 of this report includes an assessment of road traffic impacts relating to the construction phase of the Proposed Development on existing receptors.

3.6.5 According the DMRB LA 111 guidelines, the magnitude of impact at noise sensitive receptors of construction traffic shall be determined in accordance with Table 3.4.

**Table 3.4: Magnitude of impact at receptors**

| Magnitude of impact | Increase in basic noise level of closest public road used for construction traffic (dB) |
|---|---|
| Negligible | Less than 1.0 |
| Minor (Slight) | Greater than or equal to 1.0 and less than 3.0 |
| Moderate | Greater than or equal to 3.0 and less than 5.0 |
| Major | Greater than or equal to 5.0 |

Note: Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:
1) 10 or more days or nights in any 15 consecutive days or nights;
2) a total number of days exceeding 40 in any 6 consecutive months.

*Construction Phase – Vibration*

3.6.6 For construction phase vibration, the LOAEL and SOAEL for construction vibration

is set out in DMRB LA 111 and is provided in Table 3.5 below. (Appendix 4 provides an explanation of technical terms associated with the vibration assessment).

**Table 3.5: Construction vibration LOAELs and SOAELs for all receptors**

| Time Period | LOAEL | SOAEL |
|---|---|---|
| All time periods | 0.3mm/sec PPV | 1.0mm PPV |

3.6.7 The magnitude of impact for construction vibration, shall be determined in accordance with Table 3.6 (as defined in DMRB LA 111).

**Table 3.6: Magnitude of impact at receptors**

| Magnitude of impact | Vibration Level |
|---|---|
| Negligible | Below LOAEL |
| Minor (Slight) | Above or equal to LOAEL and below SOAEL |
| Moderate | Above or equal to SOAEL and below 10mm/s PPV |
| Major | Above or equal to 10mm/s PPV |

Note: Construction vibration shall constitute a likely significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:
1) 10 or more days or nights in any 15 consecutive days or nights; or
2) a total number of days exceeding 40 in any 6 consecutive months.

## 3.7 Relevant Noise Criteria

3.7.1 The relevant guidance would be BS4142:2014+A1:2019. This is appropriate to apply in general terms to any plant operational noise generated by the Proposed Development. To achieve a **low** impact the rating level would not exceed the established representative background sound level. Where rating levels exceed background sound levels by around 5dB(A) then this would indicate an **adverse impact**.

*Operational Vibration*

3.7.2 The type of plant proposed would not generate any significant operational vibration and therefore any impact would be **negligible** and not significant.

# 4.0 BASELINE SURVEY METHODOLOGY & RESULTS

## 4.1 Baseline Sound Monitoring (See Appendix 2 & Figure 1)

### Instrumentation and Fieldwork Details

4.1.1 A detailed environmental baseline sound survey was carried out at the nearest sensitive receptors to determine details of the noise climate to provide typical and representative background sound data. Three locations were chosen to establish background sound.

4.1.2 The monitoring positions are shown on Figure 1. The noise monitoring positions are representative of nearest residential receptors adjacent to the Proposed Development and provide broadband data of the existing sound climate at these receptors. Details of the instrumentation used for the survey are detailed below.

4.1.3 The existing baseline sound survey was undertaken over a weekend period on Thursday 8th to Monday 12th December 2022 at three fixed locations in proximity to NSR to the Site and is therefore considered to provide representative baseline sound levels.

4.1.4 The existing background sound survey was carried out in accordance with the advice given in BS4142: 2014+A1:2019.

4.1.5 The monitoring positions were as follows:

*Position A (Southeast of Site – on opposite side of the M56 Motorway) – Rear of Saltworks Close*

4.1.6 Monitoring position A is representative of the nearest receptor located southeast of the Site in proximity to Saltworks Close. Noise levels at this location are generally affected by distant road traffic noise from the M56 Motorway. The monitoring position was chosen just to the north and rear of Saltworks Close. Refer to Figure 1 for location.

*Position B (South of Site) – Adjacent to Wayford Mews*

4.1.7 Position B was chosen as a suitable monitoring position to represent typical baseline levels in the vicinity of properties south of Site off Wayford Mews. Noise levels at this location are formed in general by road traffic noise from the M56

Motorway. The monitoring position was chosen in the field just to the east of Wayford Mews and north of the properties off Ship Street. Figure 1 shows the location.

*Position C (Southwest of Site) – off Williams Way*

4.1.8 This monitoring position is representative of the closest receptors southwest of the BESS Site off Williams Way. Noise levels at this location are generally formed by local road traffic noise off the M56 Motorway. Monitoring at this location was in the field just to the east of the receptors. Figure 1 shows the location.

4.1.9 In consideration of the cross section of monitoring positions and locations, which were in appropriate amenity areas of properties over a weekend period, it is considered that the results represent a robust indication of existing background sound levels.

4.1.10 The main source of existing sound affecting nearest receptor properties relates to local and distant road traffic noise and bird sound.

4.1.11 For noise measurements at the nearest sensitive receptor positions the following noise meters were used:

**Table 4.1: Instrumentation**

| ***Manufacturer*** | ***Description*** | ***Type*** | ***Calibration Due Date*** | ***Serial No.*** |
|---|---|---|---|---|
| Cirrus | Real Time Sound Analyser | 171A | June 2023 | G061253 |
| Cirrus | Real Time Sound Analyser | 1710 | April 2024 | G063350 |
| Cirrus | Real Time Sound Analyser | 171B | April 2023 | G056142 |
| Cirrus | Electronic Calibrator | CR: 513A | April 2023 | 031523 |

4.1.12 The following set-up parameters were used on the sound level meters during measurements:

Static Sound Monitoring:

Time Weighting: Fast

Frequency Weighting: `A'

Measurement Period: 15 minutes

***Monitoring Period and Test Details***

4.1.13 Measurements were recorded over a period of approximately 96 hours. Data logging of $L_{Aeq}$, $L_{A10}$, $L_{A90}$ and $L_{Amax}$ were recorded at 15-minute intervals for information on the variation of sound levels (see Appendix 2 for details).

4.1.14 The noise meters were mounted on a tripod at a height of between 1.2 to 1.5 metres above ground level and fitted with a wind and rain shield.

***Calibration***

Calibration setting: 94dB

4.1.15 The noise meters were calibrated with the electronic calibrator prior to commencement and on completion of the survey. No significant drift in calibration was observed.

***Survey Dates and Personnel***

4.1.16 Static sound measurement positions (shown on Figure 1) were chosen to establish typical and representative background and ambient sound data in vicinity of nearest sensitive receptors (see Appendix 3 for detailed information). Consultants of Noise & Vibration Consultants Limited set up the sound monitoring on the Thursday 8th and removed the equipment on Monday 12th December 2022.

*Meteorological Conditions*

4.1.17 Weather details were recorded by the NVC consultant during the period of the surveys using a portable Davis Vantage Vue weather station (Position D, grid reference 351864 378674). The results of the weather conditions are provided in Appendix 2.

4.1.18 Any periods of monitoring where rain occurred, or high wind speeds were removed from the data set for the statistical analysis.

4.1.19 The above climatic conditions were suitable for monitoring environmental noise levels in accordance with advice given in BS4142:2014+A1:2019.

## 4.2 Results

*Background Sound*

4.2.1 To establish the background sound level the Standard requires the determination of a representative value which is not deemed to be the lowest but under statistical analysis the most common when measured over a representative time period.

4.2.2 Background sound measurements were taken adjacent to the nearest residential sensitive receptors. The results of measurements taken at the fixed monitoring positions are presented below in Tables 4.1 to 4.2 with detailed measurements in Appendix 2.

**Table 4.1: Existing Daytime Background Sound Levels at Monitoring Positions**

| Monitoring Position | Time Period | Grid Ref X Y | LAeq dB | LA90 dB | LAmax dB | Representative[1] LA90 dB |
|---|---|---|---|---|---|---|
| A) Saltworks Close | 0700-2300 | 352616 378812 | 63 | 61 | 57-82 | 60 |
| B) Wayford Mews | 0700-2300 | 351958 378433 | 66 | 65 | 64-85 | 64 |
| C) Williams Way | 0700-2300 | 351306 377970 | 63 | 61 | 63-83 | 61 |

[1]Takes into account the mean, median and most commonplace LA90 based on statistical analysis, whichever is lowest.

**Table 4.2: Existing Night-time Background Sound Levels at Monitoring Positions**

| Monitoring Position | Time Period | Grid Ref X Y | LAeq dB | LA90 dB | LAmax dB | Representative[1] LA90 dB |
|---|---|---|---|---|---|---|
| A) Saltworks Close | 2300-0700<br>0500-0700 | 352616 378812 | 56<br>60 | 53<br>58 | 55-78<br>58-72 | 52<br>54 |
| B) Wayford Mews | 2300-0700<br>0500-0700 | 351958 378433 | 60<br>63 | 56<br>61 | 62-80<br>65-80 | 54<br>59 |
| C) Williams Way | 2300-0700<br>0500-0700 | 351306 377970 | 58<br>62 | 54<br>59 | 61-79<br>64-79 | 52<br>57 |

[1]Takes into account the mean, median and most commonplace LA90 based on statistical analysis, whichever is lowest.

4.2.3 The methodology detailed in the latest version of BS4142:2014+A1:2019 provides an example of statistical analysis to determine the background sound level (i.e. most common place). We have compared the mean, median and most commonplace value and taken the lowest level to establish the representative background sound.

4.2.4 The results of existing background sound measurements taken at the fixed monitoring positions indicate that representative background sound levels during the weekday and weekend daytime period (0700-2300 hours) vary between 60dB and 64dB $L_{A90}$. During night-time periods (2300-0700 hours) the background levels were shown to vary between 52dB and 54dB $L_{A90}$ and during sunrise hours (during Summer months) a background level of 54dB and 57dB $L_{A90}$.

*Noise Criteria*

4.2.6 Based on the impact assessment methodology found within BS4142:2104+A1:2019, which is deemed to be the most appropriate and relevant standard, we have applied a `rating' noise limit that would not exceed the representative background sound level (LA90) when measured in terms of LAeq (1 hour measurement period during 0700 to 2300 hours and 15 minutes between 2300 to 0700 hours).

# 5.0 CONSTRUCTION NOISE & VIBRATION

## 5.1 Introduction

5.1.1 Typical planning consent conditions relating to construction noise will be based on the application of `best practicable means' in accordance with BS5228-1:2009+A1:2014 and restriction on operating hours.

## 5.2 Construction Activities

5.2.1 Initial site preparation work is likely to involve the movement of soil and piling works, which would be followed by the construction of infrastructure and installation of solar PV and BESS plant equipment. It is considered that excavators, piling rigs, front loaders, telehandlers, vehicles, dumpers, generators, cranes, compressors, concrete mixers and power tools etc. would be required to construct the site.

5.2.2 The above noise sources and their associated activities will vary from day to day and may be in use at different stages of the development for relatively short durations.

## 5.3 Construction Noise Prediction

5.3.1 The assessment below indicates the expected highest noise levels at the nearest receptors based on vehicle movements, piling works, general site activities and PV and BESS plant installation at the closest approach to existing residential areas.

5.3.2 The calculations use the methodology given in BS 5228: Part 1, 2009. For this method the sound power level of the noise source is defined, and the attenuation is calculated between its location and the selected receiver, taking account of distance, ground attenuation and the time that a noise source will be operating.

5.3.3 The results of calculations for vehicle movement, infrastructure, PV installation and general site activities are shown below in Table 5.1.

**Table 5.1: Noise Predictions for Worst Case Construction Noise (excluding mitigation measures)**

| Position (Refer to Figure 1) | Distance to receptor (m) | Works | Residual Noise Levels LAeq dB | Noise Level range at receptor, $LAeq_{1hr}$ dB | BS5228 Threshold Value LAeq dB Daytime |
|---|---|---|---|---|---|
| R1. Saltworks Close/Waterside Drive | 310-600 | Piling (mini) | 63 | 36-42 | 70 |
| | 670-800 | Piling (BESS) | 63 | 43-45 | 70 |
| | 280-600 | Site Preparation | 63 | 35-48 | 70 |
| | 320-600 | General site activities | 63 | 41-47 | 70 |
| | 350-600 | Infrastructure | 63 | 33-45 | 70 |
| | 310-600 | PV Installation | 63 | 43-49 | |
| R2. Ship Street | 240-600 | Piling (mini) | 63 | 36-44 | 70 |
| | 640-780 | Piling (BESS) | 63 | 43-45 | 70 |
| | 220-600 | Site Preparation | 63 | 35-50 | 70 |
| | 230-600 | General site activities | 63 | 41-50 | 70 |
| | 240-600 | Infrastructure | 63 | 33-49 | 70 |
| | 240-600 | PV installation | 63 | 43-51 | |
| R3. Wayford Mews | 160-600 | Piling (mini) | 66 | 36-49 | 70 |
| | 770-880 | Piling (BESS) | 66 | 42-43 | 70 |
| | 150-600 | Site Preparation | 66 | 35-54 | 70 |
| | 210-600 | General site activities | 66 | 41-51 | 70 |
| | 240-600 | Infrastructure | 66 | 33-49 | 70 |
| | 160-600 | PV Installation | 66 | 43-56 | |
| R4. Rodgers Close | 230-600 | Piling (mini) | 66 | 36-45 | 70 |
| | 1000-1130 | Piling (BESS) | 66 | 40-41 | 70 |
| | 220-600 | Site Preparation | 66 | 35-50 | 70 |
| | 280-600 | General site activities | 66 | 41-48 | 70 |
| | 320-600 | Infrastructure | 66 | 33-46 | 70 |
| | 230-600 | PV installation | 66 | 43-52 | |
| R5. Williams Way | 270-600 | Piling (mini) | 63 | 36-43 | 70 |
| | 1430-1510 | Piling (BESS) | 63 | 37-38 | 70 |
| | 240-600 | Site Preparation | 63 | 35-49 | 70 |
| | 330-600 | General site activities | 63 | 41-46 | 70 |
| | 240-600 | Infrastructure | 63 | 33-49 | 70 |
| | 270-600 | PV installation | 63 | 43-50 | |
| E1. Ecological Receptor (River Weaver) | 30-600 | Piling (mini) | 50-66[1] | 36-67 | 65-70 |
| | 40-600 | Piling (BESS) | 50-66[1] | 46-73 | 65-70 |
| | 25-600 | Site Preparation | 50-66[1] | 38-71 | 65-70 |
| | 50-600 | General site activities | 50-66[1] | 35-74 | 65-70 |
| | 30-600 | Infrastructure | 50-66[1] | 33-72 | 65-70 |
| | 30-600 | PV Installation | 50-66[1] | 43-74 | 65-70 |

[1]Estimated based on variation in distance from Motorway. Note: No screening attenuation allowed for the elevated M56 bridge structure.

5.3.4 The noise of activities during the construction of the site would vary throughout the construction phase and would depend on the particular work being undertaken. The highest noise levels are likely to be created during site preparation, piling, infrastructure activities and the PV installation. At residential NSR (R1 to R5) this level of noise would be within an acceptable level for an activity of this type and duration.

5.3.5 At the ecological receptor (E1 River Weaver) during peak noise activities at closest approach to the receptor guidance threshold are likely to be exceeded for

short-term periods during different activities without the application of mitigation measures.

5.3.6 Mitigation measures are provided below in paragraph 5.3.10 in accordance with BS5228, which employs best practical means to control construction noise generation.

5.3.7 On the basis of the above predictions and proposed mitigation measures, the level of noise, as a result of construction, is not predicted to exceed guidance thresholds at residential NSR and would be **not significant**.

5.3.8 A Construction Environmental Management Plan (CEMP) would be provided to the LPA prior to commencement of works for agreement. An Outline CEMP will be prepared as part of the DCO application and will describe the types of noise mitigation that are likely to be required/ implemented., some examples of which are described below.

5.3.9 Construction hours for noise generating activity would typically be 0700-1800 Monday to Friday and 0700-1300 hours on Saturdays.

**Mitigation Measures**

5.3.10 In accordance with BS5228-1:2009+A1:2014, best practical means would be employed to control the noise generation (e.g. using equipment that is regularly maintained, where practicable use equipment fitted with silencers or acoustic hoods).

5.3.11 In consideration of the likely highest levels of construction noise, the following approach would be considered as part of any CEMP:

- Restriction of construction hours to non-sensitive times of day.
- Community Relations – where noise levels are likely to impact on existing residual sound levels at receptor positions, this is one of the most important aspects of mitigation, as providing the nearest sensitive receptors with clear information about the activities that would be taking place and the length of time that any peak noise levels may occur will

assist in allaying people's fears. BS 5228 states *"It is suggested that good relations can be developed by keeping people informed of progress and by treating complaints fairly and expeditiously. The person, company or organisation carrying out the work on site should appoint a responsible person to liaise with the public."*

- Sensible routing of the construction plant to minimise the effect on nearest residential properties (where practicable).
- Careful choice of piling rigs to minimise noise and vibration at ecological receptors (e.g. non-percussive mini piling rigs, hire of fixed plant with acoustic enclosures etc.).
- Ensure all plant is regular maintained and correctly fitted with effective silencers / any relevant acoustic hoods etc.
- Maximise distance between any significant noise source and receptor locations.
- Plant switched off when not in use.
- Use of boundary hoarding screening close to noisy plant or site boundary to an appropriate height and location to minimise noise towards sensitive receptors.
- Use of broadband noise reverse alarms (where practicable) on mobile plant.
- Avoidance of reversing alarm near to sensitive receptors, which could include ecological receptors.

***Construction Road Traffic Noise onto Local Road***

5.3.12 The daytime peak periods for traffic flow onto the local road network close to the Site (as provided by Axis) have been used to show the change in noise climate at the nearest sensitive receptors during the construction phased works (refer to Table 5.2).

5.3.13 The following table provides detail of the predicted impact due to the temporary increase in road traffic flow during the construction phase. The Traffic Assessment provides details of the development traffic demand during peak and general construction activities. The construction phase is expected to extend for a period of 15 months. During the peak 12-week period of traffic movement when

access tracks and the compound are being established there is expected to be a maximum of 80 HGV two-way movement per day and circa 200 two-way vehicle movements for staff. The average HGV two-way movements over the complete construction period is expected to be 26 vehicles per day. The predicted peak hour noise level increase along the local road network is provided below in Table 5.2.

**Table 5.2: Predicted Road Traffic Noise Increase at NSR During Peak Hour Traffic Flow Period for the Construction Phase**

| Local Road | Time Period | Baseline noise (`do nothing') $LA10_{1hr}$ (dB) | Road Traffic Noise $LA10_{1hr}$ (dB) | Baseline + Construction noise (`do something') $LA10_{1hr}$ (dB) | Change[1] compared to baseline $LA10_{1hr}$ (dB) |
|---|---|---|---|---|---|
| Station Road | Daytime (0800-0900 hours) | 52.6[1] | 46.0 | 53.5 | +0.9 |
| Pool Lane | Daytime (0800-0900 hours) | 63.4[2] | 56.2 | 64.2 | +0.8 |

[1]Measured baseline levels (LA10) between 0800-0900 hours during baseline sound survey in April 2021 by NVC off Station Road.

5.3.14 The impact due to the Proposed Development during peak vehicle movement during the construction phase along the local road network has been calculated using Calculation of Road Traffic Noise (CRTN) methodology and impact methodology using DMRB LA 111.

5.3.15 According to Table 3.4 the DMRB LA 111, impact assessment for existing residential receptors is shown to be a **negligible** impact during the maximum peak period. In consideration of the temporary nature of the impact and relatively short period of peak traffic flows, this effect would be **not significant**.

## 5.4 Construction Phase - Vibration Effects

5.4.1 The closest separation distance between the residential NSR and nearest likely vibratory plant is circa 160m to 310m.

*Typical Vibration Levels*

5.4.2 The highest levels of vibration generated by construction plant is likely to include the following:

- Non-percussive Piling;
- Dozers;

- Vibratory rollers and compactors;
- Material offloading onto hard surfaces; and
- Concrete vibratory plant.

5.4.3 BS5228:2009+A1:2014 Part 2 deals with vibration from construction and open sites and provides information on the effects of the levels of vibration, human and structural response, response limits of structures and practical measures to reduce vibration.

5.4.4 Table 5.3 outlines the highest likely vibration levels that could be experienced during construction at the NSR (i.e. during use of vibratory plant).

**Table 5.3: Daytime Construction Vibration at NSR without mitigation**

| Location | Approximate Nearest Distance to Receptor (m) | Receptor Sensitivity | Range of highest likely vibration (mm/sec) | Perceptible levels of vibration for residential receptors (mm/sec) | Cosmetic damage limits (mm/sec) |
|---|---|---|---|---|---|
| R1. Saltworks Close | 310-600 | High | 0 | >0.3 | >5.0 |
| R2. Ship Street | 240-600 | High | 0 | >0.3 | >5.0 |
| R3. Wayford Mews | 160-600 | High | 0 | >0.3 | >5.0 |
| R4. Rodgers Close | 230-600 | High | 0 | >0.3 | >5.0 |
| R5. Williams Way | 270-600 | High | 0 | >0.3 | >5.0 |
| E1. Ecological Receptor | 30-600 | High | 0 to 0.7* | >0.3 | >5.0 |

*Note: Closest vibratory activity is likely to be use of non-percussive piling during the BESS compound construction and solar panel installation.

5.4.5 The above results show no significant vibration levels during construction and the highest likely vibration levels at residential receptors are below the level at which vibration is perceptible (refer to Tables 3.5 and 3.6). The closest approach to the River Weaver when using non-percussive piling techniques would produce vibration levels just above perceptibility but below 1mm/sec.

5.4.6 Based upon the above information, it is clear that even at the closest approach to existing residential properties the level of vibration would be below 0.3mm/sec and would rapidly reduce to zero at further separation. It should be noted that the type of equipment, ground conditions and structural form could all affect the resultant level of vibration. At this stage, it has been assumed that the highest likely vibration level scenario occurs (i.e. a conservative estimate of potential effects).

5.4.7 Studies undertaken by NVC relative to vibration from vehicle movements on local roads does not produce any perceptible vibration at dwellings, even when close to the kerbside. The only measurable vibration occurs when roads are of poor conditions and where HGVs pass-over large pot-holes, which results in minor levels of vibration at curtilages of properties. The impact from vibration is therefore not significant.

5.4.8 The levels of vibration, as a result of construction, would be **negligible** at residential receptors and **negligible to slight** impact magnitude at ecological receptors and therefore **not significant** and mitigation measures likely to be required would include the use of non-percussive piling techniques and `best practicable means' would be applied according to BS5228-2:2009+A1:2014.

# 6.0 PLANT NOISE LEVEL PREDICTIONS

## 6.1 Introduction

6.1.1 Noise has been defined as sound, which is undesired by the recipient. The effects of noise on the neighbourhood are varied and complicated, including such things as interference with speech communication, disturbance of work, leisure or sleep. A further complicating factor is that in any one neighbourhood some individuals will be more sensitive to noise than others.

6.1.2 A measure that is in general use and is recommended internationally for the description of environmental noise is the equivalent continuous noise level or LAeq parameter.

6.1.3 In general, the level of noise in the local environment that arises from a development site will depend on a number of factors. The more significant of which are:-

(a) The sound power levels (SWL's) or sound pressure levels of the plant or equipment used on site.
(b) The periods of operation of the plant on site.
(c) The distance between the source noise and the receiving position.
(d) The presence or absence of screening effects due to barriers, or ground absorption.
(e) Any reflection effects due to the facades of buildings etc.

6.1.4 The empirical noise levels have been used for the plant equipment to assist in determining the likely noise contribution at nearest sensitive receptors for comparison with the requirements of BS4142: 2014+A1:2019.

## 6.2 Prediction Methodology

*Operational Noise*

6.2.1 For site operational noise the assessment used ISO9613-2 prediction modelling and CadnaA software for producing a noise map of the highest likely generated

noise during peak noise operations. The Input settings for the noise model include:

Ground factor (G) = 0.5 (mixed ground absorption)
Temperature = 10degC
Relative humidity = 70%
Receptor height = Assumed to be 1.5m above ground for daytime (0700-2300 hours) and 4m above ground for night-time periods (2300-0700 hours). For ecological receptors a height of 1.5m above ground is assumed.

6.2.2 The methodology considers source position, distance to the nearest sensitive receptors and includes any significant screening on intervening land between site and receptor (as appropriate). The noise modelling assumes that all inverters (including cooling system), battery storage and transformers are in operation and therefore the noise predictions provide an indication of the highest likely noise level.

*Source Noise Levels*

6.2.3 The following example of mitigation measures is based on information provided by technology providers, which is typical of plant used on similar sites in the UK. It is important to note that there is more than one method to control noise levels (e.g. plant selection or design) that can achieve similar levels at NSR. The mitigation strategy would be confirmed as part of any planning consent condition.

a) Centralised solar inverter units with transformer noise level of 81dB $L_{Aeq15mins}$ @ 1m.
b) Battery Storage units noise level of 65dB $L_{Aeq15mins}$ @ 1m.
c) Switchgear noise level of 65dB $L_{Aeq15mins}$ @ 1m from container.
d) Inverters for battery storage units 81dB $L_{Aeq15mins}$ @ 1m sound pressure level with smaller LV transformers generating 65dB $L_{Aeq15mins}$ @ 1m.
e) Substation HV transformer noise level 55dB $L_{Aeq15mins}$ @ 10m sound pressure level.
f) All plant to be designed to ensure no tonal character is present from the plant in operation to eliminate any perceptible tonality at NSR in accordance with BS4142:2014+A1:2019.

6.2.4 The results of the CadnaA software prediction modelling noise contours for site operations are provided in Appendix 3.

## 6.3 Results of Noise Predictions

### Site Plant Noise Assessment:

6.3.1 Noise levels from fixed plant operating at the development site would be assessed against BS4142: 2014+A1:2019.

***Noise Contribution Levels from the Proposed Solar Farm***

**Table 6.1: Predicted Noise from Proposed Solar Farm**

| Receptor Position (Refer to Figure 1) | Period | Representative Background Sound Level $L_{A90}$ dB [LAeq] | Predicted highest rating[1] noise level $L_{Aeq}$(dB) | Level Difference dB(A) | Impact Magnitude BS4142:2019 |
|---|---|---|---|---|---|
| **Daytime** | | | | | |
| R1. Saltworks Close | Daytime | 60 [63] | **40-41** | -20 to -19 | **Low** |
| R2. Ship Street | Daytime | 60 [63] | **40-42** | -20 to -18 | **Low** |
| R3. Wayford Mews | Daytime | 64 [66] | **42-43** | -22 to -21 | **Low** |
| R4. Rodgers Close | Daytime | 64 [66] | **40** | -24 | **Low** |
| R5. Williams Way | Daytime | 61 [63] | **42-43** | -19 to -18 | **Low** |
| **Night-time** | | | | | |
| R1. Saltworks Close | Night-time<br>Sunrise | 52 [56]<br>54 [60] | **39-40**<br>**43** | -13 to -12<br>-11 | **Low**<br>**Low** |
| R2. Ship Street | Night-time<br>Sunrise | 52 [56]<br>54 [60] | **36-38**<br>**43-44** | -16 to -14<br>-11 to -10 | **Low**<br>**Low** |
| R3. Wayford Mews | Night-time<br>Sunrise | 54 [60]<br>59 [63] | **35-36**<br>**44-46** | -19 to -18<br>-15 to -13 | **Low**<br>**Low** |
| R4. Rodgers Close | Night-time<br>Sunrise | 54 [60]<br>59 [63] | **33**<br>**44** | -21<br>-15 | **Low**<br>**Low** |
| R5. Williams Way | Night-time<br>Sunrise | 52 [58]<br>57 [62] | **31**<br>**45** | -21<br>-12 | **Low**<br>**Low** |

Note: Column 5 is the subtraction of column 4 from column 3.
[1] Noise characteristics at receptor locations do not include a penalty as this would be controlled by mitigation and design.

6.3.2 Table 6.1 shows the range of predicted noise levels from the plant associated with the Proposed Development based on peak production during high ambient temperature conditions. Note: we have assumed maximum noise conditions during the sunrise period, (which in reality is unlikely to occur unless during Summer periods).

6.3.3 The fifth column in Table 6.1 shows the difference between the predicted rating noise level and the baseline sound level at the NSR. The rating level in column 5

and 6 is therefore in accordance with the methodology found within BS 4142: 2014+A1:2019 for daytime and night-time impacts.

***Daytime Operations***

6.3.4 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate a **low** impact magnitude. The residual baseline levels (in terms $L_{Aeq}$) are also significantly higher than the site rating levels.

***Night-time Operations***

6.3.5 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate a **low** impact magnitude at sensitive residential receptors. It should be noted that in a low background and rating level situation then BS4142 is not reliable and in accordance with advice in the standard, consideration of the absolute level is more appropriate (i.e. does it comply with sleep disturbance criteria). The residual baseline levels (in terms $L_{Aeq}$) are also significantly higher than the site rating levels.

6.3.6 In relation to absolute levels during night-time periods, the maximum noise levels generated by the solar farm are well below sleep disturbance limits (i.e. WHO guidelines of 40dB $L_{Aeq8hrs}$) and predicted levels within sensitive rooms with an open window would be between 15dB and 23dB $L_{Aeq}$. This level is significantly lower than guidance limits provided within BS8233: 2014 for bedrooms of 30dB $L_{Aeq}$.

***Noise Levels at Ecological NSR***

6.3.7 In relation to the ecological NSR the predicted noise levels at the nearest designated areas and the River Weaver are shown to be between 44dB and 53dB $L_{Aeq,1hr,}$ during the daytime. During night-time periods this is predicted to be between 18dB and 52dB $L_{Aeq,15mins}$.

6.3.8 The Waterbird Disturbance & Mitigation Toolkit[15] provides guidance on the impact of noise on waterbird populations.

[15] *Waterbird Disturbance & Mitigation Toolkit (2013) Institute of Estuarine and Coastal Studies, University of Hull.*

6.3.9 The guidance notes how birds are liable to habituation (e.g. they usually become more tolerant with increased exposure time to regular activities) to both aural and visual disturbance stimuli. This is particularly relevant to the Site as it is located adjacent to eh M56 and the INEOS Inovyn's Runcorn Site is located on the northern banks of the River Weaver/Weaver Navigation. The plant contains large industrial plant and equipment, including plant which generates relatively high noise levels such as air cooled condensers associated with an onsite gas fired power station.

6.3.10 The nature of the noise generated also plays an important factor in the level of disturbance, the guidance notes *"A single sudden sound will generally cause more disturbance than a constant or regular noise regardless of noise level, e.g. a dropped piece of scaffold at 65dB will cause a greater disturbance reaction than ongoing vibration piling at 80dB."* .

6.3.11 The operation of the plant equipment would not produce any significant impulse noise as this is not a characteristic of the type of plant being operated. Once the plant is operational it produces a relatively constant noise source.

6.3.12 The guidance notes that low noise level effects are as follows:

*"Low level noise is classed as that which is unlikely to cause response in birds using a fronting intertidal area. As such noises of less than 55dB at the bird are included in this category. These effects are likely to be masked by background inputs in all but the least disturbed areas and thus would not disturb the birds close by. Noise between 55-72dB in some highly disturbed areas e.g. industrial or urban areas and adjacent to roads, may feature a low level of disturbance provided the noise level was regular as birds will to often habituate to a constant noise level."*

6.3.13 Ambient noise levels in this area are relatively high due to the influence of the M56 Motorway and likely to be much higher than the guidance in areas in proximity to the local road network. Based on the existing noise conditions, the predicted noise levels and the other factors described above the impact on winter birds during plant operations is considered to be **low** and therefore **not significant**.

***Operational Road Traffic Noise***

6.3.14 This type of development will attract negligible operational traffic demand and therefore **no significant** impacts would occur.

***Operational Vibration Levels***

6.3.15 There is no likely vibration expected from this type of plant and therefore magnitude impacts would be **not significant**.

## 7.0 CONCLUSIONS

7.1 The proposed solar photovoltaic (PV) farm at the Solar Farm site, has been assessed in terms of noise impact during maximum operational conditions. This report has been undertaken to provide technical support to the planning application for the development.

7.2 The results of existing background sound measurements taken at the fixed monitoring positions indicate that representative background sound levels during the weekday and weekend daytime period (0700-2300 hours) vary between 60dB and 64dB $L_{A90}$. During night-time periods (2300-0700 hours) the background levels were shown to vary between 52dB and 54dB $L_{A90}$ and during sunrise hours (during Summer months) a background level of 54dB and 57dB $L_{A90}$ (refer to Appendix 1 for explanation of $L_{A90}$ measurement index).

7.3 Typical site operating noise levels have been established from empirical data obtained from technology providers who supply similar plant on sites in the UK, which provided input data for the noise model.

7.4 The assessment has been based on an assumption that the appropriate noise limit for a development of this nature would be a rating level that would not exceed the representative background sound level (LA90) when measured in terms of $LAeq,_{1hr}$ (daytime) and $LAeq,_{15mins}$ (night-time).

7.5 The predicted noise contribution from the application site using ISO9613-2 methodology and CadnaA noise modelling software shows noise levels from the Proposed Development range between 40dB and 46dB $L_{Aeq1hr/15mins}$ during daytime or sunrise maximum site operations at NSR. During night-time operational periods noise levels from Site range between 31dB and 40dB $L_{Aeq15mins}$.

7.6 The results show that the noise contribution from maximum site operations would be well below the representative background sound level during daytime periods. According to BS4142: 2014+A1:2019 the resultant assessment would conclude that noise from the site would result in a **low impact** and a **neutral effect**.

7.7 For night-time periods (including sunrise hours), according to BS4142: 2014+A1:2019, the rating level would be well below the assessment background sound levels and concludes a **low impact magnitude** at NSR and a **neutral effect**.

7.8 In relation to absolute levels during night-time periods, the maximum noise levels generated by the Proposed Development are below sleep disturbance limits (i.e. WHO guidelines of 40dB $L_{Aeq8hrs}$) and predicted levels within sensitive rooms with an open window would be between 16dB and 25dB $L_{Aeq}$. This level is significantly lower than guidance limits provided within BS8233: 2014 for sleeping conditions within bedrooms of 30dB $L_{Aeq}$.

7.9 The results show that the site noise contribution at NSR during night-time operating periods would be below typical residual sound levels of 41dB to 44dB $L_{Aeq}$ established during the baseline study survey.

7.10 Predictions of construction noise would indicate **no significant impacts** at residential NSR and `best practicable means' would be applied in accordance with BS5228-1:2009+A1:2014.

7.11 Prediction calculations relating to the temporary impact of changes in road traffic movements during the construction phase works at the nearest receptors, would indicate that this would be a **negligible impact** and **not significant** in accordance with Government advice and guidance.

7.12 Maximum vibration levels during peak construction activities are predicted to be below perceptible levels of vibration at residential NSR. Best Practical Means would be employed to minimise vibration being generated and impacts are **not significant**.

7.13 In terms of ecological NSR along the River Weaver, the impact from construction activity noise would be **not significant** with the application of appropriate mitigation measures by applying a `best practicable means' approach.

7.14 During the use of vibratory plant at the closest approach to ecological NSR during the construction phase of the Proposed Development, vibration levels would be just

above perceptible levels during the highest likely conditions and therefore a **slight** impact and **minor effect**, which is **not significant**.

7.15 In relation to the ecological NSR the predicted noise levels at the nearest designated areas and the River Weaver are shown to be within guidance threshold levels for winter birds and therefore impacts would be **not significant**. Ambient noise levels from local road traffic would in any case generally produce higher levels than those predicted.

7.16 The assessment concludes that the site has been designed to operate such that it complies with all appropriate and relevant noise standards and guidance. There is therefore, no reason to refuse the Proposed Development on the grounds of noise or vibration.

## REFERENCES

BS7445:2003 Description and measurement of environmental noise.

BS 4142: 2014+A1:2019 ` Methods for rating and assessing industrial and commercial sound'

BS 8233:2014 `Guidance on sound insulation and noise reduction for buildings'

BS 5228:2009+A1:2014 Part 1 Noise & Part 2 Vibration `Code of practice for noise and vibration control on construction and open sites'

Guidelines for Community Noise – World Health Organisation: April 1999

Night Noise Guidelines for Europe: 2009 – World Health Organisation

Noise Policy Statement for England (NPSE) – March 2010

Department for Communities and Local Government: National Planning Policy Framework: July 2021

National Planning Practice Guidance: June 2021

Overarching National Policy Statement for Energy (EN-1) July 2011

Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) September 2021

Cheshire West & Chester Council – Local Plan (Part One) Strategic Policies: January 2015

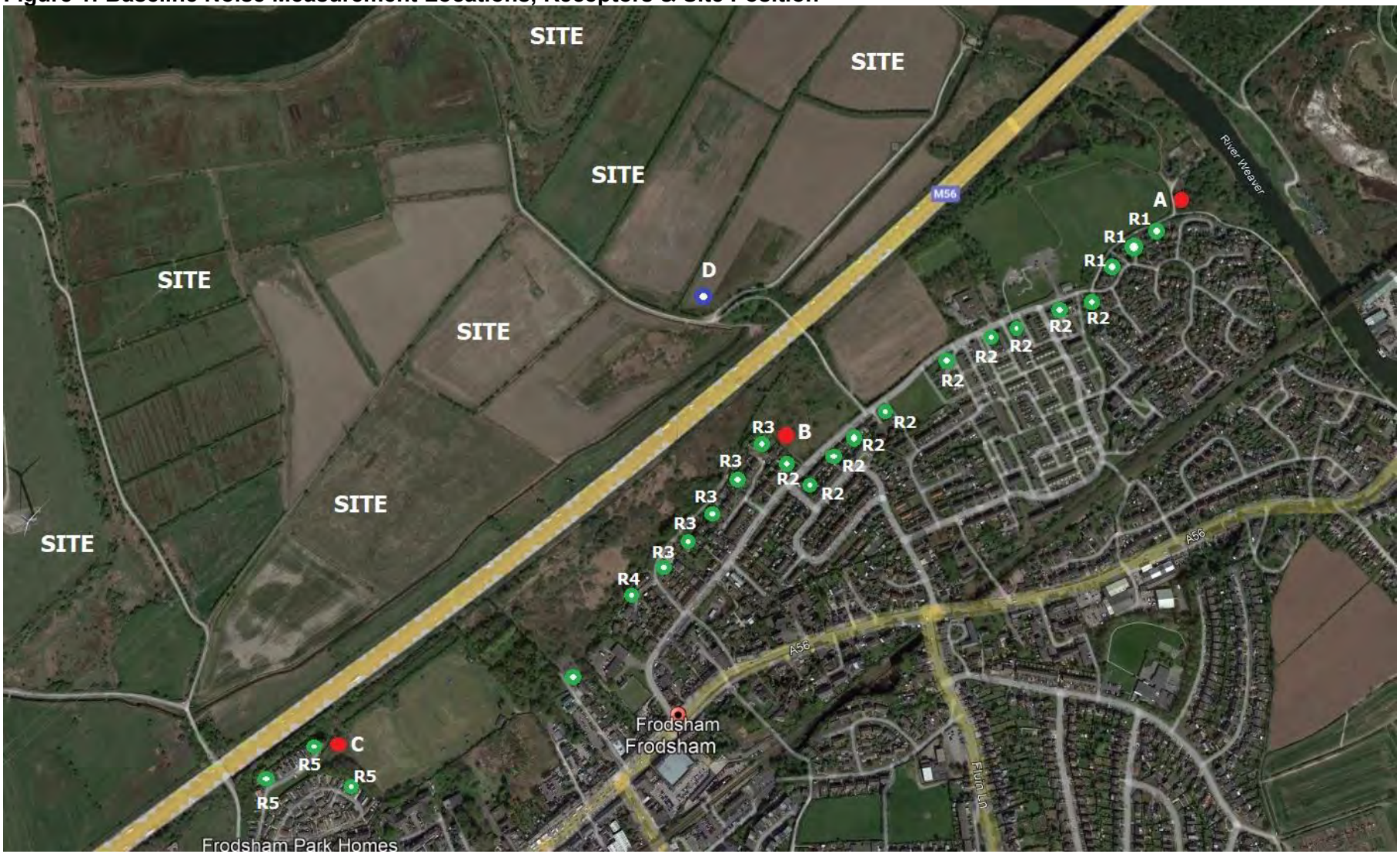
Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies: July 2019

Design Manual for Roads and Bridges, LA 111 `Noise and Vibration' (Rev 2) May 2020 (formerly HD 213/11)

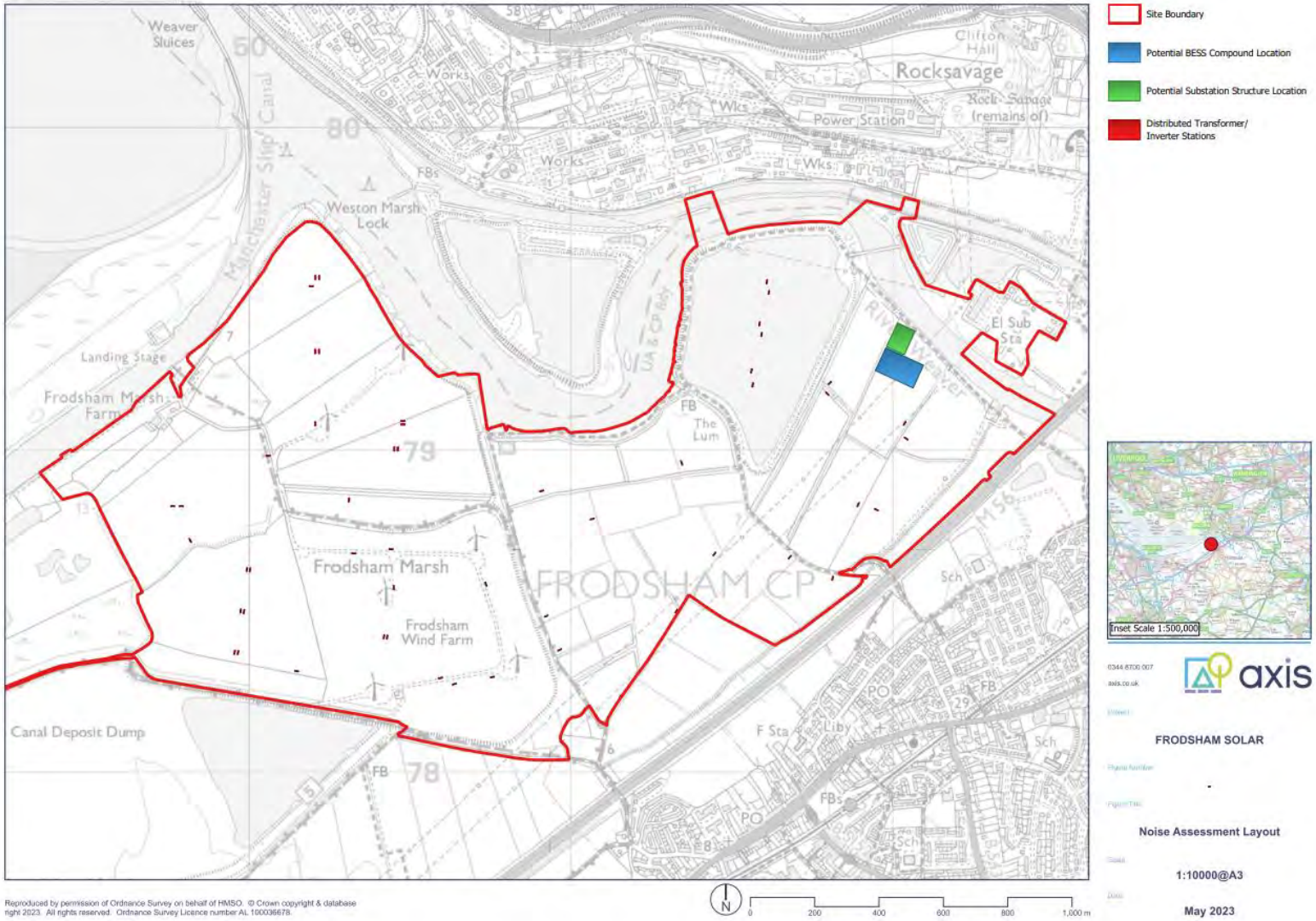
ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors

# FIGURES

**Figure 1: Baseline Noise Measurement Locations, Receptors & Site Position**



## Figure 2: Draft Site Layout



# Appendix 1

## BASIC ACOUSTIC TERMINOLOGY

Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air.

Sound Pressure Level is a measurement of the size of these pressure fluctuations. It is expressed in decibels (dB) on a logarithmic scale. Each 3 dB increase in sound pressure level represents a doubling of the sound energy. The threshold of hearing is approximately 0 dB.

The rate at which the pressure fluctuations occur determines the pitch or frequency of the sound. The frequency is expressed in Hertz (Hz), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hz to 20,000 Hz. Although sound can be of one discrete frequency - a 'pure tone' - most noises are made up of many different frequencies.

The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same 'subjective' way. This is the basis of the A-weighted sound level dB(A), normally used to assess the effect of noise on people. The dB(A) weighting emphasises or reduces the importance of certain frequencies within the audible range.

### Noise Measurement

The measurement of sound pressure level is only really meaningful where the level of noise is constant. In the typical industrial environment noise levels can vary widely and sometimes short duration high levels of noise are interspersed with periods of relative quiet. The most widely used means of 'averaging' the noise over a period of time is the Equivalent Continuous Sound Level. Normally written as $L_{Aeq}$ this value takes into account both the level of noise and the length of time over which it occurs. There are many meters available which are capable of measuring $L_{Aeq}$ by electronic integration over the measurement period.

The $L_{Aeq}$ or A-weighted equivalent continuous noise level is a measure of the total noise energy over a stated time period and includes all the varying noise levels and re-expresses as an 'average', allowing for the length of time for which each noise level was presented.

The $L_{An}$ parameters are defined as the noise levels which are exceeded for n% of the monitoring period, thus, for example, the $L_{A90}$ parameter is the noise level exceeded for 90% of the 15 minute period, i.e. 13.5 minutes. The $L_{A50}$ parameter is the noise level exceeded for 50% of the hourly period, i.e. 30 minutes, etc. The $L_{max}$ parameter is the maximum RMS A-weighted noise level occurring during the measurement period.

The definition in layman's terms is given below for terminology used in the measurement and results obtained during the survey work.

**A-weighting:** Normal hearing covers the frequency (pitch) range from about 20Hz to 20,000 Hz but sensitivity of the ear is greatest between about 500Hz and 5000Hz. The "A-weighting" is an electrical circuit built into noise meters to mimic this characteristic of the human ear.

**Ambient noise:** The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

**Attenuation:** Noise reduction

**Background noise:** The general quiet periods of ambient noise when the noise source under investigation is not there.

**Decibel (dB):** The unit of measurement for sound based on a logarithmic scale. 0dB is the threshold of normal hearing; 140dB is the threshold of pain. A change of 1dB is only detectable under controlled laboratory conditions.

**dB(A) [decibel A weighted]:** Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) serves to distinguish sounds of different frequency (or pitch) in a similar way to how the human ear responds. Measurements in dB(A) broadly agrees with an individual's assessment of loudness. A change of 3dB(A) is the minimum perceptible under normal everyday conditions, and a change of 10dB(A) corresponds roughly to doubling or halving the loudness of sound.

**dB(C): [decibel C weighted]:** Frequency weighting which does not alter low frequency octave band levels by very much compared to `A' weighting. Similar to linear reading (i.e. linear does not alter frequency spectra at all)

**Frequency (Hz):** The number of sound waves to pass a point in one second.

**$L_{Aeq}$:** This is a noise index used to describe the "average" level of a noise that varies with time (T). It allows for the different sensitivities of the human ear to different frequencies (pitch), and averages fluctuating noise levels in a manner which correlates well with human perceptions of loudness.

**$L_{A10,T}$:** This noise index gives an indication of the upper limit or peak levels of the fluctuating noise. It is the "A weighted" noise level exceeded for 10 per cent of the specified measurement period (T). e.g. If the measurement period was over 10 hours and the $L_{A10}$ reading was say 60dB, then this means that for 1 hour out of 10 the level went above 60dB.

**$L_{A90,T}$:** This noise index gives an indication of the lower limit or levels of the fluctuating noise. It is the "A weighted" noise level exceeded for 90 per cent of the specified measurement period (T). e.g. If the measurement period was over 10 hours and the $L_{A90}$ reading was say 50dB, then this means that for 9 hours out of 10 the level went above 50dB.

**$L_{Amax}$:** This is the highest `A' weighted noise level recorded during a noise measurement period.

**Residual noise:** The ambient noise remaining at a given position in a given situation when the noise source under investigation is not there.

**Specific noise:** The noise source under investigation for assessing the likelihood of complaints

**Examples of typical noise levels**

| Source/Activity | Indicative noise level [dB(A)] |
|---|---|
| Threshold of hearing | 0 |
| Rural night-time background | 20-40 |
| Quiet bedroom | 35 |
| Wind farm at 350m | 35-45 |
| Busy road at 5km | 35-45 |
| Car at 65km/h at 100m | 55 |
| Busy general office | 60 |
| Conversation | 60 |
| Truck at 50km/h at 100m | 65 |
| City Traffic at 5m | 75-85 |
| Pneumatic drill at 7m | 95 |
| Jet aircraft at 250m | 105 |
| Threshold of pain | 140 |

# Appendix 2

## Baseline Sound Survey Results

## Noise Survey Results

Date: Thursday 8th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 1**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 09:15 | 15:00 | 65.7 | 65.7 | 63.6 | 78.8 | Dominated by road traffic noise from |
| 09:30 | 15:00 | 63.0 | 63.9 | 61.3 | 73.6 | M56 Motorway |
| 09:45 | 15:00 | 61.3 | 62.7 | 58.9 | 77.2 | |
| 10:00 | 15:00 | 62.1 | 64.5 | 59.1 | 69.0 | |
| 10:15 | 15:00 | 63.6 | 64.5 | 62.1 | 68.1 | |
| 10:30 | 15:00 | 63.2 | 64.2 | 62.0 | 72.0 | |
| 10:45 | 15:00 | 64.2 | 65.2 | 62.9 | 77.7 | |
| 11:00 | 15:00 | 65.5 | 65.6 | 61.0 | 80.4 | |
| 11:15 | 15:00 | 64.6 | 65.9 | 58.1 | 82.1 | |
| 11:30 | 15:00 | 60.3 | 61.8 | 58.1 | 64.7 | |
| 11:45 | 15:00 | 57.7 | 59.2 | 55.6 | 65.1 | |
| 12:00 | 15:00 | 57.1 | 58.2 | 55.5 | 64.2 | |
| 12:15 | 15:00 | 60.2 | 61.5 | 58.5 | 65.9 | |
| 12:30 | 15:00 | 58.5 | 60.3 | 56.3 | 67.8 | |
| 12:45 | 15:00 | 60.7 | 61.8 | 59.3 | 66.0 | |
| 13:00 | 15:00 | 61.7 | 62.8 | 60.2 | 65.1 | |
| 13:15 | 15:00 | 62.3 | 63.4 | 61.0 | 65.4 | |
| 13:30 | 15:00 | 63.3 | 64.4 | 61.9 | 67.7 | |
| 13:45 | 15:00 | 64.6 | 65.7 | 63.1 | 68.6 | |
| 14:00 | 15:00 | 65.6 | 66.9 | 64.0 | 69.8 | |
| 14:15 | 15:00 | 66.4 | 67.4 | 65.0 | 72.4 | |
| 14:30 | 15:00 | 66.6 | 67.6 | 65.4 | 70.5 | |
| 14:45 | 15:00 | 66.6 | 67.4 | 65.3 | 72.8 | |
| Average 0915-1500 | | 63.5 | 64.6 | 61.7 | 64-82 | |

## Noise Survey Results

Date: Thursday 8th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 2**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 67.0 | 67.9 | 65.7 | 78.7 | |
| 15:15 | 15:00 | 67.0 | 67.9 | 65.8 | 74.2 | |
| 15:30 | 15:00 | 66.6 | 67.4 | 65.5 | 71.1 | |
| 15:45 | 15:00 | 65.8 | 66.7 | 64.6 | 73.9 | |
| 16:00 | 15:00 | 65.2 | 66.1 | 64.0 | 69.7 | |
| 16:15 | 15:00 | 64.9 | 66.2 | 63.2 | 71.9 | |
| 16:30 | 15:00 | 64.7 | 65.7 | 63.5 | 72.6 | |
| 16:45 | 15:00 | 65.7 | 66.6 | 64.3 | 69.9 | |
| 17:00 | 15:00 | 67.8 | 68.9 | 66.0 | 71.8 | |
| 17:15 | 15:00 | 68.3 | 69.4 | 66.9 | 72.4 | |
| 17:30 | 15:00 | 69.5 | 70.8 | 67.7 | 73.6 | |
| 17:45 | 15:00 | 68.4 | 69.6 | 66.6 | 72.8 | |
| 18:00 | 15:00 | 65.7 | 66.9 | 64.2 | 70.2 | |
| 18:15 | 15:00 | 64.9 | 66.1 | 63.6 | 69.1 | |
| 18:30 | 15:00 | 64.9 | 66.1 | 63.1 | 69.7 | |
| 18:45 | 15:00 | 63.8 | 64.7 | 62.6 | 68.6 | |
| 19:00 | 15:00 | 64.0 | 65.2 | 62.3 | 69.8 | |
| 19:15 | 15:00 | 62.7 | 63.9 | 61.1 | 68.0 | |
| 19:30 | 15:00 | 61.8 | 63.3 | 59.5 | 67.2 | |
| 19:45 | 15:00 | 62.8 | 63.9 | 61.2 | 68.8 | |
| 20:00 | 15:00 | 61.6 | 62.8 | 59.9 | 67.6 | |
| 20:15 | 15:00 | 61.3 | 62.8 | 59.4 | 66.7 | |
| 20:30 | 15:00 | 61.8 | 63.0 | 60.2 | 66.8 | |
| 20:45 | 15:00 | 63.2 | 64.7 | 61.0 | 69.6 | |
| 21:00 | 15:00 | 63.1 | 64.5 | 61.2 | 69.1 | |
| 21:15 | 15:00 | 61.6 | 63.4 | 58.7 | 67.8 | |
| 21:30 | 15:00 | 60.3 | 61.6 | 58.6 | 66.3 | |
| 21:45 | 15:00 | 61.0 | 62.6 | 59.1 | 66.5 | |
| 22:00 | 15:00 | 63.2 | 64.8 | 60.8 | 68.8 | |
| 22:15 | 15:00 | 63.4 | 65.4 | 60.8 | 72.0 | |
| 22:30 | 15:00 | 59.9 | 61.6 | 57.5 | 66.9 | |
| 22:45 | 15:00 | 59.8 | 61.5 | 57.2 | 66.7 | |
| Average 1500-2300 | | 64.8 | 66.0 | 63.2 | 66-79 | |

## Noise Survey Results

Date: Thursday 8th - Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 3**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 60.3 | 62.3 | 58.0 | 67.2 | Dominated by road traffic noise from |
| 23:15 | 15:00 | 61.0 | 62.8 | 58.5 | 69.5 | M56 Motorway |
| 23:30 | 15:00 | 59.1 | 60.9 | 56.1 | 65.5 | |
| 23:45 | 15:00 | 58.1 | 59.8 | 55.1 | 68.9 | |
| 00:00 | 15:00 | 57.9 | 60.0 | 54.6 | 65.6 | |
| 00:15 | 15:00 | 56.4 | 58.3 | 53.4 | 64.9 | |
| 00:30 | 15:00 | 56.8 | 59.0 | 53.3 | 67.1 | |
| 00:45 | 15:00 | 56.0 | 58.8 | 51.1 | 66.9 | |
| 01:00 | 15:00 | 55.7 | 58.3 | 51.3 | 70.4 | |
| 01:15 | 15:00 | 56.0 | 58.3 | 52.3 | 63.2 | |
| 01:30 | 15:00 | 56.4 | 58.5 | 53.1 | 64.3 | |
| 01:45 | 15:00 | 57.3 | 59.6 | 51.6 | 67.2 | |
| 02:00 | 15:00 | 56.6 | 58.7 | 52.7 | 66.4 | |
| 02:15 | 15:00 | 57.6 | 59.9 | 53.1 | 65.0 | |
| 02:30 | 15:00 | 57.1 | 59.8 | 52.1 | 68.6 | |
| 02:45 | 15:00 | 59.2 | 61.3 | 55.8 | 69.8 | |
| 03:00 | 15:00 | 59.2 | 61.1 | 56.1 | 67.8 | |
| 03:15 | 15:00 | 56.9 | 59.4 | 53.2 | 63.7 | |
| 03:30 | 15:00 | 57.4 | 59.6 | 54.6 | 63.8 | |
| 03:45 | 15:00 | 58.9 | 60.7 | 55.7 | 64.4 | |
| 04:00 | 15:00 | 57.5 | 59.5 | 54.4 | 63.7 | |
| 04:15 | 15:00 | 58.8 | 60.5 | 56.1 | 66.2 | |
| 04:30 | 15:00 | 61.1 | 62.8 | 58.4 | 68.4 | |
| 04:45 | 15:00 | 61.4 | 63.7 | 58.1 | 67.9 | |
| 05:00 | 15:00 | 60.4 | 62.0 | 58.1 | 66.3 | |
| 05:15 | 15:00 | 60.3 | 61.7 | 58.3 | 65.3 | |
| 05:30 | 15:00 | 62.4 | 64.1 | 60.1 | 66.9 | |
| 05:45 | 15:00 | 63.5 | 64.9 | 61.7 | 69.5 | |
| 06:00 | 15:00 | 66.3 | 68.2 | 64.2 | 71.9 | |
| 06:15 | 15:00 | 65.2 | 66.5 | 63.6 | 69.3 | |
| 06:30 | 15:00 | 65.4 | 66.4 | 64.1 | 69.7 | |
| 06:45 | 15:00 | 63.7 | 65.0 | 61.9 | 68.1 | |
| Average 2300-0700 | | 60.5 | 62.2 | 58.1 | 63-72 | |
| Average 0915-2300 | | 64.3 | 65.5 | 62.6 | 64-82 | |

## Noise Survey Results

Date: Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 4**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 63.3 | 64.1 | 62.3 | 66.1 | |
| 07:15 | 15:00 | 63.4 | 64.1 | 62.4 | 67.3 | |
| 07:30 | 15:00 | 63.2 | 64.2 | 61.5 | 66.1 | |
| 07:45 | 15:00 | 63.0 | 63.9 | 61.9 | 67.3 | |
| 08:00 | 15:00 | 63.3 | 64.2 | 62.1 | 66.1 | |
| 08:15 | 15:00 | 64.8 | 65.7 | 63.6 | 67.6 | |
| 08:30 | 15:00 | 67.2 | 68.5 | 65.7 | 70.2 | |
| 08:45 | 15:00 | 65.4 | 67.7 | 61.8 | 70.4 | |
| 09:00 | 15:00 | 66.6 | 68.4 | 64.4 | 70.6 | |
| 09:15 | 15:00 | 67.4 | 68.7 | 65.7 | 73.0 | |
| 09:30 | 15:00 | 67.5 | 69.1 | 64.6 | 76.2 | |
| 09:45 | 15:00 | 66.9 | 68.1 | 65.2 | 70.7 | |
| 10:00 | 15:00 | 68.3 | 69.7 | 65.9 | 71.4 | |
| 10:15 | 15:00 | 67.8 | 68.8 | 66.6 | 74.4 | |
| 10:30 | 15:00 | 64.8 | 67.2 | 60.3 | 69.6 | |
| 10:45 | 15:00 | 64.1 | 66.0 | 61.3 | 69.6 | |
| 11:00 | 15:00 | 63.0 | 63.6 | 61.9 | 69.7 | |
| 11:15 | 15:00 | 65.2 | 66.9 | 62.6 | 68.9 | |
| 11:30 | 15:00 | 66.7 | 68.1 | 64.3 | 73.0 | |
| 11:45 | 15:00 | 65.7 | 66.8 | 64.5 | 69.2 | |
| 12:00 | 15:00 | 64.8 | 66.3 | 62.8 | 68.6 | |
| 12:15 | 15:00 | 66.3 | 68.2 | 64.2 | 71.4 | |
| 12:30 | 15:00 | 66.1 | 67.2 | 64.0 | 71.6 | |
| 12:45 | 15:00 | 64.2 | 65.7 | 62.4 | 71.1 | |
| 13:00 | 15:00 | 65.5 | 66.7 | 64.1 | 69.4 | |
| 13:15 | 15:00 | 65.5 | 66.7 | 64.1 | 70.5 | |
| 13:30 | 15:00 | 65.2 | 66.2 | 63.7 | 75.6 | |
| 13:45 | 15:00 | 67.9 | 69.2 | 66.0 | 76.9 | |
| 14:00 | 15:00 | 67.9 | 69.4 | 65.8 | 73.3 | Rain |
| 14:15 | 15:00 | 66.4 | 67.5 | 64.9 | 74.2 | Rain |
| 14:30 | 15:00 | 65.0 | 66.8 | 62.9 | 69.6 | Rain |
| 14:45 | 15:00 | 63.7 | 64.9 | 61.7 | 67.5 | Rain |
| Average 0700-1500 | | 65.7 | 67.1 | 63.8 | 66-77 | |

## Noise Survey Results

Date: Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 5**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 65.4 | 66.7 | 62.8 | 69.4 | Rain |
| 15:15 | 15:00 | 66.5 | 67.3 | 65.4 | 70.2 | Rain |
| 15:30 | 15:00 | 67.3 | 68.2 | 66.2 | 70.1 | Rain |
| 15:45 | 15:00 | 66.7 | 67.5 | 65.6 | 70.5 | Rain |
| 16:00 | 15:00 | 65.8 | 66.7 | 64.7 | 68.9 | |
| 16:15 | 15:00 | 64.0 | 65.4 | 60.7 | 68.2 | |
| 16:30 | 15:00 | 65.0 | 66.1 | 63.6 | 68.2 | |
| 16:45 | 15:00 | 64.2 | 65.1 | 63.0 | 72.4 | |
| 17:00 | 15:00 | 65.1 | 66.3 | 63.7 | 68.6 | |
| 17:15 | 15:00 | 65.7 | 66.7 | 64.4 | 69.5 | |
| 17:30 | 15:00 | 65.4 | 66.3 | 64.2 | 69.9 | |
| 17:45 | 15:00 | 65.4 | 66.4 | 64.1 | 68.5 | |
| 18:00 | 15:00 | 66.0 | 66.8 | 64.9 | 69.6 | |
| 18:15 | 15:00 | 66.5 | 67.3 | 65.5 | 69.1 | |
| 18:30 | 15:00 | 66.4 | 67.6 | 64.8 | 70.5 | |
| 18:45 | 15:00 | 65.5 | 66.4 | 64.3 | 68.8 | |
| 19:00 | 15:00 | 65.6 | 66.7 | 64.0 | 70.8 | |
| 19:15 | 15:00 | 64.7 | 65.8 | 63.2 | 68.4 | |
| 19:30 | 15:00 | 64.0 | 65.2 | 62.2 | 72.2 | |
| 19:45 | 15:00 | 64.2 | 65.4 | 62.6 | 68.9 | |
| 20:00 | 15:00 | 64.4 | 65.3 | 62.6 | 74.2 | |
| 20:15 | 15:00 | 65.3 | 66.8 | 63.0 | 72.1 | |
| 20:30 | 15:00 | 63.3 | 64.6 | 61.7 | 69.6 | |
| 20:45 | 15:00 | 62.9 | 64.3 | 60.7 | 68.2 | |
| 21:00 | 15:00 | 62.8 | 64.3 | 60.6 | 67.8 | |
| 21:15 | 15:00 | 62.4 | 63.9 | 60.0 | 66.6 | |
| 21:30 | 15:00 | 62.4 | 63.8 | 60.5 | 67.6 | |
| 21:45 | 15:00 | 61.5 | 63.2 | 59.0 | 66.5 | |
| 22:00 | 15:00 | 61.6 | 63.0 | 59.7 | 66.4 | |
| 22:15 | 15:00 | 61.2 | 62.7 | 59.1 | 66.0 | |
| 22:30 | 15:00 | 61.0 | 62.7 | 58.4 | 68.0 | |
| 22:45 | 15:00 | 61.0 | 62.0 | 57.7 | 75.3 | |
| Average 1500-2300 | | 64.3 | 65.4 | 62.7 | 66-75 | |

## Noise Survey Results

Date: Friday 9th - Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 6**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 61.3 | 63.2 | 58.6 | 68.1 | |
| 23:15 | 15:00 | 61.0 | 62.6 | 58.7 | 67.1 | |
| 23:30 | 15:00 | 60.3 | 62.2 | 57.2 | 67.2 | |
| 23:45 | 15:00 | 60.7 | 62.8 | 57.7 | 66.2 | |
| 00:00 | 15:00 | 60.8 | 62.9 | 57.8 | 69.6 | |
| 00:15 | 15:00 | 60.8 | 63.2 | 56.3 | 68.6 | |
| 00:30 | 15:00 | 59.1 | 61.4 | 55.5 | 66.8 | |
| 00:45 | 15:00 | 58.2 | 60.7 | 54.1 | 65.7 | |
| 01:00 | 15:00 | 57.0 | 59.3 | 53.0 | 65.9 | |
| 01:15 | 15:00 | 56.8 | 59.1 | 52.8 | 66.1 | |
| 01:30 | 15:00 | 55.5 | 58.2 | 50.8 | 65.5 | |
| 01:45 | 15:00 | 54.2 | 56.8 | 50.0 | 64.4 | |
| 02:00 | 15:00 | 56.7 | 59.7 | 51.1 | 68.5 | |
| 02:15 | 15:00 | 58.9 | 61.7 | 54.0 | 68.0 | |
| 02:30 | 15:00 | 59.3 | 62.1 | 53.6 | 67.0 | |
| 02:45 | 15:00 | 58.6 | 61.4 | 53.7 | 68.1 | |
| 03:00 | 15:00 | 56.9 | 59.5 | 51.9 | 67.2 | |
| 03:15 | 15:00 | 56.3 | 58.7 | 51.8 | 64.4 | |
| 03:30 | 15:00 | 56.2 | 58.7 | 52.5 | 62.4 | |
| 03:45 | 15:00 | 55.6 | 58.0 | 51.9 | 63.8 | |
| 04:00 | 15:00 | 56.5 | 58.7 | 52.9 | 63.7 | |
| 04:15 | 15:00 | 57.3 | 59.4 | 53.7 | 64.8 | |
| 04:30 | 15:00 | 57.1 | 59.6 | 52.8 | 64.4 | |
| 04:45 | 15:00 | 58.6 | 61.0 | 54.3 | 64.1 | |
| 05:00 | 15:00 | 59.7 | 62.3 | 55.1 | 67.8 | |
| 05:15 | 15:00 | 55.8 | 57.9 | 51.7 | 62.3 | |
| 05:30 | 15:00 | 56.9 | 58.9 | 53.7 | 62.7 | |
| 05:45 | 15:00 | 57.6 | 59.5 | 54.8 | 63.4 | |
| 06:00 | 15:00 | 56.5 | 58.6 | 53.7 | 64.3 | |
| 06:15 | 15:00 | 55.2 | 56.6 | 53.1 | 59.5 | |
| 06:30 | 15:00 | 55.5 | 57.2 | 53.0 | 60.6 | |
| 06:45 | 15:00 | 56.4 | 57.6 | 54.9 | 62.2 | |
| Average 2300-0700 | | 58.1 | 60.4 | 54.5 | 60-70 | |
| Average 0700-2300 | | 65.5 | 66.7 | 63.7 | 66-77 | |

## Noise Survey Results

Date: Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 7**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 54.4 | 56.3 | 51.5 | 59.9 | |
| 07:15 | 15:00 | 54.1 | 55.5 | 51.7 | 61.7 | |
| 07:30 | 15:00 | 55.0 | 56.7 | 52.6 | 61.2 | |
| 07:45 | 15:00 | 57.3 | 59.1 | 55.2 | 61.8 | |
| 08:00 | 15:00 | 58.9 | 60.8 | 56.5 | 64.7 | |
| 08:15 | 15:00 | 59.1 | 60.8 | 56.7 | 64.2 | |
| 08:30 | 15:00 | 58.6 | 60.3 | 56.3 | 64.6 | |
| 08:45 | 15:00 | 59.7 | 61.3 | 57.3 | 72.5 | |
| 09:00 | 15:00 | 60.6 | 61.8 | 58.9 | 65.8 | |
| 09:15 | 15:00 | 61.2 | 62.4 | 59.8 | 64.7 | |
| 09:30 | 15:00 | 62.3 | 63.4 | 60.9 | 65.4 | |
| 09:45 | 15:00 | 63.2 | 64.7 | 61.3 | 67.0 | |
| 10:00 | 15:00 | 63.1 | 64.4 | 61.4 | 74.6 | |
| 10:15 | 15:00 | 63.6 | 64.6 | 62.4 | 67.1 | |
| 10:30 | 15:00 | 63.9 | 64.9 | 62.6 | 67.8 | |
| 10:45 | 15:00 | 61.6 | 62.5 | 60.4 | 66.9 | |
| 11:00 | 15:00 | 60.9 | 61.8 | 59.8 | 64.9 | |
| 11:15 | 15:00 | 58.1 | 59.4 | 56.3 | 60.9 | |
| 11:30 | 15:00 | 59.4 | 60.7 | 56.7 | 63.3 | |
| 11:45 | 15:00 | 61.8 | 62.9 | 60.2 | 71.2 | |
| 12:00 | 15:00 | 63.2 | 64.4 | 61.6 | 71.5 | |
| 12:15 | 15:00 | 63.9 | 64.8 | 62.7 | 68.2 | |
| 12:30 | 15:00 | 64.8 | 66.1 | 63.0 | 72.2 | |
| 12:45 | 15:00 | 65.4 | 66.5 | 63.8 | 68.7 | |
| 13:00 | 15:00 | 64.1 | 65.2 | 62.5 | 68.2 | |
| 13:15 | 15:00 | 61.1 | 62.4 | 59.1 | 71.6 | |
| 13:30 | 15:00 | 60.5 | 61.4 | 59.1 | 69.9 | |
| 13:45 | 15:00 | 61.3 | 63.1 | 56.7 | 66.1 | Rain |
| 14:00 | 15:00 | 58.3 | 59.6 | 56.5 | 64.9 | Rain |
| 14:15 | 15:00 | 59.0 | 60.2 | 57.2 | 68.3 | Rain |
| 14:30 | 15:00 | 58.2 | 59.4 | 56.6 | 61.6 | Rain |
| 14:45 | 15:00 | 57.7 | 58.7 | 56.3 | 61.9 | Rain |
| Average 0700-1500 | | 61.6 | 62.8 | 60.0 | 60-75 | |

## Noise Survey Results

Date: Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 8**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 56.5 | 57.5 | 55.0 | 61.7 | Rain |
| 15:15 | 15:00 | 57.4 | 58.6 | 55.4 | 67.4 | Rain |
| 15:30 | 15:00 | 57.5 | 58.8 | 56.0 | 61.3 | |
| 15:45 | 15:00 | 59.0 | 60.0 | 57.6 | 61.8 | |
| 16:00 | 15:00 | 57.8 | 59.3 | 54.8 | 65.1 | |
| 16:15 | 15:00 | 56.4 | 57.4 | 55.0 | 63.1 | |
| 16:30 | 15:00 | 57.0 | 58.3 | 55.3 | 64.6 | |
| 16:45 | 15:00 | 58.4 | 59.9 | 56.3 | 62.7 | |
| 17:00 | 15:00 | 57.7 | 58.7 | 56.1 | 61.6 | |
| 17:15 | 15:00 | 55.7 | 56.9 | 54.0 | 59.4 | |
| 17:30 | 15:00 | 54.7 | 55.9 | 53.0 | 59.0 | |
| 17:45 | 15:00 | 55.5 | 57.0 | 53.1 | 60.8 | |
| 18:00 | 15:00 | 55.4 | 56.8 | 53.5 | 60.1 | |
| 18:15 | 15:00 | 55.3 | 56.9 | 53.3 | 59.8 | |
| 18:30 | 15:00 | 56.5 | 57.7 | 53.6 | 67.8 | Rain |
| 18:45 | 15:00 | 53.5 | 55.4 | 51.3 | 59.8 | |
| 19:00 | 15:00 | 55.3 | 56.9 | 53.2 | 61.3 | |
| 19:15 | 15:00 | 53.5 | 55.2 | 51.2 | 60.0 | Rain |
| 19:30 | 15:00 | 54.1 | 55.9 | 51.7 | 65.7 | |
| 19:45 | 15:00 | 54.1 | 56.2 | 51.0 | 60.0 | |
| 20:00 | 15:00 | 54.0 | 55.8 | 51.1 | 59.0 | |
| 20:15 | 15:00 | 54.0 | 55.9 | 51.2 | 59.8 | |
| 20:30 | 15:00 | 52.2 | 53.5 | 50.0 | 57.6 | |
| 20:45 | 15:00 | 54.1 | 56.3 | 51.1 | 59.6 | |
| 21:00 | 15:00 | 51.3 | 53.0 | 48.7 | 62.0 | |
| 21:15 | 15:00 | 51.8 | 53.5 | 49.6 | 61.4 | |
| 21:30 | 15:00 | 52.6 | 54.6 | 49.7 | 57.7 | |
| 21:45 | 15:00 | 53.7 | 55.7 | 50.6 | 61.1 | |
| 22:00 | 15:00 | 53.8 | 55.8 | 50.8 | 60.0 | |
| 22:15 | 15:00 | 53.9 | 55.8 | 50.6 | 59.2 | |
| 22:30 | 15:00 | 51.7 | 53.8 | 48.3 | 57.2 | |
| 22:45 | 15:00 | 50.7 | 53.1 | 46.7 | 57.4 | |
| Average 1500-2300 | | 55.2 | 56.7 | 53.0 | 57-66 | |

## Noise Survey Results

Date: Saturday 10th - Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 9**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 50.4 | 53.1 | 45.8 | 60.1 | |
| 23:15 | 15:00 | 51.6 | 53.8 | 47.5 | 58.4 | |
| 23:30 | 15:00 | 54.3 | 56.6 | 50.4 | 61.4 | |
| 23:45 | 15:00 | 53.0 | 55.0 | 49.0 | 59.8 | |
| 00:00 | 15:00 | 51.4 | 53.7 | 47.9 | 58.5 | |
| 00:15 | 15:00 | 53.8 | 56.4 | 49.9 | 61.1 | |
| 00:30 | 15:00 | 53.5 | 56.2 | 47.1 | 60.8 | |
| 00:45 | 15:00 | 50.1 | 52.5 | 46.3 | 57.1 | |
| 01:00 | 15:00 | 52.4 | 54.4 | 46.0 | 77.5 | |
| 01:15 | 15:00 | 53.2 | 55.8 | 49.1 | 62.4 | |
| 01:30 | 15:00 | 51.5 | 54.2 | 44.5 | 63.5 | |
| 01:45 | 15:00 | 52.2 | 54.8 | 48.1 | 59.4 | |
| 02:00 | 15:00 | 48.6 | 51.7 | 42.5 | 56.4 | |
| 02:15 | 15:00 | 52.6 | 56.0 | 45.7 | 62.0 | |
| 02:30 | 15:00 | 54.3 | 57.0 | 49.8 | 61.2 | |
| 02:45 | 15:00 | 49.9 | 52.6 | 44.8 | 63.5 | |
| 03:00 | 15:00 | 48.5 | 51.8 | 42.4 | 58.5 | |
| 03:15 | 15:00 | 50.6 | 53.6 | 44.7 | 57.5 | |
| 03:30 | 15:00 | 50.6 | 53.2 | 45.6 | 57.9 | |
| 03:45 | 15:00 | 51.2 | 53.9 | 45.3 | 58.8 | |
| 04:00 | 15:00 | 53.0 | 55.6 | 48.5 | 60.2 | |
| 04:15 | 15:00 | 54.3 | 57.1 | 49.0 | 61.8 | |
| 04:30 | 15:00 | 54.7 | 57.6 | 47.7 | 63.0 | |
| 04:45 | 15:00 | 54.6 | 57.4 | 48.9 | 63.2 | |
| 05:00 | 15:00 | 54.3 | 56.7 | 48.6 | 62.9 | |
| 05:15 | 15:00 | 54.6 | 57.0 | 50.6 | 61.8 | |
| 05:30 | 15:00 | 58.1 | 60.0 | 54.6 | 64.6 | |
| 05:45 | 15:00 | 59.1 | 61.0 | 56.1 | 64.8 | |
| 06:00 | 15:00 | 57.7 | 59.6 | 55.0 | 63.0 | |
| 06:15 | 15:00 | 57.5 | 59.6 | 54.0 | 62.9 | |
| 06:30 | 15:00 | 55.0 | 57.7 | 51.3 | 62.0 | |
| 06:45 | 15:00 | 59.3 | 61.3 | 56.3 | 66.8 | |
| Average 2300-0700 | | 54.2 | 56.6 | 50.1 | 56-78 | |
| Average 0700-2300 | | 58.7 | 60.0 | 57.0 | 57-75 | |

## Noise Survey Results

Date: Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 10**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 59.0 | 60.7 | 56.3 | 67.3 | |
| 07:15 | 15:00 | 57.5 | 59.2 | 54.9 | 64.0 | |
| 07:30 | 15:00 | 59.1 | 60.7 | 56.7 | 65.8 | |
| 07:45 | 15:00 | 58.9 | 60.4 | 56.2 | 74.2 | |
| 08:00 | 15:00 | 57.7 | 59.2 | 55.7 | 61.8 | |
| 08:15 | 15:00 | 59.9 | 61.4 | 57.7 | 65.2 | |
| 08:30 | 15:00 | 61.4 | 62.9 | 59.3 | 66.2 | |
| 08:45 | 15:00 | 61.3 | 62.8 | 59.1 | 66.1 | |
| 09:00 | 15:00 | 61.6 | 63.0 | 59.6 | 66.6 | |
| 09:15 | 15:00 | 62.5 | 63.6 | 60.8 | 66.6 | |
| 09:30 | 15:00 | 62.8 | 64.0 | 61.1 | 74.2 | |
| 09:45 | 15:00 | 62.1 | 63.5 | 60.4 | 66.1 | |
| 10:00 | 15:00 | 62.8 | 64.0 | 60.9 | 78.5 | |
| 10:15 | 15:00 | 60.4 | 61.9 | 58.2 | 64.7 | |
| 10:30 | 15:00 | 62.3 | 63.8 | 60.6 | 68.2 | |
| 10:45 | 15:00 | 63.7 | 64.6 | 62.4 | 80.2 | |
| 11:00 | 15:00 | 63.1 | 64.4 | 61.2 | 67.2 | |
| 11:15 | 15:00 | 58.9 | 60.7 | 57.3 | 65.8 | |
| 11:30 | 15:00 | 60.1 | 61.2 | 58.5 | 63.7 | |
| 11:45 | 15:00 | 59.0 | 60.2 | 57.5 | 66.0 | |
| 12:00 | 15:00 | 58.4 | 59.6 | 56.8 | 62.0 | |
| 12:15 | 15:00 | 57.9 | 59.2 | 56.1 | 63.4 | |
| 12:30 | 15:00 | 60.5 | 61.5 | 58.8 | 68.4 | |
| 12:45 | 15:00 | 60.2 | 61.2 | 58.8 | 63.3 | |
| 13:00 | 15:00 | 59.3 | 61.0 | 56.3 | 63.3 | |
| 13:15 | 15:00 | 59.7 | 61.0 | 58.0 | 63.6 | |
| 13:30 | 15:00 | 60.5 | 61.9 | 58.7 | 66.2 | |
| 13:45 | 15:00 | 62.2 | 63.7 | 59.7 | 66.8 | |
| 14:00 | 15:00 | 63.9 | 65.0 | 62.5 | 69.6 | |
| 14:15 | 15:00 | 64.4 | 65.6 | 62.8 | 72.8 | |
| 14:30 | 15:00 | 63.7 | 64.9 | 62.1 | 68.4 | |
| 14:45 | 15:00 | 63.5 | 64.4 | 62.4 | 67.8 | |
| Average 0700-1500 | | 61.3 | 62.6 | 59.5 | 62-80 | |

## Noise Survey Results

Date: Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 11**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 62.8 | 63.9 | 61.0 | 66.6 | |
| 15:15 | 15:00 | 63.7 | 64.7 | 62.4 | 66.7 | |
| 15:30 | 15:00 | 65.3 | 66.9 | 63.2 | 69.0 | |
| 15:45 | 15:00 | 66.6 | 67.6 | 64.5 | 81.1 | |
| 16:00 | 15:00 | 67.7 | 68.8 | 66.4 | 71.1 | |
| 16:15 | 15:00 | 66.3 | 67.5 | 64.7 | 70.4 | |
| 16:30 | 15:00 | 65.7 | 66.9 | 64.2 | 70.7 | |
| 16:45 | 15:00 | 67.3 | 69.1 | 65.1 | 71.8 | |
| 17:00 | 15:00 | 65.2 | 66.3 | 63.7 | 70.7 | |
| 17:15 | 15:00 | 63.4 | 64.6 | 61.7 | 70.3 | |
| 17:30 | 15:00 | 64.2 | 65.5 | 62.4 | 70.5 | |
| 17:45 | 15:00 | 62.8 | 64.4 | 60.3 | 66.4 | |
| 18:00 | 15:00 | 61.2 | 62.5 | 59.3 | 65.1 | |
| 18:15 | 15:00 | 61.9 | 63.0 | 60.6 | 65.3 | |
| 18:30 | 15:00 | 61.7 | 63.3 | 59.9 | 66.3 | |
| 18:45 | 15:00 | 61.3 | 62.6 | 59.7 | 64.7 | |
| 19:00 | 15:00 | 62.0 | 63.2 | 60.3 | 65.2 | |
| 19:15 | 15:00 | 63.2 | 64.4 | 61.6 | 66.4 | |
| 19:30 | 15:00 | 62.2 | 63.5 | 60.3 | 66.7 | |
| 19:45 | 15:00 | 62.1 | 63.3 | 60.7 | 66.7 | |
| 20:00 | 15:00 | 62.3 | 64.1 | 59.8 | 67.5 | |
| 20:15 | 15:00 | 60.7 | 61.8 | 59.2 | 64.4 | |
| 20:30 | 15:00 | 60.7 | 62.2 | 58.9 | 69.1 | |
| 20:45 | 15:00 | 61.2 | 62.9 | 58.9 | 65.1 | |
| 21:00 | 15:00 | 58.8 | 60.3 | 57.2 | 63.7 | |
| 21:15 | 15:00 | 59.5 | 61.0 | 57.0 | 64.5 | |
| 21:30 | 15:00 | 58.5 | 60.6 | 55.0 | 65.2 | |
| 21:45 | 15:00 | 57.0 | 59.2 | 52.7 | 63.4 | |
| 22:00 | 15:00 | 54.3 | 55.9 | 52.3 | 61.0 | |
| 22:15 | 15:00 | 55.5 | 57.6 | 52.2 | 62.3 | |
| 22:30 | 15:00 | 56.5 | 58.6 | 53.8 | 64.9 | |
| 22:45 | 15:00 | 56.0 | 58.1 | 53.1 | 61.9 | |
| Average 1500-2300 | | 62.9 | 64.3 | 61.1 | 61-81 | |

## Noise Survey Results

Date: Sunday 11th - Monday 12th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 12**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 54.9 | 56.9 | 51.7 | 62.5 | |
| 23:15 | 15:00 | 55.0 | 56.9 | 52.3 | 61.7 | |
| 23:30 | 15:00 | 53.1 | 55.7 | 49.1 | 60.2 | |
| 23:45 | 15:00 | 52.5 | 54.7 | 49.3 | 57.7 | |
| 00:00 | 15:00 | 54.4 | 57.4 | 48.4 | 68.2 | |
| 00:15 | 15:00 | 55.0 | 57.9 | 49.2 | 65.0 | |
| 00:30 | 15:00 | 53.1 | 56.1 | 47.7 | 63.0 | |
| 00:45 | 15:00 | 48.6 | 50.8 | 45.4 | 57.0 | |
| 01:00 | 15:00 | 48.7 | 51.3 | 45.1 | 54.9 | |
| 01:15 | 15:00 | 47.8 | 50.1 | 44.2 | 55.1 | |
| 01:30 | 15:00 | 46.3 | 48.7 | 42.8 | 57.9 | |
| 01:45 | 15:00 | 46.6 | 49.7 | 41.9 | 56.8 | |
| 02:00 | 15:00 | 48.0 | 50.7 | 43.2 | 57.1 | |
| 02:15 | 15:00 | 48.8 | 51.7 | 44.0 | 56.2 | |
| 02:30 | 15:00 | 48.2 | 51.0 | 43.2 | 58.7 | |
| 02:45 | 15:00 | 46.8 | 49.6 | 42.4 | 55.2 | |
| 03:00 | 15:00 | 48.2 | 50.8 | 43.4 | 56.4 | |
| 03:15 | 15:00 | 48.9 | 51.3 | 44.6 | 58.0 | |
| 03:30 | 15:00 | 50.5 | 52.9 | 46.2 | 57.2 | |
| 03:45 | 15:00 | 50.7 | 53.2 | 46.2 | 58.1 | |
| 04:00 | 15:00 | 50.5 | 53.2 | 46.0 | 57.3 | |
| 04:15 | 15:00 | 51.4 | 53.9 | 47.7 | 60.9 | |
| 04:30 | 15:00 | 52.6 | 54.8 | 49.6 | 58.9 | |
| 04:45 | 15:00 | 51.8 | 53.5 | 49.3 | 58.1 | |
| 05:00 | 15:00 | 52.7 | 54.5 | 50.3 | 59.0 | |
| 05:15 | 15:00 | 52.5 | 54.1 | 50.3 | 57.8 | |
| 05:30 | 15:00 | 53.0 | 54.7 | 50.9 | 59.8 | |
| 05:45 | 15:00 | 52.9 | 54.6 | 50.5 | 58.1 | |
| 06:00 | 15:00 | 54.2 | 55.7 | 52.2 | 70.4 | |
| 06:15 | 15:00 | 54.8 | 56.3 | 52.9 | 60.8 | |
| 06:30 | 15:00 | 55.7 | 57.2 | 53.6 | 61.7 | |
| 06:45 | 15:00 | 54.5 | 55.9 | 52.8 | 59.2 | |
| Average 2300-0700 | | 52.1 | 54.3 | 49.0 | 55-70 | |
| Average 0700-2300 | | 62.2 | 63.5 | 60.4 | 61-81 | |

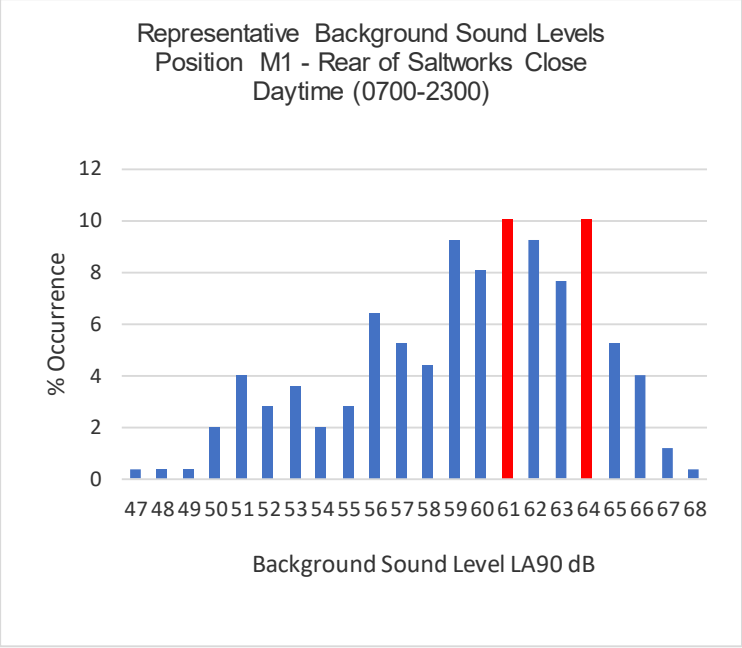
## Noise Survey Results

Date: Monday 12th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 13**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
Calibration: 94dB

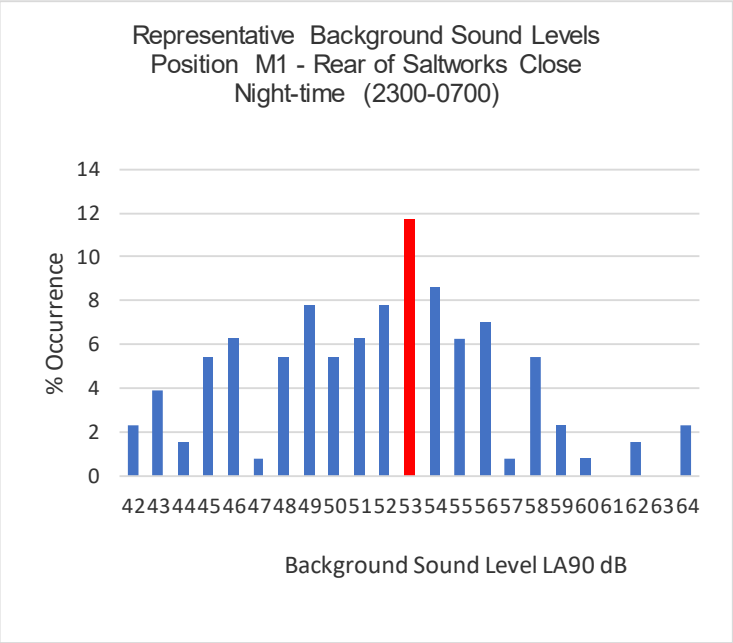
| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 55.5 | 56.6 | 53.9 | 59.3 | |
| 07:15 | 15:00 | 55.8 | 56.9 | 54.5 | 62.2 | |
| 07:30 | 15:00 | 54.9 | 56.1 | 53.4 | 63.1 | |
| 07:45 | 15:00 | 54.9 | 54.7 | 51.2 | 78.0 | |
| 08:00 | 15:00 | 52.3 | 53.8 | 50.3 | 60.7 | |
| 08:15 | 15:00 | 52.5 | 54.6 | 49.5 | 59.3 | |
| 08:30 | 15:00 | 54.2 | 55.9 | 51.5 | 60.3 | |
| 08:45 | 15:00 | 54.9 | 56.6 | 52.7 | 61.9 | |
| 09:00 | 15:00 | 58.4 | 60.2 | 56.3 | 64.7 | |
| 09:15 | 15:00 | 59.4 | 60.8 | 57.4 | 67.8 | |
| 09:30 | 15:00 | 57.8 | 59.1 | 56.2 | 65.2 | |
| 09:45 | 15:00 | 58.2 | 59.6 | 56.5 | 64.6 | |
| 10:00 | 15:00 | 59.3 | 60.4 | 57.5 | 70.4 | |
| 10:15 | 15:00 | 58.4 | 59.6 | 57.0 | 62.2 | |
| 10:30 | 15:00 | 57.2 | 58.9 | 54.4 | 68.1 | |
| 10:45 | 15:00 | 54.9 | 57.3 | 51.1 | 61.0 | |
| 11:00 | 15:00 | 55.0 | 56.7 | 52.1 | 61.2 | |
| 11:15 | 15:00 | 58.2 | 59.6 | 56.2 | 75.7 | |
| Average 0700-1130 | | 56.7 | 58.1 | 54.6 | 59-78 | |

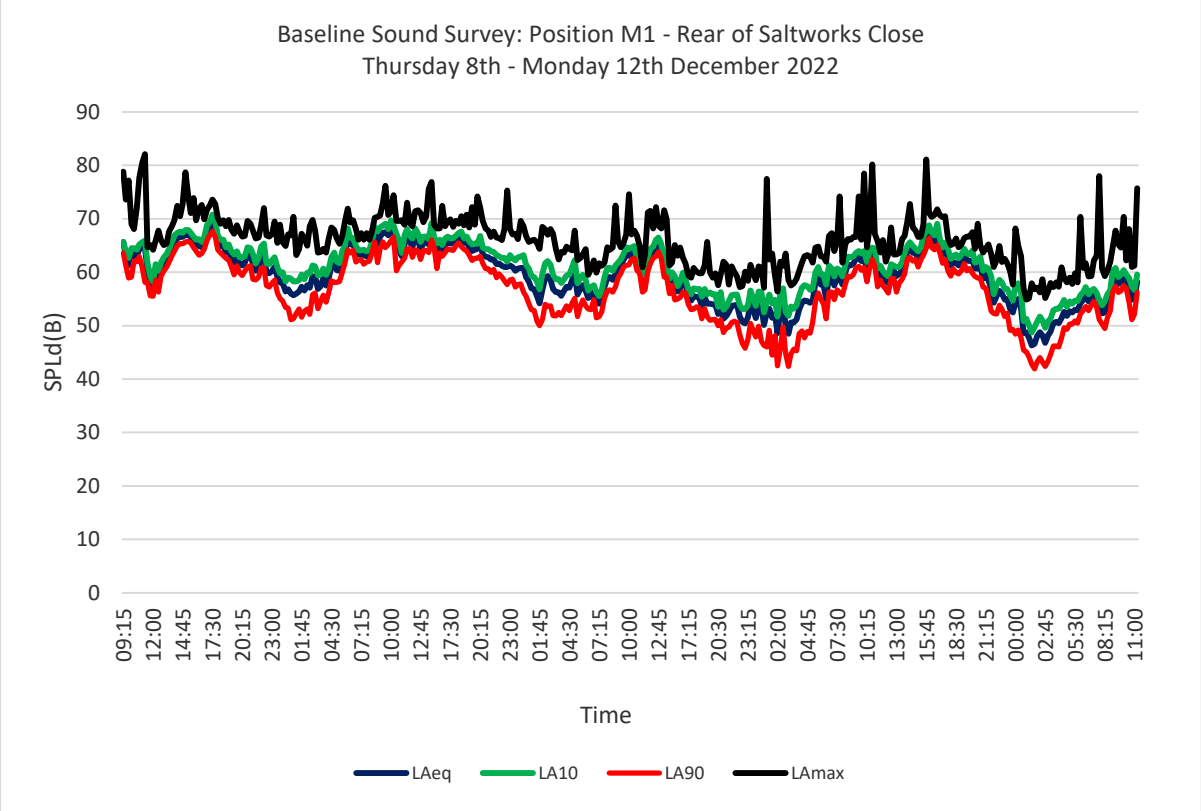
| | | | | | |
|---|---|---|---|---|---|
| **Overall Average** | **55.9** | **57.8** | **53.2** | **55-78** | |
| **Overall Average** | **63.0** | **64.2** | **61.2** | **57-82** | **Levels exclude rain periods** |

| LA90 | % Occurrence |
|---|---|
| 47 | 0.4 |
| 48 | 0.4 |
| 49 | 0.4 |
| 50 | 2.0 |
| 51 | 4.0 |
| 52 | 2.8 |
| 53 | 3.6 |
| 54 | 2.0 |
| 55 | 2.8 |
| 56 | 6.5 |
| 57 | 5.2 |
| 58 | 4.4 |
| 59 | 9.3 |
| 60 | 8.1 |
| **61** | **10.1** |
| 62 | 9.3 |
| 63 | 7.7 |
| **64** | **10.1** |
| 65 | 5.2 |
| 66 | 4.0 |
| 67 | 1.2 |
| 68 | 0.4 |



| LA90 | % Occurrence |
|---|---|
| 42 | 2.3 |
| 43 | 3.9 |
| 44 | 1.6 |
| 45 | 5.5 |
| 46 | 6.3 |
| 47 | 0.8 |
| 48 | 5.5 |
| 49 | 7.8 |
| 50 | 5.5 |
| 51 | 6.3 |
| 52 | 7.8 |
| **53** | **11.7** |
| 54 | 8.6 |
| 55 | 6.3 |
| 56 | 7.0 |
| 57 | 0.8 |
| 58 | 5.5 |
| 59 | 2.3 |
| 60 | 0.8 |
| 61 | 0.0 |
| 62 | 1.6 |
| 63 | 0.0 |
| 64 | 2.3 |



## Noise Survey Results

Date: Thursday 8th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 14**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 10:00 | 15:00 | 65.6 | 67.7 | 63.6 | 70.8 | Dominated by road traffic noise from |
| 10:15 | 15:00 | 65.9 | 67.2 | 64.3 | 73.6 | M56 Motorway |
| 10:30 | 15:00 | 66.1 | 67.3 | 64.4 | 69.3 | |
| 10:45 | 15:00 | 66.2 | 67.3 | 64.7 | 71.4 | |
| 11:00 | 15:00 | 66.0 | 67.2 | 64.4 | 70.3 | |
| 11:15 | 15:00 | 64.5 | 65.7 | 63.0 | 68.7 | |
| 11:30 | 15:00 | 64.8 | 65.9 | 63.1 | 68.6 | |
| 11:45 | 15:00 | 64.1 | 65.2 | 62.6 | 68.3 | |
| 12:00 | 15:00 | 64.2 | 65.4 | 62.5 | 68.1 | |
| 12:15 | 15:00 | 65.6 | 66.8 | 64.0 | 69.3 | |
| 12:30 | 15:00 | 65.5 | 66.6 | 64.0 | 68.2 | |
| 12:45 | 15:00 | 66.1 | 67.4 | 64.4 | 69.2 | |
| 13:00 | 15:00 | 66.7 | 67.9 | 65.2 | 70.0 | |
| 13:15 | 15:00 | 66.8 | 68.0 | 65.0 | 70.2 | |
| 13:30 | 15:00 | 66.6 | 67.9 | 64.7 | 70.1 | |
| 13:45 | 15:00 | 66.8 | 68.2 | 64.7 | 80.4 | |
| 14:00 | 15:00 | 68.7 | 69.8 | 67.2 | 72.2 | |
| 14:15 | 15:00 | 68.3 | 69.3 | 66.7 | 71.1 | |
| 14:30 | 15:00 | 68.4 | 69.3 | 67.1 | 70.7 | |
| 14:45 | 15:00 | 68.8 | 69.7 | 67.5 | 72.2 | |
| Average 1000-1500 | | 66.5 | 67.6 | 64.9 | 68-80 | |

## Noise Survey Results

Date: Thursday 8th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 15**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 68.9 | 69.9 | 67.6 | 72.0 | |
| 15:15 | 15:00 | 69.2 | 70.2 | 67.9 | 71.9 | |
| 15:30 | 15:00 | 69.7 | 70.5 | 68.6 | 72.3 | |
| 15:45 | 15:00 | 69.7 | 70.5 | 68.8 | 72.4 | |
| 16:00 | 15:00 | 68.9 | 69.8 | 67.9 | 71.7 | |
| 16:15 | 15:00 | 69.1 | 70.0 | 67.9 | 72.2 | |
| 16:30 | 15:00 | 68.5 | 69.3 | 67.2 | 71.1 | |
| 16:45 | 15:00 | 67.4 | 68.6 | 65.9 | 70.3 | |
| 17:00 | 15:00 | 69.0 | 70.1 | 67.6 | 71.7 | |
| 17:15 | 15:00 | 69.0 | 70.0 | 67.5 | 71.8 | |
| 17:30 | 15:00 | 68.9 | 69.9 | 67.7 | 72.0 | |
| 17:45 | 15:00 | 68.7 | 69.5 | 67.6 | 72.5 | |
| 18:00 | 15:00 | 67.8 | 69.1 | 65.9 | 71.0 | |
| 18:15 | 15:00 | 67.5 | 68.5 | 65.9 | 70.5 | |
| 18:30 | 15:00 | 67.1 | 68.4 | 65.3 | 70.7 | |
| 18:45 | 15:00 | 67.2 | 68.3 | 65.8 | 70.8 | |
| 19:00 | 15:00 | 66.0 | 67.2 | 64.3 | 70.8 | |
| 19:15 | 15:00 | 64.3 | 66.1 | 61.4 | 69.0 | |
| 19:30 | 15:00 | 64.8 | 66.5 | 62.4 | 69.4 | |
| 19:45 | 15:00 | 64.9 | 66.6 | 62.5 | 68.6 | |
| 20:00 | 15:00 | 64.3 | 65.9 | 62.2 | 68.1 | |
| 20:15 | 15:00 | 65.2 | 66.8 | 62.9 | 69.6 | |
| 20:30 | 15:00 | 63.3 | 65.3 | 60.3 | 69.7 | |
| 20:45 | 15:00 | 63.7 | 65.3 | 61.5 | 68.9 | |
| 21:00 | 15:00 | 63.5 | 65.5 | 60.9 | 67.8 | |
| 21:15 | 15:00 | 62.8 | 64.6 | 60.1 | 67.8 | |
| 21:30 | 15:00 | 62.4 | 64.2 | 59.5 | 67.2 | |
| 21:45 | 15:00 | 63.1 | 64.8 | 60.4 | 68.2 | |
| 22:00 | 15:00 | 63.0 | 64.9 | 59.9 | 68.5 | |
| 22:15 | 15:00 | 63.0 | 65.1 | 59.6 | 68.0 | |
| 22:30 | 15:00 | 62.5 | 64.5 | 59.8 | 67.4 | |
| 22:45 | 15:00 | 61.9 | 63.8 | 59.2 | 66.7 | |
| Average 1500-2300 | | 66.8 | 68.0 | 65.2 | 67-73 | |

## Noise Survey Results

Date: Thursday 8th - Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 16**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 61.7 | 63.9 | 58.0 | 67.8 | |
| 23:15 | 15:00 | 62.7 | 64.6 | 59.6 | 67.8 | |
| 23:30 | 15:00 | 60.6 | 63.1 | 56.3 | 66.7 | |
| 23:45 | 15:00 | 61.2 | 63.6 | 55.6 | 68.4 | |
| 00:00 | 15:00 | 60.4 | 62.7 | 55.2 | 67.4 | |
| 00:15 | 15:00 | 60.4 | 63.2 | 54.0 | 67.1 | |
| 00:30 | 15:00 | 59.6 | 62.3 | 53.1 | 65.7 | |
| 00:45 | 15:00 | 58.4 | 61.5 | 52.6 | 65.6 | |
| 01:00 | 15:00 | 58.7 | 62.1 | 48.9 | 67.5 | |
| 01:15 | 15:00 | 58.3 | 61.2 | 52.7 | 65.2 | |
| 01:30 | 15:00 | 59.9 | 62.9 | 53.0 | 67.0 | |
| 01:45 | 15:00 | 61.0 | 63.8 | 54.4 | 70.7 | |
| 02:00 | 15:00 | 59.9 | 62.4 | 55.7 | 65.7 | |
| 02:15 | 15:00 | 60.4 | 63.0 | 54.9 | 67.9 | |
| 02:30 | 15:00 | 59.2 | 61.8 | 53.7 | 66.0 | |
| 02:45 | 15:00 | 61.3 | 63.4 | 57.6 | 67.7 | |
| 03:00 | 15:00 | 59.8 | 61.9 | 55.9 | 66.6 | |
| 03:15 | 15:00 | 60.6 | 63.2 | 55.9 | 66.1 | |
| 03:30 | 15:00 | 60.9 | 63.1 | 57.2 | 66.7 | |
| 03:45 | 15:00 | 61.2 | 63.3 | 57.4 | 68.1 | |
| 04:00 | 15:00 | 61.7 | 63.9 | 57.4 | 67.5 | |
| 04:15 | 15:00 | 61.2 | 63.6 | 57.0 | 66.9 | |
| 04:30 | 15:00 | 62.7 | 64.6 | 59.4 | 68.1 | |
| 04:45 | 15:00 | 62.6 | 64.7 | 59.4 | 67.4 | |
| 05:00 | 15:00 | 64.0 | 65.8 | 61.1 | 73.0 | |
| 05:15 | 15:00 | 63.6 | 65.0 | 61.6 | 67.2 | |
| 05:30 | 15:00 | 65.3 | 67.2 | 62.5 | 69.9 | |
| 05:45 | 15:00 | 64.3 | 65.8 | 62.1 | 70.9 | |
| 06:00 | 15:00 | 66.2 | 67.5 | 64.3 | 69.6 | |
| 06:15 | 15:00 | 66.2 | 67.2 | 64.8 | 69.1 | |
| 06:30 | 15:00 | 66.9 | 68.3 | 65.2 | 70.2 | |
| 06:45 | 15:00 | 68.2 | 69.2 | 66.7 | 72.4 | |
| Average 2300-0700 | | 62.6 | 64.5 | 59.7 | 65-73 | |
| Average 1000-2300 | | 66.7 | 67.9 | 65.1 | 67-80 | |

## Noise Survey Results

Date: Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 17**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 69.7 | 71.0 | 68.0 | 72.9 | |
| 07:15 | 15:00 | 69.5 | 70.8 | 67.7 | 73.1 | |
| 07:30 | 15:00 | 68.9 | 69.9 | 67.6 | 71.7 | |
| 07:45 | 15:00 | 68.8 | 69.6 | 67.8 | 71.3 | |
| 08:00 | 15:00 | 68.3 | 69.2 | 67.2 | 71.1 | |
| 08:15 | 15:00 | 67.4 | 68.3 | 66.3 | 69.8 | |
| 08:30 | 15:00 | 68.8 | 69.8 | 67.5 | 71.8 | |
| 08:45 | 15:00 | 68.0 | 69.1 | 66.4 | 75.1 | |
| 09:00 | 15:00 | 68.7 | 69.9 | 67.0 | 75.8 | |
| 09:15 | 15:00 | 69.2 | 70.5 | 67.3 | 73.0 | |
| 09:30 | 15:00 | 69.9 | 71.0 | 68.5 | 73.1 | |
| 09:45 | 15:00 | 69.9 | 71.0 | 68.5 | 72.9 | |
| 10:00 | 15:00 | 68.3 | 69.4 | 67.1 | 71.3 | |
| 10:15 | 15:00 | 68.6 | 69.9 | 66.8 | 72.2 | |
| 10:30 | 15:00 | 67.8 | 69.7 | 65.5 | 72.8 | |
| 10:45 | 15:00 | 67.3 | 68.8 | 65.5 | 74.3 | |
| 11:00 | 15:00 | 67.1 | 68.2 | 65.3 | 70.3 | |
| 11:15 | 15:00 | 68.1 | 69.3 | 66.3 | 71.8 | |
| 11:30 | 15:00 | 68.4 | 69.6 | 66.5 | 71.3 | |
| 11:45 | 15:00 | 67.4 | 68.4 | 66.0 | 70.8 | |
| 12:00 | 15:00 | 67.9 | 69.1 | 66.0 | 71.6 | |
| 12:15 | 15:00 | 69.5 | 70.5 | 68.0 | 72.2 | |
| 12:30 | 15:00 | 69.0 | 70.1 | 67.4 | 74.6 | |
| 12:45 | 15:00 | 68.4 | 69.6 | 66.7 | 71.3 | |
| 13:00 | 15:00 | 69.1 | 70.3 | 67.4 | 74.5 | |
| 13:15 | 15:00 | 69.3 | 70.7 | 67.0 | 78.8 | |
| 13:30 | 15:00 | 68.8 | 70.0 | 66.9 | 84.5 | |
| 13:45 | 15:00 | 69.9 | 71.1 | 68.3 | 79.5 | |
| 14:00 | 15:00 | 71.0 | 72.2 | 69.3 | 81.9 | Rain |
| 14:15 | 15:00 | 70.6 | 71.8 | 68.9 | 85.9 | Rain |
| 14:30 | 15:00 | 68.5 | 69.8 | 66.4 | 85.7 | Rain |
| 14:45 | 15:00 | 67.5 | 69.2 | 64.5 | 74.2 | Rain |
| Average 0700-1500 | | 68.7 | 69.8 | 67.1 | 70-85 | |

## Noise Survey Results

Date: Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 18**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 68.9 | 70.2 | 66.8 | 74.4 | Rain |
| 15:15 | 15:00 | 69.4 | 70.4 | 68.1 | 72.9 | Rain |
| 15:30 | 15:00 | 70.3 | 71.2 | 69.1 | 73.6 | Rain |
| 15:45 | 15:00 | 69.8 | 70.9 | 68.4 | 72.7 | Rain |
| 16:00 | 15:00 | 69.1 | 70.0 | 67.8 | 74.6 | |
| 16:15 | 15:00 | 67.2 | 68.7 | 64.8 | 70.9 | |
| 16:30 | 15:00 | 68.6 | 69.6 | 67.3 | 71.6 | |
| 16:45 | 15:00 | 67.7 | 68.7 | 66.4 | 72.1 | |
| 17:00 | 15:00 | 68.2 | 69.4 | 66.4 | 71.8 | |
| 17:15 | 15:00 | 68.7 | 69.6 | 67.5 | 72.3 | |
| 17:30 | 15:00 | 68.7 | 69.7 | 67.3 | 72.7 | |
| 17:45 | 15:00 | 68.6 | 69.7 | 67.3 | 71.7 | |
| 18:00 | 15:00 | 68.7 | 69.9 | 67.2 | 71.6 | |
| 18:15 | 15:00 | 69.0 | 70.1 | 67.4 | 74.9 | |
| 18:30 | 15:00 | 68.6 | 69.9 | 66.9 | 71.8 | |
| 18:45 | 15:00 | 68.2 | 69.4 | 66.4 | 71.8 | |
| 19:00 | 15:00 | 68.3 | 69.6 | 66.4 | 71.6 | |
| 19:15 | 15:00 | 67.5 | 68.7 | 65.7 | 71.3 | |
| 19:30 | 15:00 | 66.9 | 68.1 | 64.5 | 75.4 | |
| 19:45 | 15:00 | 66.9 | 68.3 | 64.7 | 72.0 | |
| 20:00 | 15:00 | 67.0 | 68.4 | 64.7 | 72.0 | |
| 20:15 | 15:00 | 67.4 | 69.1 | 64.8 | 72.4 | |
| 20:30 | 15:00 | 65.8 | 67.2 | 63.6 | 74.8 | |
| 20:45 | 15:00 | 65.3 | 67.0 | 62.5 | 69.3 | |
| 21:00 | 15:00 | 65.3 | 66.9 | 62.7 | 70.5 | |
| 21:15 | 15:00 | 65.1 | 66.8 | 62.2 | 78.0 | |
| 21:30 | 15:00 | 65.3 | 67.0 | 63.0 | 71.9 | |
| 21:45 | 15:00 | 64.8 | 66.8 | 61.8 | 70.8 | |
| 22:00 | 15:00 | 64.7 | 66.5 | 61.8 | 70.4 | |
| 22:15 | 15:00 | 64.3 | 66.1 | 61.2 | 69.3 | |
| 22:30 | 15:00 | 64.1 | 66.2 | 60.4 | 69.1 | |
| 22:45 | 15:00 | 63.4 | 65.8 | 59.1 | 69.5 | |
| Average 1500-2300 | | 67.2 | 68.5 | 65.3 | 69-78 | |

## Noise Survey Results

Date: Friday 9th - Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 19**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 63.6 | 65.9 | 58.9 | 68.5 | |
| 23:15 | 15:00 | 63.6 | 65.5 | 60.4 | 69.4 | |
| 23:30 | 15:00 | 63.0 | 65.2 | 58.3 | 69.1 | |
| 23:45 | 15:00 | 62.7 | 65.1 | 58.7 | 68.9 | |
| 00:00 | 15:00 | 62.8 | 65.2 | 57.6 | 68.9 | |
| 00:15 | 15:00 | 61.6 | 64.3 | 56.7 | 67.7 | |
| 00:30 | 15:00 | 61.3 | 64.0 | 55.4 | 68.8 | |
| 00:45 | 15:00 | 59.9 | 62.9 | 53.4 | 67.8 | |
| 01:00 | 15:00 | 60.8 | 63.6 | 53.1 | 67.9 | |
| 01:15 | 15:00 | 60.9 | 63.7 | 54.7 | 67.1 | |
| 01:30 | 15:00 | 61.3 | 64.4 | 53.2 | 69.2 | |
| 01:45 | 15:00 | 59.8 | 62.5 | 54.1 | 67.5 | |
| 02:00 | 15:00 | 60.9 | 63.9 | 54.5 | 69.7 | |
| 02:15 | 15:00 | 61.6 | 64.5 | 55.1 | 67.9 | |
| 02:30 | 15:00 | 60.5 | 63.7 | 52.3 | 69.3 | |
| 02:45 | 15:00 | 60.7 | 64.3 | 49.3 | 69.0 | |
| 03:00 | 15:00 | 59.5 | 62.7 | 50.7 | 66.9 | |
| 03:15 | 15:00 | 59.0 | 62.3 | 51.4 | 68.1 | |
| 03:30 | 15:00 | 59.3 | 62.3 | 53.3 | 68.8 | |
| 03:45 | 15:00 | 59.1 | 62.5 | 50.9 | 67.5 | |
| 04:00 | 15:00 | 59.4 | 62.9 | 52.6 | 69.4 | |
| 04:15 | 15:00 | 59.6 | 62.8 | 52.7 | 67.0 | |
| 04:30 | 15:00 | 60.6 | 63.4 | 54.0 | 72.5 | |
| 04:45 | 15:00 | 62.2 | 65.2 | 56.1 | 76.7 | |
| 05:00 | 15:00 | 61.5 | 64.3 | 54.3 | 77.9 | |
| 05:15 | 15:00 | 61.2 | 64.0 | 55.5 | 79.9 | |
| 05:30 | 15:00 | 61.7 | 64.7 | 56.6 | 70.0 | |
| 05:45 | 15:00 | 61.0 | 63.4 | 55.8 | 69.8 | |
| 06:00 | 15:00 | 61.4 | 63.7 | 57.6 | 67.1 | |
| 06:15 | 15:00 | 62.4 | 64.5 | 59.1 | 67.3 | |
| 06:30 | 15:00 | 64.6 | 66.6 | 61.6 | 69.2 | |
| 06:45 | 15:00 | 63.8 | 65.5 | 60.8 | 68.8 | |
| Average 2300-0700 | | 61.5 | 64.1 | 56.3 | 67-80 | |
| Average 0700-2300 | | 68.4 | 69.6 | 66.7 | 69-85 | |

## Noise Survey Results

Date: Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 20**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 62.2 | 64.0 | 59.3 | 76.5 | |
| 07:15 | 15:00 | 62.7 | 64.6 | 59.7 | 66.8 | |
| 07:30 | 15:00 | 64.8 | 66.9 | 61.9 | 69.8 | |
| 07:45 | 15:00 | 63.8 | 65.9 | 60.5 | 72.7 | |
| 08:00 | 15:00 | 63.3 | 65.1 | 60.1 | 74.9 | |
| 08:15 | 15:00 | 62.5 | 64.6 | 59.4 | 73.4 | |
| 08:30 | 15:00 | 61.4 | 63.3 | 58.5 | 70.3 | |
| 08:45 | 15:00 | 62.2 | 64.2 | 59.7 | 71.0 | |
| 09:00 | 15:00 | 63.2 | 65.0 | 60.5 | 72.4 | |
| 09:15 | 15:00 | 64.0 | 65.4 | 62.0 | 73.7 | |
| 09:30 | 15:00 | 64.8 | 66.1 | 63.1 | 74.5 | |
| 09:45 | 15:00 | 65.8 | 67.2 | 63.8 | 74.8 | |
| 10:00 | 15:00 | 66.3 | 67.7 | 64.5 | 79.8 | |
| 10:15 | 15:00 | 66.6 | 67.8 | 65.0 | 70.7 | |
| 10:30 | 15:00 | 66.9 | 68.1 | 65.2 | 72.4 | |
| 10:45 | 15:00 | 65.3 | 66.4 | 63.8 | 68.9 | |
| 11:00 | 15:00 | 65.4 | 66.4 | 64.2 | 68.4 | |
| 11:15 | 15:00 | 65.5 | 66.6 | 64.0 | 68.9 | |
| 11:30 | 15:00 | 65.8 | 66.8 | 64.5 | 70.1 | |
| 11:45 | 15:00 | 66.5 | 67.5 | 65.1 | 69.5 | |
| 12:00 | 15:00 | 66.9 | 68.2 | 65.1 | 71.4 | |
| 12:15 | 15:00 | 67.4 | 68.6 | 65.7 | 84.4 | |
| 12:30 | 15:00 | 67.7 | 68.8 | 65.9 | 74.3 | |
| 12:45 | 15:00 | 68.5 | 69.6 | 67.0 | 71.7 | |
| 13:00 | 15:00 | 67.0 | 68.4 | 65.2 | 75.2 | |
| 13:15 | 15:00 | 65.5 | 66.9 | 63.7 | 79.3 | |
| 13:30 | 15:00 | 66.1 | 67.4 | 64.5 | 75.8 | |
| 13:45 | 15:00 | 66.8 | 68.0 | 65.1 | 70.6 | Rain |
| 14:00 | 15:00 | 66.1 | 67.1 | 64.6 | 74.4 | Rain |
| 14:15 | 15:00 | 65.4 | 66.8 | 63.8 | 77.8 | Rain |
| 14:30 | 15:00 | 65.3 | 66.4 | 63.8 | 81.6 | Rain |
| 14:45 | 15:00 | 65.3 | 66.4 | 63.8 | 71.7 | Rain |
| Average 0700-1500 | | 65.4 | 66.8 | 63.6 | 67-84 | |

## Noise Survey Results

Date: Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 21**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 63.8 | 64.9 | 62.3 | 67.9 | Rain |
| 15:15 | 15:00 | 64.8 | 65.9 | 63.2 | 69.3 | Rain |
| 15:30 | 15:00 | 65.1 | 66.3 | 63.5 | 69.1 | |
| 15:45 | 15:00 | 65.7 | 66.8 | 64.1 | 71.5 | |
| 16:00 | 15:00 | 64.8 | 66.0 | 63.2 | 68.2 | |
| 16:15 | 15:00 | 64.3 | 65.9 | 61.9 | 67.9 | |
| 16:30 | 15:00 | 64.0 | 65.3 | 62.2 | 67.9 | |
| 16:45 | 15:00 | 64.4 | 65.6 | 62.6 | 68.1 | |
| 17:00 | 15:00 | 64.3 | 65.5 | 62.6 | 67.8 | |
| 17:15 | 15:00 | 63.5 | 64.8 | 61.8 | 67.1 | |
| 17:30 | 15:00 | 63.0 | 64.4 | 61.1 | 66.5 | |
| 17:45 | 15:00 | 63.4 | 64.9 | 61.5 | 67.2 | |
| 18:00 | 15:00 | 63.1 | 64.5 | 61.2 | 69.5 | |
| 18:15 | 15:00 | 63.2 | 64.6 | 61.3 | 66.8 | |
| 18:30 | 15:00 | 63.6 | 65.2 | 60.7 | 72.8 | Rain |
| 18:45 | 15:00 | 62.4 | 63.9 | 60.0 | 67.6 | |
| 19:00 | 15:00 | 63.0 | 64.5 | 60.7 | 67.7 | |
| 19:15 | 15:00 | 61.9 | 63.6 | 59.3 | 66.4 | Rain |
| 19:30 | 15:00 | 62.4 | 63.8 | 59.9 | 77.4 | |
| 19:45 | 15:00 | 62.5 | 64.6 | 59.3 | 68.2 | |
| 20:00 | 15:00 | 62.7 | 64.5 | 59.8 | 67.2 | |
| 20:15 | 15:00 | 61.7 | 63.5 | 58.8 | 70.1 | |
| 20:30 | 15:00 | 60.8 | 62.5 | 57.9 | 66.0 | |
| 20:45 | 15:00 | 61.5 | 63.5 | 58.4 | 66.3 | |
| 21:00 | 15:00 | 58.9 | 61.0 | 55.7 | 64.2 | |
| 21:15 | 15:00 | 59.7 | 61.4 | 57.3 | 64.9 | |
| 21:30 | 15:00 | 61.0 | 63.2 | 57.1 | 65.5 | |
| 21:45 | 15:00 | 61.5 | 63.2 | 59.0 | 65.8 | |
| 22:00 | 15:00 | 60.6 | 62.9 | 57.0 | 66.5 | |
| 22:15 | 15:00 | 60.9 | 62.8 | 57.8 | 65.9 | |
| 22:30 | 15:00 | 59.2 | 61.5 | 55.1 | 64.1 | |
| 22:45 | 15:00 | 58.6 | 61.2 | 53.9 | 64.0 | |
| Average 1500-2300 | | 62.7 | 64.2 | 60.5 | 64-77 | |

## Noise Survey Results

Date: Saturday 10th - Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 22**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 58.8 | 61.4 | 53.6 | 67.0 | |
| 23:15 | 15:00 | 59.0 | 61.3 | 54.8 | 64.9 | |
| 23:30 | 15:00 | 60.4 | 62.9 | 56.0 | 66.3 | |
| 23:45 | 15:00 | 60.7 | 62.7 | 57.1 | 66.3 | |
| 00:00 | 15:00 | 58.8 | 61.4 | 54.1 | 65.5 | |
| 00:15 | 15:00 | 59.6 | 62.1 | 54.6 | 66.1 | |
| 00:30 | 15:00 | 58.5 | 61.1 | 54.1 | 65.2 | |
| 00:45 | 15:00 | 57.3 | 60.1 | 52.0 | 63.7 | |
| 01:00 | 15:00 | 58.1 | 60.7 | 52.3 | 66.8 | |
| 01:15 | 15:00 | 58.0 | 60.9 | 52.3 | 66.0 | |
| 01:30 | 15:00 | 57.2 | 60.1 | 51.7 | 64.3 | |
| 01:45 | 15:00 | 57.6 | 60.2 | 53.1 | 63.9 | |
| 02:00 | 15:00 | 56.0 | 58.9 | 50.4 | 64.3 | |
| 02:15 | 15:00 | 58.4 | 61.0 | 53.6 | 65.8 | |
| 02:30 | 15:00 | 59.2 | 62.0 | 54.2 | 66.1 | |
| 02:45 | 15:00 | 57.0 | 60.3 | 50.3 | 65.1 | |
| 03:00 | 15:00 | 57.1 | 60.4 | 48.8 | 65.7 | |
| 03:15 | 15:00 | 57.9 | 60.9 | 51.1 | 66.2 | |
| 03:30 | 15:00 | 58.4 | 61.3 | 52.1 | 65.9 | |
| 03:45 | 15:00 | 58.0 | 61.3 | 47.5 | 67.5 | |
| 04:00 | 15:00 | 59.2 | 62.8 | 50.5 | 69.2 | |
| 04:15 | 15:00 | 58.4 | 61.7 | 50.1 | 65.2 | |
| 04:30 | 15:00 | 58.8 | 62.0 | 51.2 | 65.4 | |
| 04:45 | 15:00 | 57.3 | 60.5 | 49.3 | 64.2 | |
| 05:00 | 15:00 | 58.1 | 61.1 | 51.0 | 65.5 | |
| 05:15 | 15:00 | 60.0 | 62.6 | 55.8 | 66.6 | |
| 05:30 | 15:00 | 61.7 | 63.6 | 58.5 | 66.6 | |
| 05:45 | 15:00 | 61.4 | 63.7 | 57.3 | 66.2 | |
| 06:00 | 15:00 | 61.1 | 63.4 | 57.1 | 66.8 | |
| 06:15 | 15:00 | 62.6 | 64.6 | 59.5 | 67.8 | |
| 06:30 | 15:00 | 62.7 | 64.8 | 58.9 | 67.9 | |
| 06:45 | 15:00 | 63.1 | 65.3 | 59.5 | 69.2 | |
| Average 2300-0700 | | 59.4 | 62.0 | 54.7 | 64-69 | |
| Average 0700-2300 | | 63.5 | 65.0 | 61.5 | 64-84 | |

## Noise Survey Results

Date: Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 23**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 61.8 | 63.8 | 58.7 | 67.4 | |
| 07:15 | 15:00 | 62.4 | 63.9 | 59.9 | 66.4 | |
| 07:30 | 15:00 | 63.6 | 65.7 | 60.7 | 68.6 | |
| 07:45 | 15:00 | 63.6 | 65.3 | 61.2 | 68.1 | |
| 08:00 | 15:00 | 63.1 | 64.7 | 60.9 | 67.5 | |
| 08:15 | 15:00 | 63.9 | 65.6 | 61.6 | 69.1 | |
| 08:30 | 15:00 | 64.9 | 66.3 | 62.8 | 70.2 | |
| 08:45 | 15:00 | 65.0 | 66.6 | 62.7 | 72.3 | |
| 09:00 | 15:00 | 64.8 | 66.1 | 62.9 | 69.1 | |
| 09:15 | 15:00 | 66.3 | 67.6 | 64.4 | 70.4 | |
| 09:30 | 15:00 | 66.0 | 67.3 | 64.4 | 69.7 | |
| 09:45 | 15:00 | 64.3 | 65.5 | 62.8 | 68.7 | |
| 10:00 | 15:00 | 64.6 | 65.8 | 62.9 | 67.5 | |
| 10:15 | 15:00 | 64.2 | 65.5 | 62.3 | 71.2 | |
| 10:30 | 15:00 | 65.1 | 66.2 | 63.5 | 68.8 | |
| 10:45 | 15:00 | 65.8 | 66.7 | 64.5 | 70.5 | |
| 11:00 | 15:00 | 65.5 | 66.6 | 64.0 | 68.8 | |
| 11:15 | 15:00 | 65.2 | 66.3 | 63.7 | 68.3 | |
| 11:30 | 15:00 | 66.1 | 67.2 | 64.6 | 69.3 | |
| 11:45 | 15:00 | 65.5 | 66.6 | 64.0 | 68.9 | |
| 12:00 | 15:00 | 65.9 | 67.0 | 64.2 | 68.8 | |
| 12:15 | 15:00 | 65.6 | 66.7 | 64.1 | 68.6 | |
| 12:30 | 15:00 | 66.1 | 67.1 | 64.6 | 70.3 | |
| 12:45 | 15:00 | 65.4 | 66.4 | 64.2 | 68.2 | |
| 13:00 | 15:00 | 64.7 | 65.7 | 63.2 | 67.7 | |
| 13:15 | 15:00 | 64.9 | 66.1 | 63.0 | 68.8 | |
| 13:30 | 15:00 | 66.6 | 68.0 | 64.7 | 69.9 | |
| 13:45 | 15:00 | 67.3 | 68.6 | 65.2 | 72.2 | |
| 14:00 | 15:00 | 67.6 | 68.8 | 66.0 | 70.5 | |
| 14:15 | 15:00 | 67.4 | 68.5 | 65.9 | 70.6 | |
| 14:30 | 15:00 | 66.8 | 67.8 | 65.6 | 69.8 | |
| 14:45 | 15:00 | 66.7 | 67.9 | 65.0 | 72.6 | |
| Average 0700-1500 | | 65.4 | 66.6 | 63.6 | 66-73 | |

## Noise Survey Results

Date: Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 24**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 65.9 | 67.0 | 64.4 | 68.7 | |
| 15:15 | 15:00 | 66.3 | 67.4 | 64.8 | 69.4 | |
| 15:30 | 15:00 | 68.3 | 69.9 | 66.0 | 72.0 | |
| 15:45 | 15:00 | 68.9 | 70.0 | 67.5 | 76.2 | |
| 16:00 | 15:00 | 68.2 | 69.3 | 66.9 | 71.3 | |
| 16:15 | 15:00 | 70.3 | 71.7 | 68.0 | 74.8 | |
| 16:30 | 15:00 | 69.8 | 71.2 | 67.9 | 73.9 | |
| 16:45 | 15:00 | 70.6 | 71.8 | 69.1 | 73.6 | |
| 17:00 | 15:00 | 69.5 | 70.5 | 67.9 | 72.3 | |
| 17:15 | 15:00 | 68.2 | 69.5 | 66.7 | 71.7 | |
| 17:30 | 15:00 | 68.3 | 69.6 | 66.5 | 71.7 | |
| 17:45 | 15:00 | 67.9 | 69.1 | 66.2 | 71.8 | |
| 18:00 | 15:00 | 66.4 | 67.5 | 64.9 | 69.5 | |
| 18:15 | 15:00 | 66.5 | 67.7 | 64.9 | 69.6 | |
| 18:30 | 15:00 | 66.7 | 68.3 | 64.2 | 71.5 | |
| 18:45 | 15:00 | 66.3 | 68.0 | 64.3 | 70.8 | |
| 19:00 | 15:00 | 67.0 | 68.4 | 65.1 | 70.3 | |
| 19:15 | 15:00 | 66.0 | 67.2 | 64.5 | 69.8 | |
| 19:30 | 15:00 | 66.4 | 67.7 | 64.6 | 69.9 | |
| 19:45 | 15:00 | 64.6 | 65.9 | 62.8 | 68.0 | |
| 20:00 | 15:00 | 66.3 | 67.8 | 64.0 | 70.8 | |
| 20:15 | 15:00 | 66.6 | 68.2 | 64.3 | 71.0 | |
| 20:30 | 15:00 | 65.0 | 66.5 | 63.0 | 69.3 | |
| 20:45 | 15:00 | 64.8 | 66.2 | 62.7 | 68.7 | |
| 21:00 | 15:00 | 65.1 | 67.1 | 62.1 | 70.1 | |
| 21:15 | 15:00 | 64.6 | 66.3 | 62.4 | 69.4 | |
| 21:30 | 15:00 | 64.2 | 65.7 | 62.1 | 68.3 | |
| 21:45 | 15:00 | 63.3 | 65.2 | 60.5 | 67.6 | |
| 22:00 | 15:00 | 63.4 | 65.3 | 60.0 | 69.3 | |
| 22:15 | 15:00 | 63.6 | 65.8 | 60.0 | 69.1 | |
| 22:30 | 15:00 | 62.0 | 64.3 | 58.3 | 67.7 | |
| 22:45 | 15:00 | 61.6 | 63.6 | 58.1 | 67.2 | |
| Average 1500-2300 | | 66.9 | 68.2 | 64.9 | 67-76 | |

## Noise Survey Results

Date: Sunday 11th - Monday 12th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 25**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 61.1 | 63.7 | 56.9 | 67.8 | |
| 23:15 | 15:00 | 61.2 | 63.2 | 57.8 | 67.4 | |
| 23:30 | 15:00 | 60.0 | 62.7 | 55.1 | 66.4 | |
| 23:45 | 15:00 | 59.6 | 62.0 | 54.8 | 65.9 | |
| 00:00 | 15:00 | 58.7 | 61.5 | 53.7 | 64.8 | |
| 00:15 | 15:00 | 58.6 | 61.1 | 53.9 | 64.6 | |
| 00:30 | 15:00 | 57.8 | 60.8 | 52.7 | 65.3 | |
| 00:45 | 15:00 | 56.5 | 59.6 | 51.2 | 64.8 | |
| 01:00 | 15:00 | 56.4 | 59.5 | 49.5 | 66.2 | |
| 01:15 | 15:00 | 55.8 | 58.5 | 50.9 | 62.9 | |
| 01:30 | 15:00 | 55.1 | 58.2 | 48.3 | 63.5 | |
| 01:45 | 15:00 | 55.0 | 57.7 | 50.2 | 63.9 | |
| 02:00 | 15:00 | 55.1 | 58.3 | 48.8 | 63.0 | |
| 02:15 | 15:00 | 55.5 | 58.4 | 49.6 | 62.6 | |
| 02:30 | 15:00 | 55.3 | 58.4 | 49.7 | 63.5 | |
| 02:45 | 15:00 | 55.0 | 58.0 | 48.6 | 61.9 | |
| 03:00 | 15:00 | 55.7 | 58.6 | 49.8 | 65.2 | |
| 03:15 | 15:00 | 55.8 | 58.7 | 51.2 | 63.1 | |
| 03:30 | 15:00 | 57.2 | 60.0 | 50.9 | 63.7 | |
| 03:45 | 15:00 | 57.5 | 60.0 | 53.3 | 63.2 | |
| 04:00 | 15:00 | 57.3 | 59.7 | 53.6 | 63.3 | |
| 04:15 | 15:00 | 57.8 | 60.0 | 53.8 | 64.8 | |
| 04:30 | 15:00 | 59.3 | 61.2 | 56.5 | 65.5 | |
| 04:45 | 15:00 | 59.4 | 61.2 | 56.7 | 64.8 | |
| 05:00 | 15:00 | 59.9 | 61.7 | 57.3 | 64.8 | |
| 05:15 | 15:00 | 60.3 | 62.1 | 57.9 | 66.2 | |
| 05:30 | 15:00 | 60.6 | 62.3 | 58.1 | 65.5 | |
| 05:45 | 15:00 | 61.2 | 62.6 | 59.2 | 64.9 | |
| 06:00 | 15:00 | 62.3 | 64.0 | 60.2 | 66.6 | |
| 06:15 | 15:00 | 63.0 | 64.4 | 61.1 | 68.1 | |
| 06:30 | 15:00 | 63.3 | 64.6 | 61.7 | 66.6 | |
| 06:45 | 15:00 | 62.0 | 63.2 | 60.6 | 65.6 | |
| Average 2300-0700 | | 59.1 | 61.2 | 56.0 | 62-68 | |
| Average 0700-2300 | | 66.2 | 67.5 | 64.3 | 66-76 | |

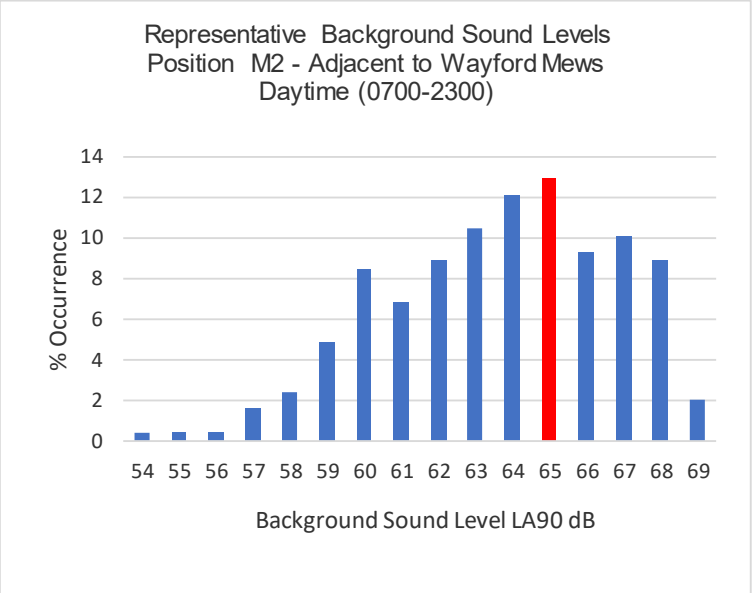
## Noise Survey Results

Date: Monday 12th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 26**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
Calibration: 94dB

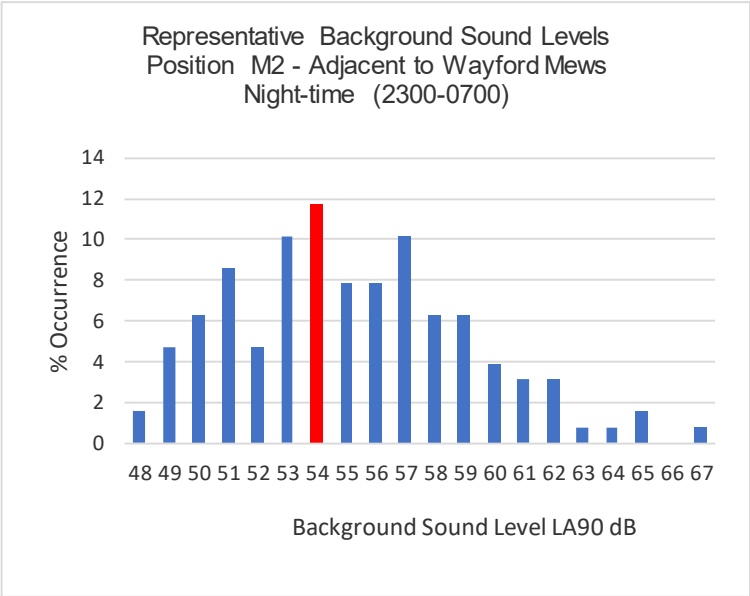
| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 61.5 | 62.6 | 60.1 | 65.0 | |
| 07:15 | 15:00 | 61.0 | 61.9 | 59.9 | 63.7 | |
| 07:30 | 15:00 | 61.7 | 62.7 | 60.5 | 66.1 | |
| 07:45 | 15:00 | 60.8 | 61.9 | 59.4 | 64.6 | |
| 08:00 | 15:00 | 60.0 | 61.2 | 58.7 | 63.3 | |
| 08:15 | 15:00 | 59.8 | 61.2 | 57.2 | 64.2 | |
| 08:30 | 15:00 | 59.8 | 61.0 | 58.3 | 69.3 | |
| 08:45 | 15:00 | 60.8 | 62.1 | 59.2 | 64.0 | |
| 09:00 | 15:00 | 63.5 | 64.7 | 62.1 | 66.9 | |
| 09:15 | 15:00 | 63.0 | 64.1 | 61.6 | 67.0 | |
| 09:30 | 15:00 | 63.6 | 64.8 | 62.1 | 67.7 | |
| 09:45 | 15:00 | 64.3 | 65.5 | 62.7 | 67.5 | |
| 10:00 | 15:00 | 64.7 | 65.9 | 63.1 | 68.1 | |
| 10:15 | 15:00 | 64.7 | 65.7 | 63.4 | 67.6 | |
| 10:30 | 15:00 | 63.7 | 64.9 | 61.8 | 69.1 | |
| 10:45 | 15:00 | 62.5 | 63.8 | 60.7 | 66.4 | |
| 11:00 | 15:00 | 62.0 | 63.3 | 60.0 | 65.8 | |
| 11:15 | 15:00 | 62.4 | 63.9 | 60.3 | 67.3 | |
| 11:30 | 15:00 | 63.4 | 65.0 | 61.0 | 66.9 | |
| 11:45 | 15:00 | 62.9 | 64.4 | 60.8 | 70.3 | |
| 12:00 | 15:00 | 62.7 | 63.4 | 61.8 | 64.9 | |
| Average 0700-1215 | | 62.5 | 63.7 | 60.9 | 63-70 | |

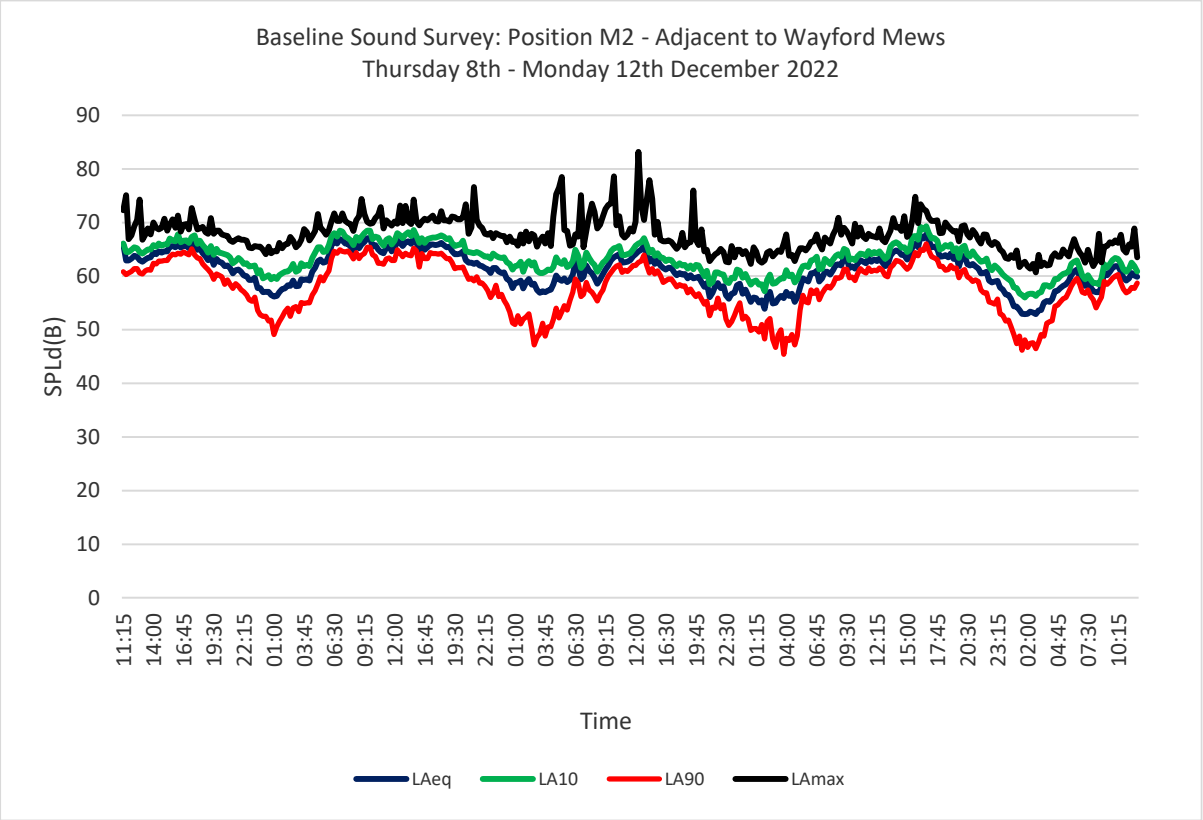
| | | | | | |
|---|---|---|---|---|---|
| **Overall Average** | **59.5** | **61.6** | **56.1** | **62-80** | |
| **Overall Average** | **66.2** | **67.5** | **64.5** | **64-85** | **Levels exclude rain periods** |

| LA90 | % Occurrence |
|---|---|
| 54 | 0.4 |
| 55 | 0.4 |
| 56 | 0.4 |
| 57 | 1.6 |
| 58 | 2.4 |
| 59 | 4.8 |
| 60 | 8.5 |
| 61 | 6.9 |
| 62 | 8.9 |
| 63 | 10.5 |
| 64 | 12.1 |
| **65** | **12.9** |
| 66 | 9.3 |
| 67 | 10.1 |
| 68 | 8.9 |
| 69 | 2.0 |




| LA90 | % Occurrence |
|---|---|
| 48 | 1.6 |
| 49 | 4.7 |
| 50 | 6.3 |
| 51 | 8.6 |
| 52 | 4.7 |
| 53 | 10.2 |
| **54** | **11.7** |
| 55 | 7.8 |
| 56 | 7.8 |
| 57 | 10.2 |
| 58 | 6.3 |
| 59 | 6.3 |
| 60 | 3.9 |
| 61 | 3.1 |
| 62 | 3.1 |
| 63 | 0.8 |
| 64 | 0.8 |
| 65 | 1.6 |
| 66 | 0.0 |
| 67 | 0.8 |






## Noise Survey Results

Date: Thursday 8th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 27**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 11:15 | 15:00 | 65.9 | 66.1 | 60.8 | 72.3 | Dominated by road traffic noise from |
| 11:30 | 15:00 | 62.9 | 64.5 | 60.3 | 75.1 | M56 Motorway |
| 11:45 | 15:00 | 62.9 | 64.5 | 60.6 | 66.9 | |
| 12:00 | 15:00 | 63.3 | 64.9 | 60.9 | 67.6 | |
| 12:15 | 15:00 | 63.8 | 65.4 | 61.4 | 69.3 | |
| 12:30 | 15:00 | 63.6 | 65.2 | 61.4 | 70.5 | |
| 12:45 | 15:00 | 63.0 | 64.5 | 60.6 | 74.3 | |
| 13:00 | 15:00 | 62.7 | 64.2 | 60.4 | 66.8 | |
| 13:15 | 15:00 | 63.1 | 64.6 | 61.0 | 67.7 | |
| 13:30 | 15:00 | 63.4 | 65.0 | 61.2 | 68.9 | |
| 13:45 | 15:00 | 63.5 | 65.0 | 61.1 | 67.8 | |
| 14:00 | 15:00 | 64.4 | 65.8 | 62.4 | 70.0 | |
| 14:15 | 15:00 | 64.1 | 65.5 | 62.3 | 69.0 | |
| 14:30 | 15:00 | 64.6 | 66.1 | 62.8 | 68.7 | |
| 14:45 | 15:00 | 64.4 | 65.7 | 62.8 | 69.0 | |
| Average 1115-1500 | | 63.7 | 65.1 | 61.4 | 67-75 | |

## Noise Survey Results

Date: Thursday 8th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 28**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 64.6 | 65.9 | 62.9 | 70.7 | |
| 15:15 | 15:00 | 64.6 | 65.9 | 62.9 | 68.5 | |
| 15:30 | 15:00 | 65.5 | 67.0 | 63.6 | 69.6 | |
| 15:45 | 15:00 | 65.6 | 66.7 | 64.1 | 70.6 | |
| 16:00 | 15:00 | 65.4 | 66.5 | 64.0 | 69.0 | |
| 16:15 | 15:00 | 66.3 | 67.8 | 64.3 | 71.3 | |
| 16:30 | 15:00 | 65.3 | 66.3 | 64.1 | 68.3 | |
| 16:45 | 15:00 | 65.7 | 66.6 | 64.5 | 69.6 | |
| 17:00 | 15:00 | 65.6 | 66.7 | 64.2 | 69.7 | |
| 17:15 | 15:00 | 65.2 | 66.2 | 64.0 | 68.7 | |
| 17:30 | 15:00 | 66.3 | 67.3 | 65.1 | 72.7 | |
| 17:45 | 15:00 | 66.0 | 67.6 | 64.0 | 70.6 | |
| 18:00 | 15:00 | 64.9 | 66.0 | 63.4 | 68.7 | |
| 18:15 | 15:00 | 65.2 | 66.6 | 63.3 | 68.9 | |
| 18:30 | 15:00 | 64.3 | 65.8 | 62.3 | 69.2 | |
| 18:45 | 15:00 | 63.7 | 65.2 | 61.7 | 68.2 | |
| 19:00 | 15:00 | 63.0 | 64.4 | 61.2 | 67.9 | |
| 19:15 | 15:00 | 63.6 | 65.6 | 60.6 | 70.8 | |
| 19:30 | 15:00 | 62.1 | 64.0 | 59.4 | 67.9 | |
| 19:45 | 15:00 | 63.2 | 65.1 | 60.4 | 68.5 | |
| 20:00 | 15:00 | 62.7 | 64.4 | 60.2 | 68.5 | |
| 20:15 | 15:00 | 62.5 | 64.3 | 59.9 | 67.8 | |
| 20:30 | 15:00 | 61.9 | 64.1 | 58.5 | 67.6 | |
| 20:45 | 15:00 | 62.0 | 63.9 | 59.3 | 67.5 | |
| 21:00 | 15:00 | 61.5 | 63.5 | 58.5 | 66.7 | |
| 21:15 | 15:00 | 60.5 | 62.4 | 57.7 | 66.4 | |
| 21:30 | 15:00 | 61.1 | 62.8 | 58.6 | 66.8 | |
| 21:45 | 15:00 | 61.2 | 63.4 | 58.1 | 67.1 | |
| 22:00 | 15:00 | 60.8 | 63.0 | 57.5 | 66.8 | |
| 22:15 | 15:00 | 60.1 | 62.3 | 57.1 | 66.8 | |
| 22:30 | 15:00 | 60.0 | 62.4 | 56.5 | 66.6 | |
| 22:45 | 15:00 | 59.3 | 61.8 | 55.6 | 65.3 | |
| Average 1500-2300 | | 63.8 | 65.3 | 61.9 | 65-73 | |

## Noise Survey Results

Date: Thursday 8th - Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 29**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 59.3 | 61.9 | 55.3 | 65.2 | |
| 23:15 | 15:00 | 59.7 | 62.0 | 56.1 | 65.6 | |
| 23:30 | 15:00 | 57.8 | 60.5 | 53.6 | 65.5 | |
| 23:45 | 15:00 | 57.8 | 61.1 | 52.8 | 65.5 | |
| 00:00 | 15:00 | 57.0 | 59.6 | 52.5 | 64.9 | |
| 00:15 | 15:00 | 57.1 | 59.9 | 52.5 | 64.1 | |
| 00:30 | 15:00 | 57.1 | 60.2 | 51.6 | 65.5 | |
| 00:45 | 15:00 | 56.5 | 59.4 | 51.8 | 64.3 | |
| 01:00 | 15:00 | 56.2 | 59.9 | 49.1 | 64.7 | |
| 01:15 | 15:00 | 56.3 | 59.5 | 50.6 | 64.6 | |
| 01:30 | 15:00 | 57.0 | 60.2 | 51.5 | 66.2 | |
| 01:45 | 15:00 | 57.6 | 60.5 | 52.4 | 65.2 | |
| 02:00 | 15:00 | 57.7 | 60.8 | 53.4 | 65.9 | |
| 02:15 | 15:00 | 58.3 | 60.9 | 54.0 | 66.0 | |
| 02:30 | 15:00 | 58.2 | 61.3 | 52.5 | 67.3 | |
| 02:45 | 15:00 | 59.2 | 62.3 | 54.1 | 66.6 | |
| 03:00 | 15:00 | 58.1 | 60.8 | 54.3 | 65.4 | |
| 03:15 | 15:00 | 58.2 | 61.1 | 53.4 | 65.9 | |
| 03:30 | 15:00 | 59.4 | 62.4 | 55.1 | 66.8 | |
| 03:45 | 15:00 | 59.3 | 61.9 | 54.9 | 68.8 | |
| 04:00 | 15:00 | 59.4 | 62.1 | 55.0 | 68.2 | |
| 04:15 | 15:00 | 59.2 | 61.9 | 55.0 | 66.7 | |
| 04:30 | 15:00 | 60.8 | 63.4 | 56.5 | 67.5 | |
| 04:45 | 15:00 | 61.6 | 64.4 | 57.3 | 68.4 | |
| 05:00 | 15:00 | 62.8 | 65.4 | 58.6 | 71.6 | |
| 05:15 | 15:00 | 63.1 | 65.4 | 59.9 | 69.1 | |
| 05:30 | 15:00 | 62.5 | 64.5 | 59.1 | 68.5 | |
| 05:45 | 15:00 | 62.7 | 64.6 | 60.2 | 67.7 | |
| 06:00 | 15:00 | 63.8 | 65.8 | 61.0 | 68.6 | |
| 06:15 | 15:00 | 65.7 | 67.4 | 63.3 | 70.2 | |
| 06:30 | 15:00 | 66.6 | 68.0 | 64.6 | 71.7 | |
| 06:45 | 15:00 | 66.1 | 67.4 | 64.3 | 70.3 | |
| Average 2300-0700 | | 60.8 | 63.1 | 57.6 | 65-72 | |
| Average 1115-2300 | | 63.8 | 65.3 | 61.7 | 65-75 | |

## Noise Survey Results

Date: Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 30**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 66.9 | 68.5 | 64.9 | 70.3 | |
| 07:15 | 15:00 | 66.7 | 68.3 | 64.6 | 71.7 | |
| 07:30 | 15:00 | 66.1 | 67.4 | 64.5 | 70.3 | |
| 07:45 | 15:00 | 66.0 | 67.1 | 64.7 | 69.9 | |
| 08:00 | 15:00 | 65.5 | 66.7 | 64.1 | 69.7 | |
| 08:15 | 15:00 | 64.6 | 65.8 | 63.2 | 68.4 | |
| 08:30 | 15:00 | 66.0 | 67.3 | 64.4 | 70.4 | |
| 08:45 | 15:00 | 65.2 | 66.6 | 63.3 | 71.2 | |
| 09:00 | 15:00 | 65.9 | 67.4 | 63.9 | 74.4 | |
| 09:15 | 15:00 | 66.4 | 68.0 | 64.2 | 71.6 | |
| 09:30 | 15:00 | 67.1 | 68.5 | 65.4 | 70.1 | |
| 09:45 | 15:00 | 67.1 | 68.5 | 65.4 | 69.8 | |
| 10:00 | 15:00 | 65.5 | 66.9 | 64.0 | 69.9 | |
| 10:15 | 15:00 | 65.8 | 67.4 | 63.7 | 70.8 | |
| 10:30 | 15:00 | 65.0 | 67.2 | 62.4 | 71.4 | |
| 10:45 | 15:00 | 64.5 | 66.3 | 62.4 | 72.9 | |
| 11:00 | 15:00 | 64.3 | 65.7 | 62.2 | 68.9 | |
| 11:15 | 15:00 | 65.3 | 66.8 | 63.2 | 70.4 | |
| 11:30 | 15:00 | 65.6 | 67.1 | 63.4 | 69.9 | |
| 11:45 | 15:00 | 64.6 | 65.9 | 62.9 | 69.4 | |
| 12:00 | 15:00 | 65.1 | 66.6 | 62.9 | 70.2 | |
| 12:15 | 15:00 | 66.7 | 68.0 | 64.9 | 69.8 | |
| 12:30 | 15:00 | 66.2 | 67.6 | 64.3 | 73.2 | |
| 12:45 | 15:00 | 65.6 | 67.1 | 63.6 | 69.9 | |
| 13:00 | 15:00 | 66.3 | 67.8 | 64.3 | 73.1 | |
| 13:15 | 15:00 | 66.5 | 68.2 | 63.9 | 70.2 | |
| 13:30 | 15:00 | 66.0 | 67.5 | 63.8 | 69.7 | |
| 13:45 | 15:00 | 67.1 | 68.6 | 65.2 | 74.3 | |
| 14:00 | 15:00 | 68.2 | 69.7 | 66.2 | 80.5 | Rain |
| 14:15 | 15:00 | 67.8 | 69.3 | 65.8 | 84.5 | Rain |
| 14:30 | 15:00 | 65.7 | 67.3 | 63.3 | 84.3 | Rain |
| 14:45 | 15:00 | 64.7 | 66.7 | 61.4 | 72.8 | Rain |
| Average 0700-1500 | | 65.9 | 67.3 | 64.0 | 68-74 | |

## Noise Survey Results

Date: Friday 9th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 31**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 66.1 | 67.7 | 63.7 | 73.0 | Rain |
| 15:15 | 15:00 | 66.6 | 67.9 | 65.0 | 71.5 | Rain |
| 15:30 | 15:00 | 67.5 | 68.7 | 66.0 | 72.2 | Rain |
| 15:45 | 15:00 | 67.0 | 68.4 | 65.3 | 71.3 | Rain |
| 16:00 | 15:00 | 66.3 | 67.5 | 64.7 | 70.2 | |
| 16:15 | 15:00 | 64.4 | 66.2 | 61.7 | 69.5 | |
| 16:30 | 15:00 | 65.8 | 67.1 | 64.2 | 70.2 | |
| 16:45 | 15:00 | 64.9 | 66.2 | 63.3 | 70.7 | |
| 17:00 | 15:00 | 65.4 | 66.9 | 63.3 | 70.4 | |
| 17:15 | 15:00 | 65.9 | 67.1 | 64.4 | 70.9 | |
| 17:30 | 15:00 | 65.9 | 67.2 | 64.2 | 71.3 | |
| 17:45 | 15:00 | 65.8 | 67.2 | 64.2 | 70.3 | |
| 18:00 | 15:00 | 65.9 | 67.4 | 64.1 | 70.2 | |
| 18:15 | 15:00 | 66.2 | 67.6 | 64.3 | 72.1 | |
| 18:30 | 15:00 | 65.8 | 67.4 | 63.8 | 70.4 | |
| 18:45 | 15:00 | 65.4 | 66.9 | 63.3 | 70.4 | |
| 19:00 | 15:00 | 65.5 | 67.1 | 63.3 | 70.2 | |
| 19:15 | 15:00 | 64.7 | 66.2 | 62.6 | 71.1 | |
| 19:30 | 15:00 | 64.1 | 65.6 | 61.4 | 71.0 | |
| 19:45 | 15:00 | 64.1 | 65.8 | 61.6 | 70.6 | |
| 20:00 | 15:00 | 64.2 | 65.9 | 61.6 | 70.6 | |
| 20:15 | 15:00 | 64.6 | 66.6 | 61.7 | 71.0 | |
| 20:30 | 15:00 | 63.0 | 64.7 | 60.5 | 73.4 | |
| 20:45 | 15:00 | 62.5 | 64.5 | 59.4 | 67.9 | |
| 21:00 | 15:00 | 62.5 | 64.4 | 59.6 | 69.1 | |
| 21:15 | 15:00 | 62.3 | 64.3 | 59.1 | 76.6 | |
| 21:30 | 15:00 | 62.5 | 64.5 | 59.9 | 70.5 | |
| 21:45 | 15:00 | 62.0 | 64.3 | 58.7 | 69.4 | |
| 22:00 | 15:00 | 61.9 | 64.0 | 58.7 | 69.0 | |
| 22:15 | 15:00 | 61.5 | 63.6 | 58.1 | 67.9 | |
| 22:30 | 15:00 | 61.3 | 63.7 | 57.3 | 67.7 | |
| 22:45 | 15:00 | 60.6 | 63.3 | 56.0 | 68.1 | |
| Average 1500-2300 | | 64.4 | 66.0 | 62.2 | 68-77 | |

## Noise Survey Results

Date: Friday 9th - Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 32**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 61.5 | 64.2 | 56.8 | 67.1 | |
| 23:15 | 15:00 | 61.5 | 63.8 | 58.3 | 68.0 | |
| 23:30 | 15:00 | 60.9 | 63.5 | 56.2 | 67.7 | |
| 23:45 | 15:00 | 60.6 | 63.4 | 56.6 | 67.5 | |
| 00:00 | 15:00 | 60.7 | 63.5 | 55.5 | 67.5 | |
| 00:15 | 15:00 | 59.5 | 62.6 | 54.6 | 66.3 | |
| 00:30 | 15:00 | 59.2 | 62.3 | 53.3 | 67.4 | |
| 00:45 | 15:00 | 57.8 | 61.2 | 51.3 | 66.4 | |
| 01:00 | 15:00 | 58.7 | 61.9 | 51.0 | 66.5 | |
| 01:15 | 15:00 | 58.8 | 62.0 | 52.6 | 65.7 | |
| 01:30 | 15:00 | 59.2 | 62.7 | 51.1 | 67.8 | |
| 01:45 | 15:00 | 57.7 | 60.8 | 52.0 | 66.1 | |
| 02:00 | 15:00 | 58.8 | 62.2 | 52.4 | 68.3 | |
| 02:15 | 15:00 | 59.5 | 62.8 | 53.0 | 66.5 | |
| 02:30 | 15:00 | 58.4 | 62.0 | 50.2 | 67.9 | |
| 02:45 | 15:00 | 58.6 | 62.6 | 47.2 | 67.6 | |
| 03:00 | 15:00 | 57.4 | 61.0 | 48.6 | 65.5 | |
| 03:15 | 15:00 | 56.9 | 60.6 | 49.3 | 66.7 | |
| 03:30 | 15:00 | 57.2 | 60.6 | 51.2 | 67.4 | |
| 03:45 | 15:00 | 57.0 | 60.8 | 48.8 | 66.1 | |
| 04:00 | 15:00 | 57.3 | 61.2 | 50.5 | 68.0 | |
| 04:15 | 15:00 | 57.5 | 61.1 | 50.6 | 65.6 | |
| 04:30 | 15:00 | 58.5 | 61.7 | 51.9 | 71.1 | |
| 04:45 | 15:00 | 60.1 | 63.5 | 54.0 | 75.3 | |
| 05:00 | 15:00 | 59.4 | 62.6 | 52.2 | 76.5 | |
| 05:15 | 15:00 | 59.1 | 62.3 | 53.4 | 78.5 | |
| 05:30 | 15:00 | 59.6 | 63.0 | 54.5 | 68.6 | |
| 05:45 | 15:00 | 58.9 | 61.7 | 53.7 | 68.4 | |
| 06:00 | 15:00 | 59.3 | 62.0 | 55.5 | 65.7 | |
| 06:15 | 15:00 | 60.3 | 62.8 | 57.0 | 65.9 | |
| 06:30 | 15:00 | 62.5 | 64.9 | 59.5 | 67.8 | |
| 06:45 | 15:00 | 61.7 | 63.8 | 58.7 | 67.4 | |
| Average 2300-0700 | | 59.4 | 62.4 | 54.2 | 66-79 | |
| Average 0700-2300 | | 65.6 | 67.1 | 63.6 | 68-77 | |

## Noise Survey Results

Date: Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 33**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 59.4 | 61.5 | 56.2 | 75.1 | |
| 07:15 | 15:00 | 59.9 | 62.1 | 56.6 | 65.4 | |
| 07:30 | 15:00 | 62.0 | 64.4 | 58.8 | 68.4 | |
| 07:45 | 15:00 | 61.0 | 63.4 | 57.4 | 71.3 | |
| 08:00 | 15:00 | 60.5 | 62.6 | 57.0 | 73.5 | |
| 08:15 | 15:00 | 59.7 | 62.1 | 56.3 | 72.0 | |
| 08:30 | 15:00 | 58.6 | 60.8 | 55.4 | 68.9 | |
| 08:45 | 15:00 | 59.4 | 61.7 | 56.6 | 69.6 | |
| 09:00 | 15:00 | 60.4 | 62.5 | 57.4 | 71.2 | |
| 09:15 | 15:00 | 61.2 | 62.9 | 58.9 | 72.5 | |
| 09:30 | 15:00 | 62.0 | 63.6 | 60.0 | 73.3 | |
| 09:45 | 15:00 | 63.0 | 64.7 | 60.7 | 73.6 | |
| 10:00 | 15:00 | 63.5 | 65.2 | 61.4 | 78.6 | |
| 10:15 | 15:00 | 63.8 | 65.3 | 61.9 | 69.5 | |
| 10:30 | 15:00 | 64.1 | 65.6 | 62.1 | 71.2 | |
| 10:45 | 15:00 | 62.5 | 63.9 | 60.7 | 67.7 | |
| 11:00 | 15:00 | 62.6 | 63.9 | 61.1 | 67.2 | |
| 11:15 | 15:00 | 62.7 | 64.1 | 60.9 | 67.7 | |
| 11:30 | 15:00 | 63.0 | 64.3 | 61.4 | 68.9 | |
| 11:45 | 15:00 | 63.7 | 65.0 | 62.0 | 68.3 | |
| 12:00 | 15:00 | 64.1 | 65.7 | 62.0 | 70.2 | |
| 12:15 | 15:00 | 64.6 | 66.1 | 62.6 | 83.2 | |
| 12:30 | 15:00 | 64.9 | 66.3 | 62.8 | 73.1 | |
| 12:45 | 15:00 | 65.7 | 67.1 | 63.9 | 70.5 | |
| 13:00 | 15:00 | 64.2 | 65.9 | 62.1 | 74.0 | |
| 13:15 | 15:00 | 62.7 | 64.4 | 60.6 | 77.9 | |
| 13:30 | 15:00 | 63.3 | 64.9 | 61.4 | 74.4 | |
| 13:45 | 15:00 | 64.0 | 65.5 | 62.0 | 69.2 | Rain |
| 14:00 | 15:00 | 63.3 | 64.6 | 61.5 | 73.0 | Rain |
| 14:15 | 15:00 | 62.6 | 64.3 | 60.7 | 76.4 | Rain |
| 14:30 | 15:00 | 62.5 | 63.9 | 60.7 | 78.5 | Rain |
| 14:45 | 15:00 | 62.5 | 63.9 | 60.7 | 70.3 | Rain |
| Average 0700-1500 | | 62.6 | 64.3 | 60.5 | 65-83 | |

## Noise Survey Results

Date: Saturday 10th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 34**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 61.0 | 62.4 | 59.2 | 66.5 | Rain |
| 15:15 | 15:00 | 62.0 | 63.4 | 60.1 | 67.9 | Rain |
| 15:30 | 15:00 | 62.3 | 63.8 | 60.4 | 67.7 | |
| 15:45 | 15:00 | 62.9 | 64.3 | 61.0 | 70.1 | |
| 16:00 | 15:00 | 62.0 | 63.5 | 60.1 | 66.8 | |
| 16:15 | 15:00 | 61.5 | 63.4 | 58.8 | 66.5 | |
| 16:30 | 15:00 | 61.2 | 62.8 | 59.1 | 66.5 | |
| 16:45 | 15:00 | 61.6 | 63.1 | 59.5 | 66.7 | |
| 17:00 | 15:00 | 61.5 | 63.0 | 59.5 | 66.4 | |
| 17:15 | 15:00 | 60.7 | 62.3 | 58.7 | 65.7 | |
| 17:30 | 15:00 | 60.2 | 61.9 | 58.0 | 65.1 | |
| 17:45 | 15:00 | 60.6 | 62.4 | 58.4 | 65.8 | |
| 18:00 | 15:00 | 60.3 | 62.0 | 58.1 | 68.1 | |
| 18:15 | 15:00 | 60.4 | 62.1 | 58.2 | 65.4 | |
| 18:30 | 15:00 | 60.8 | 62.7 | 57.6 | 71.4 | Rain |
| 18:45 | 15:00 | 59.6 | 61.4 | 56.9 | 66.2 | |
| 19:00 | 15:00 | 60.2 | 62.0 | 57.6 | 66.3 | |
| 19:15 | 15:00 | 59.1 | 61.1 | 56.2 | 65.0 | Rain |
| 19:30 | 15:00 | 59.6 | 61.3 | 56.8 | 76.0 | |
| 19:45 | 15:00 | 59.7 | 62.1 | 56.2 | 66.8 | |
| 20:00 | 15:00 | 59.9 | 62.0 | 56.7 | 65.8 | |
| 20:15 | 15:00 | 58.9 | 61.0 | 55.7 | 68.7 | |
| 20:30 | 15:00 | 58.0 | 60.0 | 54.8 | 64.6 | |
| 20:45 | 15:00 | 58.7 | 61.0 | 55.3 | 64.9 | |
| 21:00 | 15:00 | 56.1 | 58.5 | 52.6 | 62.8 | |
| 21:15 | 15:00 | 56.9 | 58.9 | 54.2 | 63.5 | |
| 21:30 | 15:00 | 58.2 | 60.7 | 54.0 | 64.1 | |
| 21:45 | 15:00 | 58.7 | 60.7 | 55.9 | 64.4 | |
| 22:00 | 15:00 | 57.8 | 60.4 | 53.9 | 65.1 | |
| 22:15 | 15:00 | 58.1 | 60.3 | 54.7 | 64.5 | |
| 22:30 | 15:00 | 56.4 | 59.0 | 52.0 | 62.7 | |
| 22:45 | 15:00 | 55.8 | 58.7 | 50.8 | 62.6 | |
| Average 1500-2300 | | 59.9 | 61.7 | 57.4 | 63-76 | |

## Noise Survey Results

Date: Saturday 10th - Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 35**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 56.7 | 59.7 | 51.5 | 65.6 | |
| 23:15 | 15:00 | 56.9 | 59.6 | 52.7 | 63.5 | |
| 23:30 | 15:00 | 58.3 | 61.2 | 53.9 | 64.9 | |
| 23:45 | 15:00 | 58.6 | 61.0 | 55.0 | 64.9 | |
| 00:00 | 15:00 | 56.7 | 59.7 | 52.0 | 64.1 | |
| 00:15 | 15:00 | 57.5 | 60.4 | 52.5 | 64.7 | |
| 00:30 | 15:00 | 56.4 | 59.4 | 52.0 | 63.8 | |
| 00:45 | 15:00 | 55.2 | 58.4 | 49.9 | 62.3 | |
| 01:00 | 15:00 | 56.0 | 59.0 | 50.2 | 65.4 | |
| 01:15 | 15:00 | 55.9 | 59.2 | 50.2 | 64.6 | |
| 01:30 | 15:00 | 55.1 | 58.4 | 49.6 | 62.9 | |
| 01:45 | 15:00 | 55.5 | 58.5 | 51.0 | 62.5 | |
| 02:00 | 15:00 | 53.9 | 57.2 | 48.3 | 62.9 | |
| 02:15 | 15:00 | 56.3 | 59.3 | 51.5 | 64.4 | |
| 02:30 | 15:00 | 57.1 | 60.3 | 52.1 | 64.7 | |
| 02:45 | 15:00 | 54.9 | 58.6 | 48.2 | 63.7 | |
| 03:00 | 15:00 | 55.0 | 58.7 | 46.7 | 64.3 | |
| 03:15 | 15:00 | 55.8 | 59.2 | 49.0 | 64.8 | |
| 03:30 | 15:00 | 56.3 | 59.6 | 50.0 | 64.5 | |
| 03:45 | 15:00 | 55.9 | 59.6 | 45.4 | 66.1 | |
| 04:00 | 15:00 | 57.1 | 61.1 | 48.4 | 67.8 | |
| 04:15 | 15:00 | 56.3 | 60.0 | 48.0 | 63.8 | |
| 04:30 | 15:00 | 56.7 | 60.3 | 49.1 | 64.0 | |
| 04:45 | 15:00 | 55.2 | 58.8 | 47.2 | 62.8 | |
| 05:00 | 15:00 | 56.0 | 59.4 | 48.9 | 64.1 | |
| 05:15 | 15:00 | 57.9 | 60.9 | 53.7 | 65.2 | |
| 05:30 | 15:00 | 59.6 | 61.9 | 56.4 | 65.2 | |
| 05:45 | 15:00 | 59.3 | 62.0 | 55.2 | 64.8 | |
| 06:00 | 15:00 | 59.0 | 61.7 | 55.0 | 65.4 | |
| 06:15 | 15:00 | 60.5 | 62.9 | 57.4 | 66.4 | |
| 06:30 | 15:00 | 60.6 | 63.1 | 56.8 | 66.5 | |
| 06:45 | 15:00 | 61.0 | 63.6 | 57.4 | 67.8 | |
| Average 2300-0700 | | 57.3 | 60.3 | 52.6 | 62-68 | |
| Average 0700-2300 | | 60.7 | 62.5 | 58.4 | 63-83 | |

## Noise Survey Results

Date: Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 36**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 59.0 | 61.3 | 55.6 | 66.0 | |
| 07:15 | 15:00 | 59.6 | 61.4 | 56.8 | 65.0 | |
| 07:30 | 15:00 | 60.8 | 63.2 | 57.6 | 67.2 | |
| 07:45 | 15:00 | 60.8 | 62.8 | 58.1 | 66.7 | |
| 08:00 | 15:00 | 60.3 | 62.2 | 57.8 | 66.1 | |
| 08:15 | 15:00 | 61.1 | 63.1 | 58.5 | 67.7 | |
| 08:30 | 15:00 | 62.1 | 63.8 | 59.7 | 68.8 | |
| 08:45 | 15:00 | 62.2 | 64.1 | 59.6 | 70.9 | |
| 09:00 | 15:00 | 62.0 | 63.6 | 59.8 | 67.7 | |
| 09:15 | 15:00 | 63.5 | 65.1 | 61.3 | 69.0 | |
| 09:30 | 15:00 | 63.2 | 64.8 | 61.3 | 68.3 | |
| 09:45 | 15:00 | 61.5 | 63.0 | 59.7 | 67.3 | |
| 10:00 | 15:00 | 61.8 | 63.3 | 59.8 | 66.1 | |
| 10:15 | 15:00 | 61.4 | 63.0 | 59.2 | 69.8 | |
| 10:30 | 15:00 | 62.3 | 63.7 | 60.4 | 67.4 | |
| 10:45 | 15:00 | 63.0 | 64.2 | 61.4 | 69.1 | |
| 11:00 | 15:00 | 62.7 | 64.1 | 60.9 | 67.4 | |
| 11:15 | 15:00 | 62.4 | 63.8 | 60.6 | 66.9 | |
| 11:30 | 15:00 | 63.3 | 64.7 | 61.5 | 67.9 | |
| 11:45 | 15:00 | 62.7 | 64.1 | 60.9 | 67.5 | |
| 12:00 | 15:00 | 63.1 | 64.5 | 61.1 | 67.4 | |
| 12:15 | 15:00 | 62.8 | 64.2 | 61.0 | 67.2 | |
| 12:30 | 15:00 | 63.3 | 64.6 | 61.5 | 68.9 | |
| 12:45 | 15:00 | 62.6 | 63.9 | 61.1 | 66.8 | |
| 13:00 | 15:00 | 61.9 | 63.2 | 60.1 | 66.3 | |
| 13:15 | 15:00 | 62.1 | 63.6 | 59.9 | 67.4 | |
| 13:30 | 15:00 | 63.8 | 65.5 | 61.6 | 68.5 | |
| 13:45 | 15:00 | 64.5 | 66.1 | 62.1 | 70.8 | |
| 14:00 | 15:00 | 64.8 | 66.3 | 62.9 | 69.1 | |
| 14:15 | 15:00 | 64.6 | 66.0 | 62.8 | 69.2 | |
| 14:30 | 15:00 | 64.0 | 65.3 | 62.5 | 68.4 | |
| 14:45 | 15:00 | 63.9 | 65.4 | 61.9 | 71.2 | |
| Average 0700-1500 | | 62.6 | 64.1 | 60.5 | 65-71 | |

## Noise Survey Results

Date: Sunday 11th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 37**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 15:00 | 15:00 | 63.1 | 64.5 | 61.3 | 67.3 | |
| 15:15 | 15:00 | 63.5 | 64.9 | 61.7 | 68.0 | |
| 15:30 | 15:00 | 65.5 | 67.4 | 62.9 | 70.6 | |
| 15:45 | 15:00 | 66.1 | 67.5 | 64.4 | 74.8 | |
| 16:00 | 15:00 | 65.4 | 66.8 | 63.8 | 69.9 | |
| 16:15 | 15:00 | 67.5 | 69.2 | 64.9 | 73.4 | |
| 16:30 | 15:00 | 67.0 | 68.7 | 64.8 | 72.5 | |
| 16:45 | 15:00 | 67.8 | 69.3 | 66.0 | 72.2 | |
| 17:00 | 15:00 | 66.7 | 68.0 | 64.8 | 70.9 | |
| 17:15 | 15:00 | 65.4 | 67.0 | 63.6 | 70.3 | |
| 17:30 | 15:00 | 65.5 | 67.1 | 63.4 | 70.3 | |
| 17:45 | 15:00 | 65.1 | 66.6 | 63.1 | 70.4 | |
| 18:00 | 15:00 | 63.6 | 65.0 | 61.8 | 68.0 | |
| 18:15 | 15:00 | 63.7 | 65.2 | 61.8 | 68.1 | |
| 18:30 | 15:00 | 63.9 | 65.8 | 61.1 | 70.0 | |
| 18:45 | 15:00 | 63.5 | 65.5 | 61.2 | 69.3 | |
| 19:00 | 15:00 | 64.2 | 65.9 | 62.0 | 68.8 | |
| 19:15 | 15:00 | 63.2 | 64.7 | 61.4 | 68.3 | |
| 19:30 | 15:00 | 63.6 | 65.2 | 61.5 | 68.4 | |
| 19:45 | 15:00 | 61.8 | 63.4 | 59.7 | 66.5 | |
| 20:00 | 15:00 | 63.5 | 65.3 | 60.9 | 69.3 | |
| 20:15 | 15:00 | 63.8 | 65.7 | 61.2 | 69.5 | |
| 20:30 | 15:00 | 62.2 | 64.0 | 59.9 | 67.8 | |
| 20:45 | 15:00 | 62.0 | 63.7 | 59.6 | 67.2 | |
| 21:00 | 15:00 | 62.3 | 64.6 | 59.0 | 68.6 | |
| 21:15 | 15:00 | 61.8 | 63.8 | 59.3 | 67.9 | |
| 21:30 | 15:00 | 61.4 | 63.2 | 59.0 | 66.8 | |
| 21:45 | 15:00 | 60.5 | 62.7 | 57.4 | 66.1 | |
| 22:00 | 15:00 | 60.6 | 62.8 | 56.9 | 67.8 | |
| 22:15 | 15:00 | 60.8 | 63.3 | 56.9 | 67.7 | |
| 22:30 | 15:00 | 59.2 | 61.8 | 55.2 | 66.3 | |
| 22:45 | 15:00 | 58.8 | 61.1 | 55.0 | 65.8 | |
| Average 1500-2300 | | 64.1 | 65.7 | 61.8 | 66-75 | |

## Noise Survey Results

Date: Sunday 11th - Monday 12th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 38**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 23:00 | 15:00 | 59.0 | 62.0 | 54.8 | 66.4 | |
| 23:15 | 15:00 | 59.1 | 61.5 | 55.7 | 66.0 | |
| 23:30 | 15:00 | 57.9 | 61.0 | 53.0 | 65.0 | |
| 23:45 | 15:00 | 57.5 | 60.3 | 52.7 | 64.5 | |
| 00:00 | 15:00 | 56.6 | 59.8 | 51.6 | 63.4 | |
| 00:15 | 15:00 | 56.5 | 59.4 | 51.8 | 63.2 | |
| 00:30 | 15:00 | 55.7 | 59.1 | 50.6 | 63.9 | |
| 00:45 | 15:00 | 54.4 | 57.9 | 49.1 | 63.4 | |
| 01:00 | 15:00 | 54.3 | 57.8 | 47.4 | 64.8 | |
| 01:15 | 15:00 | 53.7 | 56.8 | 48.8 | 61.7 | |
| 01:30 | 15:00 | 53.0 | 56.5 | 46.2 | 62.3 | |
| 01:45 | 15:00 | 52.9 | 56.0 | 48.1 | 62.7 | |
| 02:00 | 15:00 | 53.0 | 56.6 | 46.7 | 61.8 | |
| 02:15 | 15:00 | 53.4 | 56.7 | 47.5 | 61.4 | |
| 02:30 | 15:00 | 53.2 | 56.7 | 47.6 | 62.3 | |
| 02:45 | 15:00 | 52.9 | 56.3 | 46.5 | 60.7 | |
| 03:00 | 15:00 | 53.6 | 56.9 | 47.7 | 64.0 | |
| 03:15 | 15:00 | 53.7 | 57.0 | 49.1 | 61.9 | |
| 03:30 | 15:00 | 55.1 | 58.3 | 48.8 | 62.5 | |
| 03:45 | 15:00 | 55.4 | 58.3 | 51.2 | 62.0 | |
| 04:00 | 15:00 | 55.2 | 58.0 | 51.5 | 62.1 | |
| 04:15 | 15:00 | 55.7 | 58.3 | 51.7 | 63.6 | |
| 04:30 | 15:00 | 57.2 | 59.5 | 54.4 | 64.3 | |
| 04:45 | 15:00 | 57.3 | 59.5 | 54.6 | 63.6 | |
| 05:00 | 15:00 | 57.8 | 60.0 | 55.2 | 63.6 | |
| 05:15 | 15:00 | 58.2 | 60.4 | 55.8 | 65.0 | |
| 05:30 | 15:00 | 58.5 | 60.6 | 56.0 | 64.3 | |
| 05:45 | 15:00 | 59.1 | 60.9 | 57.1 | 63.7 | |
| 06:00 | 15:00 | 60.2 | 62.3 | 58.1 | 65.4 | |
| 06:15 | 15:00 | 60.9 | 62.7 | 59.0 | 66.9 | |
| 06:30 | 15:00 | 61.2 | 62.9 | 59.6 | 65.4 | |
| 06:45 | 15:00 | 59.9 | 61.5 | 58.5 | 64.4 | |
| Average 2300-0700 | | 57.0 | 59.5 | 53.9 | 61-67 | |
| Average 0700-2300 | | 63.4 | 65.0 | 61.2 | 65-75 | |

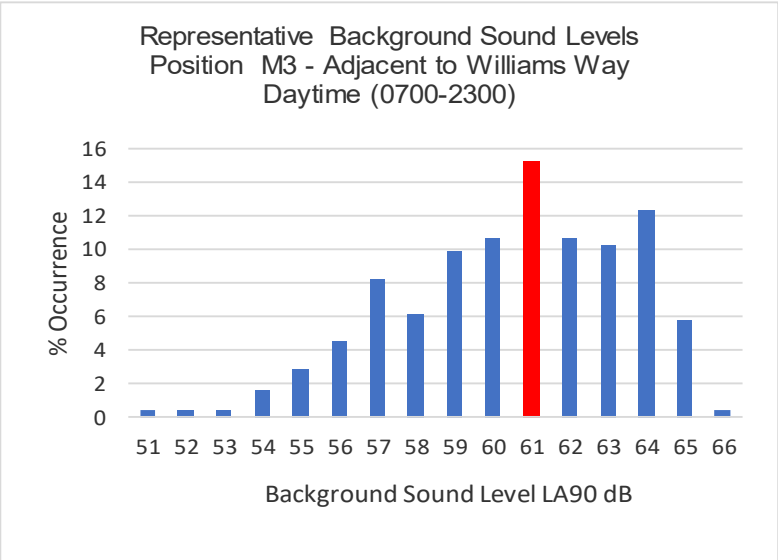
## Noise Survey Results

Date: Monday 12th December 2022
Location: Mersey Estuary, Frodsham, Runcorn, Cheshire **TABLE 39**
Client: Axis
Project: Solar Farm & BESS Facility
Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
Calibration: 94dB

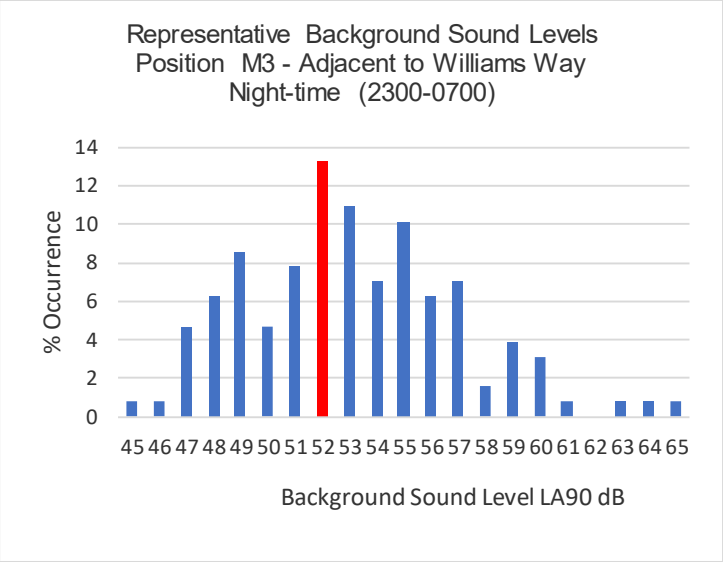
| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmax (dB) | Observations |
|---|---|---|---|---|---|---|
| 07:00 | 15:00 | 58.7 | 60.1 | 57.0 | 63.8 | |
| 07:15 | 15:00 | 58.2 | 59.4 | 56.8 | 62.5 | |
| 07:30 | 15:00 | 58.9 | 60.2 | 57.4 | 64.9 | |
| 07:45 | 15:00 | 58.0 | 59.4 | 56.3 | 63.2 | |
| 08:00 | 15:00 | 57.2 | 58.7 | 55.6 | 61.9 | |
| 08:15 | 15:00 | 57.0 | 58.7 | 54.1 | 62.8 | |
| 08:30 | 15:00 | 57.0 | 58.5 | 55.2 | 67.9 | |
| 08:45 | 15:00 | 58.0 | 59.6 | 56.1 | 62.6 | |
| 09:00 | 15:00 | 60.7 | 62.2 | 59.0 | 65.5 | |
| 09:15 | 15:00 | 60.2 | 61.6 | 58.5 | 65.6 | |
| 09:30 | 15:00 | 60.8 | 62.3 | 59.0 | 66.3 | |
| 09:45 | 15:00 | 61.5 | 63.0 | 59.6 | 66.1 | |
| 10:00 | 15:00 | 61.9 | 63.4 | 60.0 | 66.7 | |
| 10:15 | 15:00 | 61.9 | 63.2 | 60.3 | 66.2 | |
| 10:30 | 15:00 | 60.9 | 62.4 | 58.7 | 67.7 | |
| 10:45 | 15:00 | 59.7 | 61.3 | 57.6 | 65.0 | |
| 11:00 | 15:00 | 59.2 | 60.8 | 56.9 | 64.4 | |
| 11:15 | 15:00 | 59.6 | 61.4 | 57.2 | 65.9 | |
| 11:30 | 15:00 | 60.6 | 62.5 | 57.9 | 65.5 | |
| 11:45 | 15:00 | 60.1 | 61.9 | 57.7 | 68.9 | |
| 12:00 | 15:00 | 59.9 | 60.9 | 58.7 | 63.5 | |
| Average 0700-1215 | | 59.7 | 61.2 | 57.8 | 62-69 | |

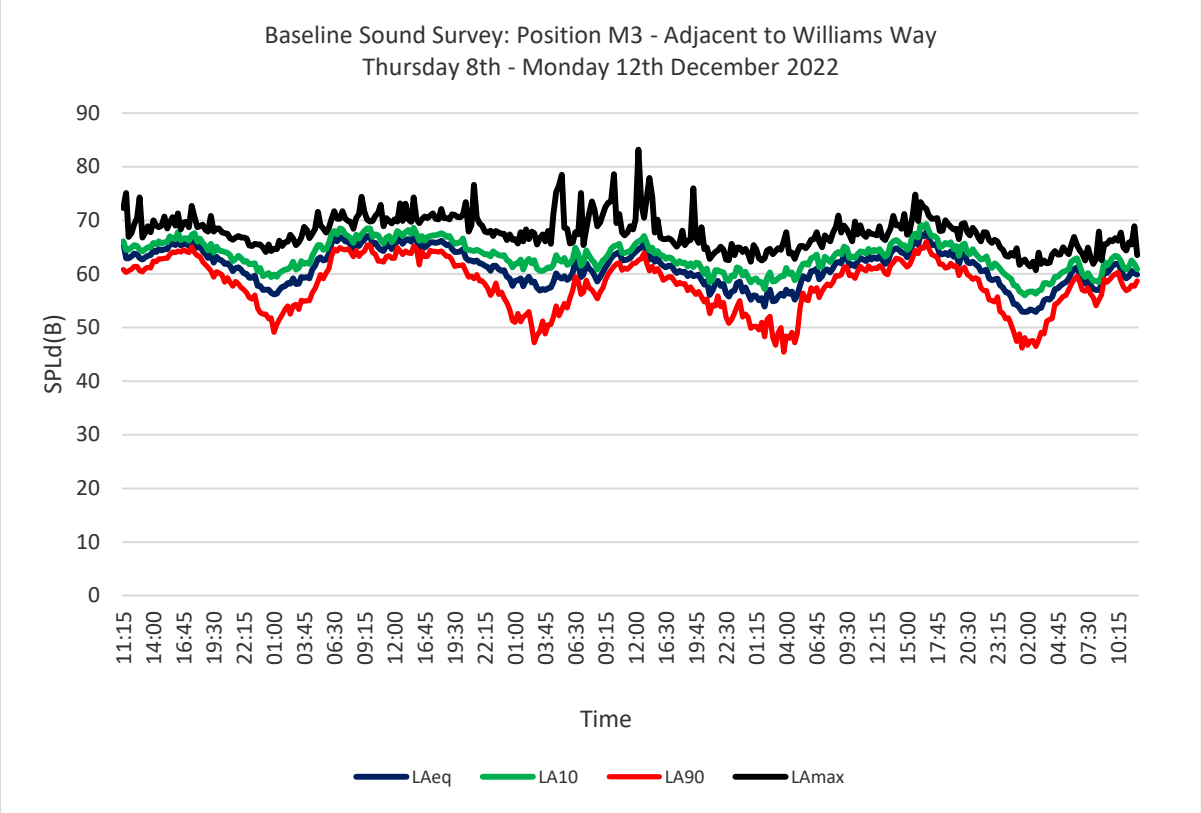
| | | | | | |
|---|---|---|---|---|---|
| **Overall Average** | **57.6** | **60.1** | **54** | **61-79** | |
| **Overall Average** | **63.4** | **65.0** | **61.3** | **63-83** | **Levels exclude rain periods** |

| LA90 | % Occurrence |
|---|---|
| 51 | 0.4 |
| 52 | 0.4 |
| 53 | 0.4 |
| 54 | 1.6 |
| 55 | 2.9 |
| 56 | 4.5 |
| 57 | 8.2 |
| 58 | 6.2 |
| 59 | 9.9 |
| 60 | 10.7 |
| **61** | **15.2** |
| 62 | 10.7 |
| 63 | 10.3 |
| 64 | 12.3 |
| 65 | 5.8 |
| 66 | 0.4 |



| LA90 | % Occurrence |
|---|---|
| 45 | 0.8 |
| 46 | 0.8 |
| 47 | 4.7 |
| 48 | 6.3 |
| 49 | 8.6 |
| 50 | 4.7 |
| 51 | 7.8 |
| **52** | **13.3** |
| 53 | 10.9 |
| 54 | 7.0 |
| 55 | 10.2 |
| 56 | 6.3 |
| 57 | 7.0 |
| 58 | 1.6 |
| 59 | 3.9 |
| 60 | 3.1 |
| 61 | 0.8 |
| 62 | 0.0 |
| 63 | 0.8 |
| 64 | 0.8 |
| 65 | 0.8 |



**M1 = Rear of Saltworks Close**

**M2 = Adjacent to Wayford Mews**

**M3 = Adjacent to Williams Way**

| | M1 Daytime | M1 Night-time | M2 Daytime | M2 Night-time | M3 Daytime | M3 Night-time |
|---|---|---|---|---|---|---|
| Total number of values | 248 | 128 | 248 | 128 | 243 | 128 |
| Number of excluded values | 0 | 0 | 0 | 0 | 0 | 0 |
| Number of binned values | 248 | 128 | 248 | 128 | 243 | 128 |
| Minimum | 47 | 42 | 54 | 48 | 51 | 45 |
| 25% Percentile | 56.25 | 48 | 61 | 52 | 59 | 50 |
| Median | **60** | **52** | **64** | **55** | **61** | **53** |
| 75% Percentile | 63 | 55 | 66 | 58 | 63 | 55.75 |
| Maximum | 68 | 64 | 69 | 67 | 66 | 65 |
| Most common place (\|mode) | **61** | **53** | **65** | **54** | **61** | **52** |
| Mean | **60** | **52** | **64** | **55** | **61** | **53** |
| Std. Deviation | 4.5 | 4.9 | 3.1 | 4.0 | 3.0 | 3.9 |
| Std. Error of Mean | 0.3 | 0.4 | 0.2 | 0.4 | 0.2 | 0.3 |
| Lower 95% CI of mean | 58.9 | 50.8 | 63.3 | 54.5 | 60.1 | 52.4 |
| Upper 95% CI of mean | 60.1 | 52.5 | 64.0 | 55.9 | 60.9 | 53.8 |

# Weather Conditions During Baseline Survey

| | | Temp | Wind | Wind | | |
|---|---|---|---|---|---|---|
| Date | Time | Out | Speed | Dir | Bar | Rain |
| 08/12/2022 | 11:30 | 1.6 | 0.4 | SW | 772.6 | 0 |
| 08/12/2022 | 11:40 | 1.6 | 0 | --- | 772.5 | 0 |
| 08/12/2022 | 11:50 | 1.5 | 0.5 | ESE | 772.5 | 0 |
| 08/12/2022 | 12:00 | 1.1 | 0.3 | E | 772.5 | 0 |
| 08/12/2022 | 12:10 | 1.1 | 0 | --- | 772.5 | 0 |
| 08/12/2022 | 12:20 | 1.7 | 0 | --- | 772.5 | 0 |
| 08/12/2022 | 12:30 | 2.2 | 0 | --- | 772.4 | 0 |
| 08/12/2022 | 12:40 | 2.4 | 0 | --- | 772.3 | 0 |
| 08/12/2022 | 12:50 | 2.6 | 0 | --- | 772.2 | 0 |
| 08/12/2022 | 13:00 | 2.8 | 0 | --- | 772.2 | 0 |
| 08/12/2022 | 13:10 | 2.2 | 0.4 | SW | 772.2 | 0 |
| 08/12/2022 | 13:20 | 2.1 | 0.4 | NNW | 772.1 | 0 |
| 08/12/2022 | 13:30 | 2.1 | 0 | --- | 772.1 | 0 |
| 08/12/2022 | 13:40 | 1.9 | 0 | --- | 772 | 0 |
| 08/12/2022 | 13:50 | 2 | 0 | --- | 771.8 | 0 |
| 08/12/2022 | 14:00 | 2.1 | 0.6 | ESE | 771.7 | 0 |
| 08/12/2022 | 14:10 | 2.1 | 0.4 | E | 771.6 | 0 |
| 08/12/2022 | 14:20 | 2.1 | 0.7 | E | 771.5 | 0 |
| 08/12/2022 | 14:30 | 2.1 | 0 | --- | 771.8 | 0 |
| 08/12/2022 | 14:40 | 2.1 | 0.4 | NE | 771.5 | 0 |
| 08/12/2022 | 14:50 | 1.9 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 15:00 | 2 | 0.9 | WSW | 771.3 | 0 |
| 08/12/2022 | 15:10 | 2.4 | 1.8 | S | 771.2 | 0 |
| 08/12/2022 | 15:20 | 2.4 | 0.4 | ESE | 771.2 | 0 |
| 08/12/2022 | 15:30 | 2.2 | 0.2 | SE | 771.1 | 0 |
| 08/12/2022 | 15:40 | 2.1 | 0 | --- | 771.1 | 0 |
| 08/12/2022 | 15:50 | 2 | 0.3 | E | 771 | 0 |
| 08/12/2022 | 16:00 | 1.6 | 0 | --- | 771.2 | 0 |
| 08/12/2022 | 16:10 | 1.2 | 0 | --- | 771.2 | 0 |
| 08/12/2022 | 16:20 | 1.1 | 0 | --- | 771.1 | 0 |
| 08/12/2022 | 16:30 | 1.1 | 0 | --- | 771.1 | 0 |
| 08/12/2022 | 16:40 | 1.1 | 0 | --- | 771 | 0 |
| 08/12/2022 | 16:50 | 0.9 | 0 | --- | 771.2 | 0 |
| 08/12/2022 | 17:00 | 0.7 | 0 | --- | 771.2 | 0 |
| 08/12/2022 | 17:10 | 0.7 | 0 | --- | 771.2 | 0 |
| 08/12/2022 | 17:20 | -0.2 | 0 | --- | 771.2 | 0 |
| 08/12/2022 | 17:30 | -0.4 | 0 | --- | 771.2 | 0 |
| 08/12/2022 | 17:40 | -0.3 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 17:50 | -0.7 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 18:00 | -0.7 | 0 | --- | 771.5 | 0 |
| 08/12/2022 | 18:10 | -0.4 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 18:20 | -0.9 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 18:30 | -0.5 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 18:40 | -0.2 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 18:50 | 0 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 19:00 | 0.2 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 19:10 | 0.4 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 19:20 | 0.2 | 0 | --- | 771.4 | 0 |
| | | Temp | Wind | Wind | | |
| Date | Time | Out | Speed | Dir | Bar | Rain |
| 08/12/2022 | 19:30 | 0.3 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 19:40 | 0.3 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 19:50 | 0.2 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 20:00 | 0.1 | 0 | --- | 771.2 | 0 |
| 08/12/2022 | 20:10 | 0.3 | 0 | --- | 771.1 | 0 |
| 08/12/2022 | 20:20 | 0.2 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 20:30 | 0.3 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 20:40 | 0.2 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 20:50 | 0.3 | 0 | --- | 771.5 | 0 |
| 08/12/2022 | 21:00 | 0.7 | 0.6 | SSW | 771.5 | 0 |
| 08/12/2022 | 21:10 | 0.6 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 21:20 | 0.4 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 21:30 | 0.3 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 21:40 | -0.1 | 0.5 | NW | 771.5 | 0 |
| 08/12/2022 | 21:50 | -0.2 | 0 | --- | 771.5 | 0 |
| 08/12/2022 | 22:00 | -0.2 | 0 | --- | 771.5 | 0 |
| 08/12/2022 | 22:10 | -0.1 | 0 | --- | 771.6 | 0 |
| 08/12/2022 | 22:20 | 0.2 | 0 | --- | 771.6 | 0 |
| 08/12/2022 | 22:30 | 0.4 | 0 | --- | 771.5 | 0 |
| 08/12/2022 | 22:40 | 0.2 | 0 | --- | 771.5 | 0 |
| 08/12/2022 | 22:50 | 0.3 | 0 | --- | 771.5 | 0 |
| 08/12/2022 | 23:00 | 0.3 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 23:10 | 0.4 | 0.4 | NW | 771.5 | 0 |
| 08/12/2022 | 23:20 | 0.5 | 0 | --- | 771.4 | 0 |
| 08/12/2022 | 23:30 | 0.6 | 0 | --- | 771.3 | 0 |
| 08/12/2022 | 23:40 | 0.8 | 0.3 | NE | 771.4 | 0 |
| 08/12/2022 | 23:50 | 0.5 | 0.2 | E | 771.4 | 0 |
| 09/12/2022 | 00:00 | 0.3 | 0 | --- | 771.4 | 0 |
| 09/12/2022 | 00:10 | 0.5 | 0.3 | ESE | 771.3 | 0 |
| 09/12/2022 | 00:20 | 1.3 | 0 | --- | 771.4 | 0 |
| 09/12/2022 | 00:30 | 1.3 | 0 | --- | 771.4 | 0 |
| 09/12/2022 | 00:40 | 1.5 | 0.1 | NNW | 771.3 | 0 |
| 09/12/2022 | 00:50 | 1.6 | 0 | --- | 771.3 | 0 |
| 09/12/2022 | 01:00 | 1.7 | 0 | --- | 771.3 | 0 |
| 09/12/2022 | 01:10 | 1.3 | 0 | --- | 771.2 | 0 |
| 09/12/2022 | 01:20 | 1.2 | 0.5 | E | 771.3 | 0 |
| 09/12/2022 | 01:30 | 0.9 | 0 | --- | 771.3 | 0 |
| 09/12/2022 | 01:40 | 0.8 | 0.6 | ESE | 771.3 | 0 |
| 09/12/2022 | 01:50 | 1 | 0.7 | ESE | 771.3 | 0 |
| 09/12/2022 | 02:00 | 1.1 | 0 | --- | 771.2 | 0 |
| 09/12/2022 | 02:10 | 0.9 | 0.4 | NE | 771.1 | 0 |
| 09/12/2022 | 02:20 | 0.9 | 0.5 | NNW | 771.1 | 0 |
| 09/12/2022 | 02:30 | 0.9 | 0.9 | N | 771 | 0 |
| 09/12/2022 | 02:40 | 0.8 | 0 | --- | 771 | 0 |
| 09/12/2022 | 02:50 | 0.9 | 0.4 | E | 771.1 | 0 |
| 09/12/2022 | 03:00 | 0.6 | 0.3 | ESE | 771.1 | 0 |

| | | | Hi | Wind | | |
|---|---|---|---|---|---|---|
| Date | Time | | Speed | Dir | Bar | Rain |
| 09/12/2022 | 03:10 | 0.4 | 0.4 | ENE | 771 | 0 |
| 09/12/2022 | 03:20 | 0.1 | 0.6 | ENE | 771 | 0 |
| 09/12/2022 | 03:30 | -0.6 | 0.3 | ENE | 771 | 0 |
| 09/12/2022 | 03:40 | -0.8 | 0 | --- | 771 | 0 |
| 09/12/2022 | 03:50 | -1 | 0 | --- | 771 | 0 |
| 09/12/2022 | 04:00 | -1 | 0 | --- | 770.9 | 0 |
| 09/12/2022 | 04:10 | -1 | 0.4 | ENE | 770.8 | 0 |
| 09/12/2022 | 04:20 | -1.5 | 0 | --- | 770.8 | 0 |
| 09/12/2022 | 04:30 | -1.9 | 0 | --- | 770.8 | 0 |
| 09/12/2022 | 04:40 | -2 | 0.3 | ENE | 770.8 | 0 |
| 09/12/2022 | 04:50 | -1.9 | 0.4 | ENE | 770.8 | 0 |
| 09/12/2022 | 05:00 | -2.2 | 0.5 | SE | 770.8 | 0 |
| 09/12/2022 | 05:10 | -2.6 | 0 | --- | 770.9 | 0 |
| 09/12/2022 | 05:20 | -2.9 | 0 | --- | 770.9 | 0 |
| 09/12/2022 | 05:30 | -3 | 0 | --- | 770.8 | 0 |
| 09/12/2022 | 05:40 | -3.2 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 05:50 | -3.5 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 06:00 | -3.6 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 06:10 | -3.1 | 0.5 | SSW | 770.7 | 0 |
| 09/12/2022 | 06:20 | -2.3 | 0.7 | SW | 770.7 | 0 |
| 09/12/2022 | 06:30 | -2 | 0.8 | SW | 770.7 | 0 |
| 09/12/2022 | 06:40 | -2.6 | 0 | --- | 770.6 | 0 |
| 09/12/2022 | 06:50 | -2.9 | 0 | --- | 770.6 | 0 |
| 09/12/2022 | 07:00 | -3.2 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 07:10 | -3.7 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 07:20 | -3.9 | 0 | --- | 770.6 | 0 |
| 09/12/2022 | 07:30 | -3.7 | 0 | --- | 770.6 | 0 |
| 09/12/2022 | 07:40 | -4 | 0 | --- | 770.6 | 0 |
| 09/12/2022 | 07:50 | -4.3 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 08:00 | -4.4 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 08:10 | -4.2 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 08:20 | -4.1 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 08:30 | -4 | 0 | --- | 770.7 | 0 |
| 09/12/2022 | 08:40 | -4.2 | 0 | --- | 770.6 | 0 |
| 09/12/2022 | 08:50 | -4.2 | 0 | --- | 770.6 | 0 |
| 09/12/2022 | 09:00 | -4.3 | 0 | --- | 770.5 | 0 |
| 09/12/2022 | 09:10 | -4.1 | 0.9 | SSW | 770.5 | 0 |
| 09/12/2022 | 09:20 | -2.4 | 1.3 | SW | 770.5 | 0 |
| 09/12/2022 | 09:30 | -2.6 | 0 | --- | 770.5 | 0 |
| 09/12/2022 | 09:40 | -2.9 | 0 | --- | 770.5 | 0 |
| 09/12/2022 | 09:50 | -2.7 | 0 | --- | 770.5 | 0 |
| 09/12/2022 | 10:00 | -2.5 | 0 | --- | 770.5 | 0 |
| 09/12/2022 | 10:10 | -1.9 | 0.4 | SW | 770.6 | 0 |
| 09/12/2022 | 10:20 | -1.5 | 0.5 | SSW | 770.6 | 0 |
| 09/12/2022 | 10:30 | -0.8 | 0 | --- | 770.3 | 0 |
| 09/12/2022 | 10:40 | -0.2 | 1.8 | S | 770.2 | 0 |
| 09/12/2022 | 10:50 | 0.1 | 0.4 | S | 770.3 | 0 |
| 09/12/2022 | 11:00 | 0.1 | 0 | --- | 770.2 | 0 |
| | | | Hi | Wind | | |
| Date | Time | | Speed | Dir | Bar | Rain |
| 09/12/2022 | 11:10 | 0.4 | 0.4 | ESE | 770.2 | 0 |
| 09/12/2022 | 11:20 | 0.8 | 0.9 | ESE | 770.4 | 0 |
| 09/12/2022 | 11:30 | 0.7 | 1.8 | E | 770.3 | 0.4 |
| 09/12/2022 | 11:40 | 0.7 | 0.4 | ESE | 770.1 | 0.6 |
| 09/12/2022 | 11:50 | 0.9 | 0.3 | ESE | 770.1 | 0.2 |
| 09/12/2022 | 12:00 | 1.3 | 0 | --- | 770.1 | 0 |
| 09/12/2022 | 12:10 | 2.4 | 0.3 | NW | 770.1 | 0 |
| 09/12/2022 | 12:20 | 2.3 | 0.5 | NW | 769.8 | 0 |
| 09/12/2022 | 12:30 | 1.9 | 0 | --- | 769.8 | 0 |
| 09/12/2022 | 12:40 | 2.2 | 0 | --- | 769.7 | 0 |
| 09/12/2022 | 12:50 | 3.1 | 0.4 | ENE | 769.8 | 0 |
| 09/12/2022 | 13:00 | 3.3 | 0.2 | E | 769.5 | 0 |
| 09/12/2022 | 13:10 | 3.4 | 0.9 | ESE | 769.8 | 0 |
| 09/12/2022 | 13:20 | 3.3 | 0.6 | E | 769.6 | 0 |
| 09/12/2022 | 13:30 | 3.2 | 0.4 | E | 769.6 | 0 |
| 09/12/2022 | 13:40 | 3.2 | 0.9 | ENE | 769.7 | 0 |
| 09/12/2022 | 13:50 | 2.9 | 0.8 | E | 769.5 | 0 |
| 09/12/2022 | 14:00 | 2.9 | 0 | --- | 769.5 | 0 |
| 09/12/2022 | 14:10 | 2.9 | 0.3 | E | 769.3 | 0.2 |
| 09/12/2022 | 14:20 | 2.7 | 0 | --- | 769.3 | 0.2 |
| 09/12/2022 | 14:30 | 2.6 | 0.1 | E | 769.3 | 0.6 |
| 09/12/2022 | 14:40 | 2.2 | 0 | --- | 769.4 | 0.4 |
| 09/12/2022 | 14:50 | 2.1 | 0.4 | ESE | 769.5 | 0.4 |
| 09/12/2022 | 15:00 | 2.1 | 0.9 | ESE | 769.6 | 0.2 |
| 09/12/2022 | 15:10 | 1.8 | 1.3 | ESE | 769.6 | 0.8 |
| 09/12/2022 | 15:20 | 1.4 | 0.9 | ENE | 769.6 | 0.8 |
| 09/12/2022 | 15:30 | 1.3 | 0.4 | E | 769.6 | 0.8 |
| 09/12/2022 | 15:40 | 1.2 | 1.3 | E | 769.5 | 0.6 |
| 09/12/2022 | 15:50 | 1.1 | 1.2 | S | 769.4 | 0.2 |
| 09/12/2022 | 16:00 | 1.1 | 1.1 | S | 769.4 | 0 |
| 09/12/2022 | 16:10 | 1 | 1 | SE | 769.4 | 0 |
| 09/12/2022 | 16:20 | 0.9 | 0.9 | NE | 769.3 | 0 |
| 09/12/2022 | 16:30 | 0.7 | 0.7 | W | 769.3 | 0 |
| 09/12/2022 | 16:40 | 0.5 | 0 | --- | 769.3 | 0 |
| 09/12/2022 | 16:50 | 0.4 | 0 | --- | 769.5 | 0 |
| 09/12/2022 | 17:00 | 0.6 | 0.5 | ENE | 769.4 | 0 |
| 09/12/2022 | 17:10 | 0.7 | 0.6 | E | 769.5 | 0 |
| 09/12/2022 | 17:20 | 0.8 | 0.6 | W | 769.5 | 0 |
| 09/12/2022 | 17:30 | 0.7 | 0.8 | WSW | 769.4 | 0 |
| 09/12/2022 | 17:40 | 0.5 | 0.4 | E | 769.4 | 0 |
| 09/12/2022 | 17:50 | 0.7 | 0.9 | E | 769.4 | 0 |
| 09/12/2022 | 18:00 | 0.6 | 0.7 | WNW | 769.5 | 0 |
| 09/12/2022 | 18:10 | 0.3 | 0.7 | ESE | 769.3 | 0 |
| 09/12/2022 | 18:20 | 0.2 | 0.6 | NE | 769.4 | 0 |
| 09/12/2022 | 18:30 | -0.1 | 0.4 | NE | 769.3 | 0 |
| 09/12/2022 | 18:40 | -0.1 | 0.9 | ENE | 769.3 | 0 |
| 09/12/2022 | 18:50 | -0.2 | 0 | --- | 769.3 | 0 |
| 09/12/2022 | 19:00 | -0.5 | 0.4 | SE | 769.3 | 0 |

| | | | Hi | Wind | | |
|---|---|---|---|---|---|---|
| **Date** | **Time** | | **Speed** | **Dir** | **Bar** | **Rain** |
| 09/12/2022 | 19:10 | -0.7 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 19:20 | -0.6 | 0.5 | SE | 769.4 | 0 |
| 09/12/2022 | 19:30 | -0.7 | 0.5 | ESE | 769.5 | 0 |
| 09/12/2022 | 19:40 | -0.5 | 0.4 | E | 769.4 | 0 |
| 09/12/2022 | 19:50 | -0.5 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 20:00 | -0.6 | 0.7 | ENE | 769.4 | 0 |
| 09/12/2022 | 20:10 | -0.7 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 20:20 | -0.7 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 20:30 | -0.8 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 20:40 | -0.8 | 0.3 | ENE | 769.4 | 0 |
| 09/12/2022 | 20:50 | -0.7 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 21:00 | -0.8 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 21:10 | -0.9 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 21:20 | -1.1 | 0.4 | ENE | 769.5 | 0 |
| 09/12/2022 | 21:30 | -1 | 0.5 | ENE | 769.5 | 0 |
| 09/12/2022 | 21:40 | -1.3 | 0 | --- | 769.6 | 0 |
| 09/12/2022 | 21:50 | -1.4 | 0 | --- | 769.6 | 0 |
| 09/12/2022 | 22:00 | -1.5 | 0 | --- | 769.6 | 0 |
| 09/12/2022 | 22:10 | -1.6 | 0 | --- | 769.5 | 0 |
| 09/12/2022 | 22:20 | -1 | 0.3 | ENE | 769.6 | 0 |
| 09/12/2022 | 22:30 | -0.4 | 0 | --- | 769.6 | 0 |
| 09/12/2022 | 22:40 | -0.3 | 0.4 | W | 769.6 | 0 |
| 09/12/2022 | 22:50 | -0.1 | 0 | --- | 769.6 | 0 |
| 09/12/2022 | 23:00 | -0.1 | 0.3 | ENE | 769.6 | 0 |
| 09/12/2022 | 23:10 | -0.1 | 0.4 | NE | 769.6 | 0 |
| 09/12/2022 | 23:20 | 0.1 | 0.6 | E | 769.6 | 0 |
| 09/12/2022 | 23:30 | 0 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 23:40 | -0.2 | 0 | --- | 769.4 | 0 |
| 09/12/2022 | 23:50 | -0.1 | 0.7 | ENE | 769.4 | 0 |
| 10/12/2022 | 00:00 | -0.3 | 0.5 | ENE | 769.4 | 0 |
| 10/12/2022 | 00:10 | -0.4 | 0.4 | ENE | 769.5 | 0 |
| 10/12/2022 | 00:20 | -0.6 | 0 | --- | 769.6 | 0 |
| 10/12/2022 | 00:30 | -0.6 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 00:40 | -0.7 | 0 | --- | 769.4 | 0 |
| 10/12/2022 | 00:50 | -0.9 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 01:00 | -1.1 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 01:10 | -1.2 | 0 | --- | 769.3 | 0 |
| 10/12/2022 | 01:20 | -0.7 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 01:30 | -0.7 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 01:40 | -0.4 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 01:50 | -0.3 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 02:00 | -0.2 | 0.2 | ENE | 769.4 | 0 |
| 10/12/2022 | 02:10 | -0.1 | 0 | --- | 769.4 | 0 |
| 10/12/2022 | 02:20 | -0.1 | 0 | --- | 769.3 | 0 |
| 10/12/2022 | 02:30 | -0.1 | 0 | --- | 769.4 | 0 |
| 10/12/2022 | 02:40 | -0.2 | 0 | --- | 769.4 | 0 |
| 10/12/2022 | 02:50 | -0.1 | 0.2 | NE | 769.4 | 0 |
| 10/12/2022 | 03:00 | -0.2 | 0 | --- | 769.4 | 0 |
| | | | Hi | Wind | | |
| **Date** | **Time** | | **Speed** | **Dir** | **Bar** | **Rain** |
| 10/12/2022 | 03:10 | -0.3 | 0.3 | ESE | 769.4 | 0 |
| 10/12/2022 | 03:20 | -0.4 | 0 | --- | 769.4 | 0 |
| 10/12/2022 | 03:30 | -0.5 | 0.3 | ESE | 769.4 | 0 |
| 10/12/2022 | 03:40 | -0.3 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 03:50 | -0.1 | 0.3 | W | 769.5 | 0 |
| 10/12/2022 | 04:00 | 0.3 | 0.4 | WNW | 769.4 | 0 |
| 10/12/2022 | 04:10 | 0.3 | 0 | --- | 769.4 | 0 |
| 10/12/2022 | 04:20 | 0.3 | 0 | --- | 769.4 | 0 |
| 10/12/2022 | 04:30 | 0.4 | 0 | --- | 769.3 | 0 |
| 10/12/2022 | 04:40 | 0.4 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 04:50 | 0.5 | 0 | --- | 769.1 | 0 |
| 10/12/2022 | 05:00 | 0.4 | 0 | --- | 769.1 | 0 |
| 10/12/2022 | 05:10 | 0.4 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 05:20 | 0.5 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 05:30 | 0.4 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 05:40 | 0.6 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 05:50 | 0.6 | 0.5 | ENE | 769.2 | 0 |
| 10/12/2022 | 06:00 | 0.6 | 0.9 | E | 769.2 | 0 |
| 10/12/2022 | 06:10 | 0.7 | 0.9 | E | 769.2 | 0 |
| 10/12/2022 | 06:20 | 0.6 | 0 | --- | 769.1 | 0 |
| 10/12/2022 | 06:30 | 0.6 | 0 | --- | 769.1 | 0 |
| 10/12/2022 | 06:40 | 0.5 | 0 | --- | 769 | 0 |
| 10/12/2022 | 06:50 | 0.4 | 0 | --- | 769 | 0 |
| 10/12/2022 | 07:00 | 0.6 | 0 | --- | 768.9 | 0 |
| 10/12/2022 | 07:10 | 0.7 | 0 | --- | 768.9 | 0 |
| 10/12/2022 | 07:20 | 0.8 | 0.5 | NW | 768.9 | 0 |
| 10/12/2022 | 07:30 | 0.8 | 0 | --- | 768.9 | 0 |
| 10/12/2022 | 07:40 | 0.7 | 0.6 | SSW | 768.9 | 0 |
| 10/12/2022 | 07:50 | 0.6 | 0.6 | S | 768.9 | 0 |
| 10/12/2022 | 08:00 | 0.6 | 0.7 | S | 768.9 | 0 |
| 10/12/2022 | 08:10 | 0.6 | 0.7 | S | 768.9 | 0 |
| 10/12/2022 | 08:20 | 0.6 | 0 | --- | 768.9 | 0 |
| 10/12/2022 | 08:30 | 0.6 | 0 | --- | 769 | 0 |
| 10/12/2022 | 08:40 | 0.6 | 0.8 | S | 769.1 | 0 |
| 10/12/2022 | 08:50 | 0.6 | 0.9 | SSW | 769.1 | 0 |
| 10/12/2022 | 09:00 | 0.4 | 0.7 | ENE | 769.1 | 0 |
| 10/12/2022 | 09:10 | 0.4 | 0.7 | E | 769.1 | 0 |
| 10/12/2022 | 09:20 | 0.4 | 0.8 | E | 769.1 | 0 |
| 10/12/2022 | 09:30 | 0.3 | 0.6 | W | 769.1 | 0 |
| 10/12/2022 | 09:40 | 0.3 | 0.6 | NW | 769 | 0 |
| 10/12/2022 | 09:50 | 0.3 | 0 | --- | 769.1 | 0 |
| 10/12/2022 | 10:00 | 0.4 | 0.5 | ENE | 769.1 | 0 |
| 10/12/2022 | 10:10 | 0.4 | 0 | --- | 769.1 | 0 |
| 10/12/2022 | 10:20 | 0.6 | 0.4 | ESE | 769 | 0 |
| 10/12/2022 | 10:30 | 0.6 | 0.5 | SW | 768.9 | 0 |
| 10/12/2022 | 10:40 | 0.7 | 0 | --- | 768.9 | 0 |
| 10/12/2022 | 10:50 | 0.8 | 0.4 | E | 769.1 | 0 |
| 10/12/2022 | 11:00 | 0.8 | 0.3 | ESE | 769.1 | 0 |

| | | | Hi | Wind | | |
|---|---|---|---|---|---|---|
| Date | Time | | Speed | Dir | Bar | Rain |
| 10/12/2022 | 11:10 | 0.9 | 0.3 | N | 769.2 | 0 |
| 10/12/2022 | 11:20 | 0.9 | 0.2 | E | 769.2 | 0 |
| 10/12/2022 | 11:30 | 1.1 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 11:40 | 1.1 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 11:50 | 1.1 | 0.2 | ENE | 769.2 | 0 |
| 10/12/2022 | 12:00 | 1.2 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 12:10 | 1.4 | 0 | --- | 769.1 | 0 |
| 10/12/2022 | 12:20 | 1.6 | 0.1 | NW | 769.1 | 0 |
| 10/12/2022 | 12:30 | 1.8 | 0.3 | WNW | 769.1 | 0 |
| 10/12/2022 | 12:40 | 1.9 | 0.4 | SE | 769 | 0 |
| 10/12/2022 | 12:50 | 2.2 | 0.5 | ESE | 769 | 0 |
| 10/12/2022 | 13:00 | 2.1 | 0.6 | ESE | 769 | 0 |
| 10/12/2022 | 13:10 | 2 | 0.6 | ENE | 769.1 | 0 |
| 10/12/2022 | 13:20 | 1.9 | 0.7 | E | 768.9 | 0 |
| 10/12/2022 | 13:30 | 1.7 | 0.8 | ENE | 769 | 0 |
| 10/12/2022 | 13:40 | 1.5 | 0.9 | ENE | 769.1 | 0 |
| 10/12/2022 | 13:50 | 1.4 | 0.9 | E | 769 | 0.2 |
| 10/12/2022 | 14:00 | 1.3 | 2.2 | E | 769.1 | 0.2 |
| 10/12/2022 | 14:10 | 1.1 | 0 | --- | 769.1 | 0.4 |
| 10/12/2022 | 14:20 | 0.9 | 0 | --- | 769.1 | 0.4 |
| 10/12/2022 | 14:30 | 0.8 | 0.4 | NW | 769 | 0.4 |
| 10/12/2022 | 14:40 | 0.9 | 0 | --- | 769 | 0.3 |
| 10/12/2022 | 14:50 | 1.1 | 0 | --- | 769 | 0.2 |
| 10/12/2022 | 15:00 | 1.1 | 0 | --- | 768.9 | 0.2 |
| 10/12/2022 | 15:10 | 1.1 | 0.9 | WSW | 768.9 | 0.2 |
| 10/12/2022 | 15:20 | 1.3 | 0.9 | WSW | 769 | 0.2 |
| 10/12/2022 | 15:30 | 1.3 | 0.9 | WSW | 769 | 0 |
| 10/12/2022 | 15:40 | 1.2 | 0.9 | WSW | 769.1 | 0 |
| 10/12/2022 | 15:50 | 1.3 | 0.9 | WSW | 769.2 | 0 |
| 10/12/2022 | 16:00 | 1.3 | 0.9 | SW | 769.1 | 0 |
| 10/12/2022 | 16:10 | 1.3 | 0 | --- | 769.1 | 0 |
| 10/12/2022 | 16:20 | 1.2 | 0 | --- | 769.2 | 0 |
| 10/12/2022 | 16:30 | 1.2 | 0.9 | WSW | 769.2 | 0 |
| 10/12/2022 | 16:40 | 1.1 | 1.8 | WSW | 769.2 | 0 |
| 10/12/2022 | 16:50 | 1 | 1.3 | WSW | 769.3 | 0 |
| 10/12/2022 | 17:00 | 1 | 1.3 | WSW | 769.3 | 0 |
| 10/12/2022 | 17:10 | 0.9 | 1.8 | WSW | 769.3 | 0 |
| 10/12/2022 | 17:20 | 1.1 | 0.9 | WSW | 769.3 | 0 |
| 10/12/2022 | 17:30 | 1 | 1.3 | SW | 769.3 | 0 |
| 10/12/2022 | 17:40 | 1 | 0.9 | SW | 769.2 | 0 |
| 10/12/2022 | 17:50 | 0.9 | 1.8 | WSW | 769.2 | 0 |
| 10/12/2022 | 18:00 | 0.9 | 1.3 | SW | 769.2 | 0 |
| 10/12/2022 | 18:10 | 0.9 | 0.9 | SW | 769.3 | 0 |
| 10/12/2022 | 18:20 | 0.9 | 0.6 | WSW | 769.2 | 0 |
| 10/12/2022 | 18:30 | 0.9 | 0.7 | WSW | 769.3 | 0.2 |
| 10/12/2022 | 18:40 | 0.9 | 0.5 | WSW | 769.3 | 0 |
| 10/12/2022 | 18:50 | 0.9 | 0.9 | SW | 769.4 | 0 |
| 10/12/2022 | 19:00 | 1 | 1.3 | WSW | 769.4 | 0 |
| | | | Hi | Wind | | |
| Date | Time | | Speed | Dir | Bar | Rain |
| 10/12/2022 | 19:10 | 1 | 0.4 | W | 769.4 | 0 |
| 10/12/2022 | 19:20 | 0.9 | 0.9 | WSW | 769.3 | 0.2 |
| 10/12/2022 | 19:30 | 0.9 | 0.7 | WSW | 769.4 | 0 |
| 10/12/2022 | 19:40 | 0.9 | 0 | --- | 769.4 | 0 |
| 10/12/2022 | 19:50 | 0.9 | 0.8 | WSW | 769.3 | 0 |
| 10/12/2022 | 20:00 | 0.9 | 0.5 | WSW | 769.4 | 0 |
| 10/12/2022 | 20:10 | 0.7 | 0.5 | WSW | 769.4 | 0 |
| 10/12/2022 | 20:20 | 0.4 | 0 | --- | 769.3 | 0 |
| 10/12/2022 | 20:30 | 0.3 | 0.6 | WSW | 769.4 | 0 |
| 10/12/2022 | 20:40 | 0.3 | 0.4 | WSW | 769.5 | 0 |
| 10/12/2022 | 20:50 | 0.4 | 0.5 | SSW | 769.5 | 0 |
| 10/12/2022 | 21:00 | 0.4 | 0.6 | SSW | 769.5 | 0 |
| 10/12/2022 | 21:10 | 0.4 | 0.7 | SSW | 769.5 | 0 |
| 10/12/2022 | 21:20 | 0.6 | 0.4 | SSW | 769.6 | 0 |
| 10/12/2022 | 21:30 | 0.6 | 0 | --- | 769.6 | 0 |
| 10/12/2022 | 21:40 | 0.7 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 21:50 | 0.7 | 0 | --- | 769.5 | 0 |
| 10/12/2022 | 22:00 | 0.7 | 0 | --- | 769.6 | 0 |
| 10/12/2022 | 22:10 | 0.8 | 0 | --- | 769.6 | 0 |
| 10/12/2022 | 22:20 | 0.9 | 0.9 | SSW | 769.5 | 0 |
| 10/12/2022 | 22:30 | 1.1 | 1 | SW | 769.6 | 0 |
| 10/12/2022 | 22:40 | 1.1 | 1.1 | SW | 769.8 | 0 |
| 10/12/2022 | 22:50 | 0.9 | 1.3 | WSW | 769.8 | 0 |
| 10/12/2022 | 23:00 | 0.9 | 0.9 | WSW | 769.8 | 0 |
| 10/12/2022 | 23:10 | 0.9 | 0.7 | WSW | 769.8 | 0 |
| 10/12/2022 | 23:20 | 0.8 | 0 | --- | 769.8 | 0 |
| 10/12/2022 | 23:30 | 0.8 | 0 | --- | 769.9 | 0 |
| 10/12/2022 | 23:40 | 0.9 | 0 | --- | 769.8 | 0 |
| 10/12/2022 | 23:50 | 0.9 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 00:00 | 0.9 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 00:10 | 0.9 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 00:20 | 0.9 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 00:30 | 0.9 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 00:40 | 0.8 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 00:50 | 0.7 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 01:00 | 0.7 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 01:10 | 0.6 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 01:20 | 0.4 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 01:30 | 0.4 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 01:40 | 0.4 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 01:50 | 0.5 | 0 | --- | 770 | 0 |
| 11/12/2022 | 02:00 | 0.6 | 0 | --- | 770.1 | 0 |
| 11/12/2022 | 02:10 | 0.6 | 0 | --- | 770 | 0 |
| 11/12/2022 | 02:20 | 0.6 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 02:30 | 0.7 | 0.9 | SW | 769.7 | 0 |
| 11/12/2022 | 02:40 | 0.6 | 0.7 | SW | 769.7 | 0 |
| 11/12/2022 | 02:50 | 0.7 | 0.9 | SW | 769.8 | 0 |
| 11/12/2022 | 03:00 | 0.7 | 0 | --- | 769.8 | 0 |

| | | | Hi | Wind | | |
|---|---|---|---|---|---|---|
| Date | Time | | Speed | Dir | Bar | Rain |
| 11/12/2022 | 03:10 | 0.6 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 03:20 | 0.7 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 03:30 | 0.8 | 0.5 | WSW | 769.8 | 0 |
| 11/12/2022 | 03:40 | 0.6 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 03:50 | 0.4 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 04:00 | 0.2 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 04:10 | 0.4 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 04:20 | 0.5 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 04:30 | 0.5 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 04:40 | 0.3 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 04:50 | 0.3 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 05:00 | 0.3 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 05:10 | 0.1 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 05:20 | -0.1 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 05:30 | -0.2 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 05:40 | -0.1 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 05:50 | -0.1 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 06:00 | 0 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 06:10 | 0.1 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 06:20 | 0.2 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 06:30 | 0.2 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 06:40 | 0.2 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 06:50 | 0.2 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 07:00 | 0.2 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 07:10 | 0.2 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 07:20 | 0.3 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 07:30 | 0.4 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 07:40 | 0.4 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 07:50 | 0.3 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 08:00 | 0.3 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 08:10 | 0.3 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 08:20 | 0.3 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 08:30 | 0.3 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 08:40 | 0.3 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 08:50 | 0.2 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 09:00 | 0.1 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 09:10 | 0.4 | 0.4 | WSW | 769.7 | 0 |
| 11/12/2022 | 09:20 | 0.5 | 0.6 | WSW | 769.8 | 0 |
| 11/12/2022 | 09:30 | 0.6 | 0.9 | W | 769.8 | 0 |
| 11/12/2022 | 09:40 | 0.6 | 1.3 | WSW | 769.8 | 0 |
| 11/12/2022 | 09:50 | 0.6 | 2.2 | WSW | 769.8 | 0 |
| 11/12/2022 | 10:00 | 0.6 | 1.8 | WSW | 769.8 | 0 |
| 11/12/2022 | 10:10 | 0.4 | 1.8 | WSW | 769.9 | 0 |
| 11/12/2022 | 10:20 | 0.3 | 2.2 | WSW | 769.8 | 0 |
| 11/12/2022 | 10:30 | 0.2 | 1.8 | WSW | 770 | 0 |
| 11/12/2022 | 10:40 | 0.3 | 1.3 | WSW | 769.9 | 0 |
| 11/12/2022 | 10:50 | 0.4 | 0.9 | WSW | 769.9 | 0 |
| 11/12/2022 | 11:00 | 0.5 | 0.9 | WSW | 769.9 | 0 |
| | | | Hi | Wind | | |
| Date | Time | | Speed | Dir | Bar | Rain |
| 11/12/2022 | 11:10 | 0.6 | 1.3 | WSW | 769.9 | 0 |
| 11/12/2022 | 11:20 | 0.7 | 0.9 | WSW | 769.9 | 0 |
| 11/12/2022 | 11:30 | 0.7 | 0.7 | SW | 769.9 | 0 |
| 11/12/2022 | 11:40 | 0.8 | 0.6 | WSW | 769.8 | 0 |
| 11/12/2022 | 11:50 | 0.8 | 1.3 | WSW | 769.8 | 0 |
| 11/12/2022 | 12:00 | 0.9 | 0.4 | WSW | 769.8 | 0 |
| 11/12/2022 | 12:10 | 0.9 | 1 | WSW | 769.6 | 0 |
| 11/12/2022 | 12:20 | 1.2 | 0.9 | WSW | 769.6 | 0 |
| 11/12/2022 | 12:30 | 1.2 | 1.1 | WSW | 769.6 | 0 |
| 11/12/2022 | 12:40 | 1.1 | 0.6 | WSW | 769.6 | 0 |
| 11/12/2022 | 12:50 | 1.3 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 13:00 | 1.3 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 13:10 | 1.2 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 13:20 | 1.1 | 0 | --- | 769.3 | 0 |
| 11/12/2022 | 13:30 | 1.2 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 13:40 | 1.1 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 13:50 | 1.1 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 14:00 | 1.2 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 14:10 | 1.3 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 14:20 | 1.2 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 14:30 | 1.3 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 14:40 | 1.4 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 14:50 | 1.6 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 15:00 | 1.8 | 0.7 | E | 769.4 | 0 |
| 11/12/2022 | 15:10 | 1.8 | 0.9 | E | 769.4 | 0 |
| 11/12/2022 | 15:20 | 1.7 | 0.5 | E | 769.4 | 0 |
| 11/12/2022 | 15:30 | 1.6 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 15:40 | 1.1 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 15:50 | 0.5 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 16:00 | 0.1 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 16:10 | -0.3 | 0 | --- | 769.4 | 0 |
| 11/12/2022 | 16:20 | -0.7 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 16:30 | -0.7 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 16:40 | -0.7 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 16:50 | -0.7 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 17:00 | -0.7 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 17:10 | -0.8 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 17:20 | -0.9 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 17:30 | -1.1 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 17:40 | -1 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 17:50 | -1.4 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 18:00 | -1.6 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 18:10 | -1.7 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 18:20 | -1.9 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 18:30 | -2.1 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 18:40 | -2.1 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 18:50 | -2.3 | 0 | --- | 769.5 | 0 |
| 11/12/2022 | 19:00 | -2.2 | 0 | --- | 769.7 | 0 |

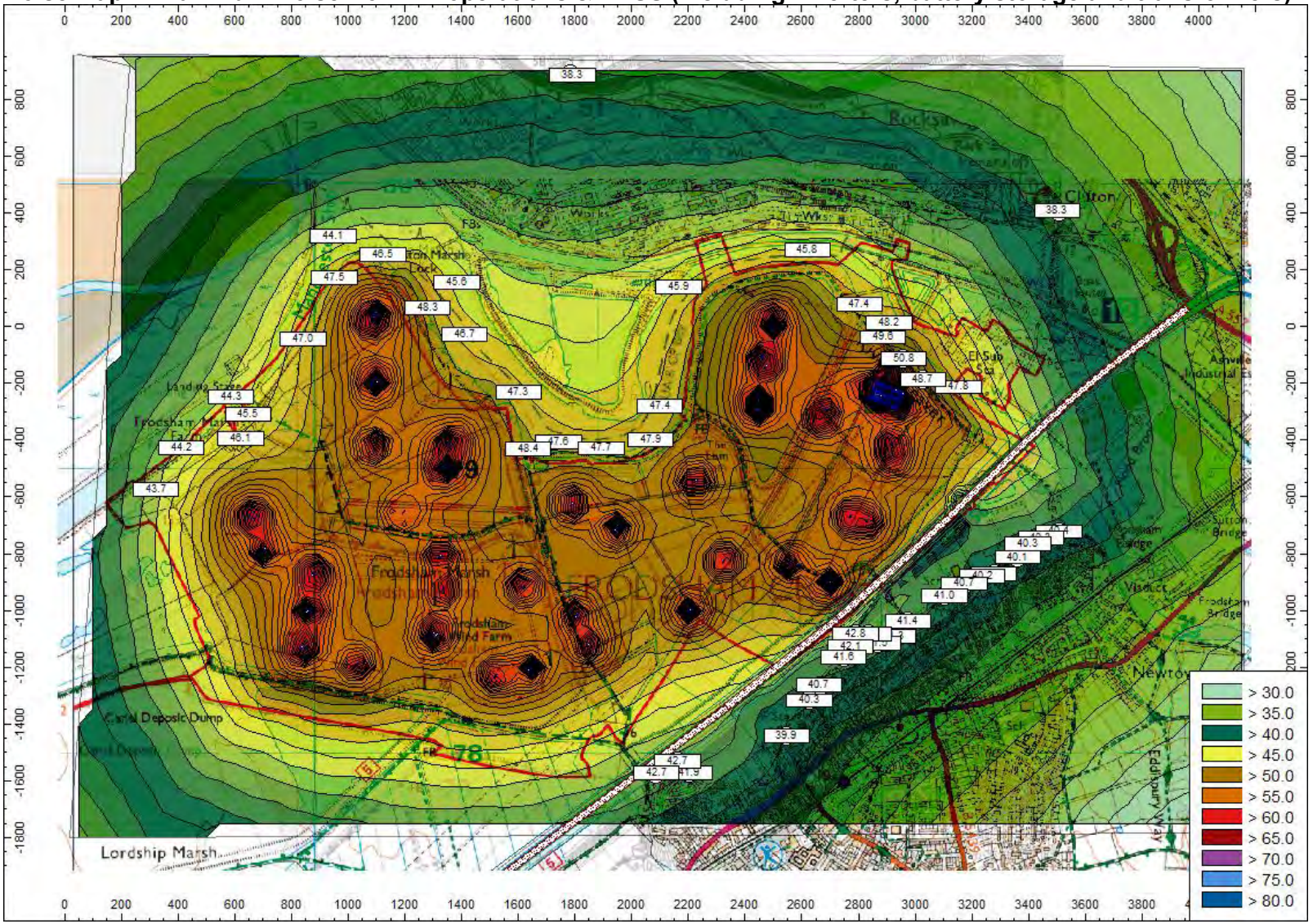
| | | | Hi | Wind | | |
|---|---|---|---|---|---|---|
| Date | Time | | Speed | Dir | Bar | Rain |
| 11/12/2022 | 19:10 | -2.2 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 19:20 | -1.9 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 19:30 | -2.3 | 0 | --- | 769.6 | 0 |
| 11/12/2022 | 19:40 | -2.7 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 19:50 | -2.8 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 20:00 | -2.9 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 20:10 | -3.3 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 20:20 | -3.1 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 20:30 | -3.3 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 20:40 | -3.5 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 20:50 | -3.4 | 0 | --- | 769.7 | 0 |
| 11/12/2022 | 21:00 | -3.4 | 0 | --- | 769.8 | 0 |
| 11/12/2022 | 21:10 | -3.6 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 21:20 | -3.8 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 21:30 | -3.7 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 21:40 | -3.8 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 21:50 | -4.3 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 22:00 | -4.5 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 22:10 | -4.6 | 0 | --- | 770 | 0 |
| 11/12/2022 | 22:20 | -5 | 0 | --- | 769.9 | 0 |
| 11/12/2022 | 22:30 | -4.7 | 0 | --- | 770.1 | 0 |
| 11/12/2022 | 22:40 | -4.3 | 0 | --- | 770.1 | 0 |
| 11/12/2022 | 22:50 | -3.9 | 0 | --- | 770.2 | 0 |
| 11/12/2022 | 23:00 | -4.1 | 0 | --- | 770.2 | 0 |
| 11/12/2022 | 23:10 | -4.2 | 0 | --- | 770.3 | 0 |
| 11/12/2022 | 23:20 | -4.4 | 0 | --- | 770.3 | 0 |
| 11/12/2022 | 23:30 | -4 | 0 | --- | 770.2 | 0 |
| 11/12/2022 | 23:40 | -4 | 0 | --- | 770.2 | 0 |
| 11/12/2022 | 23:50 | -4.5 | 0 | --- | 770.3 | 0 |
| 12/12/2022 | 00:00 | -4.7 | 0 | --- | 770.3 | 0 |
| 12/12/2022 | 00:10 | -4.4 | 0 | --- | 770.2 | 0 |
| 12/12/2022 | 00:20 | -4.4 | 0 | --- | 770.3 | 0 |
| 12/12/2022 | 00:30 | -4.1 | 0 | --- | 770.4 | 0 |
| 12/12/2022 | 00:40 | -4.1 | 0 | --- | 770.4 | 0 |
| 12/12/2022 | 00:50 | -4.1 | 1.3 | SW | 770.4 | 0 |
| 12/12/2022 | 01:00 | -4.2 | 1.3 | SW | 770.4 | 0 |
| 12/12/2022 | 01:10 | -4.3 | 0.4 | SW | 770.5 | 0 |
| 12/12/2022 | 01:20 | -4.4 | 0 | --- | 770.5 | 0 |
| 12/12/2022 | 01:30 | -4.8 | 0 | --- | 770.5 | 0 |
| 12/12/2022 | 01:40 | -5.1 | 0 | --- | 770.5 | 0 |
| 12/12/2022 | 01:50 | -5.1 | 0.4 | SSW | 770.6 | 0 |
| 12/12/2022 | 02:00 | -4.6 | 0.9 | SW | 770.5 | 0 |
| 12/12/2022 | 02:10 | -4.7 | 2.2 | SW | 770.6 | 0 |
| 12/12/2022 | 02:20 | -4.8 | 2.2 | SW | 770.6 | 0 |
| 12/12/2022 | 02:30 | -4.9 | 1.8 | SW | 770.5 | 0 |
| 12/12/2022 | 02:40 | -4.9 | 0.9 | SSW | 770.6 | 0 |
| 12/12/2022 | 02:50 | -4.8 | 2.2 | SW | 770.6 | 0 |
| 12/12/2022 | 03:00 | -4.9 | 1.8 | SW | 770.6 | 0 |
| | | | Hi | Wind | | |
| Date | Time | | Speed | Dir | Bar | Rain |
| 12/12/2022 | 03:10 | -4.9 | 1.8 | WSW | 770.7 | 0 |
| 12/12/2022 | 03:20 | -4.9 | 1.3 | SW | 770.7 | 0 |
| 12/12/2022 | 03:30 | -4.9 | 0.4 | W | 770.7 | 0 |
| 12/12/2022 | 03:40 | -4.8 | 1.3 | SW | 770.7 | 0 |
| 12/12/2022 | 03:50 | -4.8 | 1.8 | SW | 770.7 | 0 |
| 12/12/2022 | 04:00 | -4.8 | 1.8 | SW | 770.6 | 0 |
| 12/12/2022 | 04:10 | -4.8 | 2.2 | SW | 770.5 | 0 |
| 12/12/2022 | 04:20 | -4.9 | 0.4 | W | 770.7 | 0 |
| 12/12/2022 | 04:30 | -4.9 | 0.4 | WSW | 770.7 | 0 |
| 12/12/2022 | 04:40 | -4.9 | 0.4 | SW | 770.6 | 0 |
| 12/12/2022 | 04:50 | -4.8 | 0.9 | SW | 770.6 | 0 |
| 12/12/2022 | 05:00 | -4.8 | 1.8 | SW | 770.5 | 0 |
| 12/12/2022 | 05:10 | -4.7 | 1.8 | SW | 770.5 | 0 |
| 12/12/2022 | 05:20 | -4.9 | 0.4 | W | 770.6 | 0 |
| 12/12/2022 | 05:30 | -4.9 | 1.3 | WSW | 770.6 | 0 |
| 12/12/2022 | 05:40 | -4.9 | 1.3 | WSW | 770.7 | 0 |
| 12/12/2022 | 05:50 | -4.9 | 0.9 | SW | 770.7 | 0 |
| 12/12/2022 | 06:00 | -5 | 0.9 | W | 770.8 | 0 |
| 12/12/2022 | 06:10 | -5.1 | 0.7 | WNW | 770.8 | 0 |
| 12/12/2022 | 06:20 | -5 | 0.8 | SW | 770.8 | 0 |
| 12/12/2022 | 06:30 | -5.1 | 0.6 | SW | 770.8 | 0 |
| 12/12/2022 | 06:40 | -5.1 | 0.5 | W | 770.7 | 0 |
| 12/12/2022 | 06:50 | -5.1 | 0.4 | W | 770.6 | 0 |
| 12/12/2022 | 07:00 | -5 | 1 | SW | 770.6 | 0 |
| 12/12/2022 | 07:10 | -5 | 0.4 | SSW | 770.7 | 0 |
| 12/12/2022 | 07:20 | -5 | 1.1 | WSW | 770.6 | 0 |
| 12/12/2022 | 07:30 | -5.2 | 0.9 | W | 770.7 | 0 |
| 12/12/2022 | 07:40 | -5.2 | 0.8 | SW | 770.6 | 0 |
| 12/12/2022 | 07:50 | -5.1 | 0.9 | SW | 770.6 | 0 |
| 12/12/2022 | 08:00 | -5.1 | 0.4 | WSW | 770.6 | 0 |
| 12/12/2022 | 08:10 | -5 | 0.5 | WSW | 770.7 | 0 |
| 12/12/2022 | 08:20 | -4.9 | 0.4 | W | 770.6 | 0 |
| 12/12/2022 | 08:30 | -4.9 | 0.6 | W | 770.6 | 0 |
| 12/12/2022 | 08:40 | -4.8 | 0.5 | W | 770.6 | 0 |
| 12/12/2022 | 08:50 | -4.7 | 0.6 | W | 770.6 | 0 |
| 12/12/2022 | 09:00 | -4.9 | 0.9 | WSW | 770.7 | 0 |
| 12/12/2022 | 09:10 | -4.9 | 0.4 | W | 770.7 | 0 |
| 12/12/2022 | 09:20 | -4.8 | 0.9 | W | 770.8 | 0 |
| 12/12/2022 | 09:30 | -4.6 | 0.5 | W | 770.7 | 0 |
| 12/12/2022 | 09:40 | -4.5 | 0.4 | WSW | 770.8 | 0 |
| 12/12/2022 | 09:50 | -4.4 | 0.3 | W | 770.9 | 0 |
| 12/12/2022 | 10:00 | -4.2 | 0.2 | SW | 771.1 | 0 |
| 12/12/2022 | 10:10 | -3.9 | 0.3 | WSW | 770.9 | 0 |
| 12/12/2022 | 10:20 | -3.7 | 0.4 | WSW | 770.9 | 0 |
| 12/12/2022 | 10:30 | -3.6 | 0.6 | SW | 771 | 0 |
| 12/12/2022 | 10:40 | -3.4 | 0.4 | WNW | 771 | 0 |
| 12/12/2022 | 10:50 | -3.2 | 0 | --- | 771.1 | 0 |
| 12/12/2022 | 11:00 | -2.9 | 0 | --- | 771.1 | 0 |

| | | | Hi | Wind | | |
|---|---|---|---|---|---|---|
| **Date** | **Time** | | **Speed** | **Dir** | **Bar** | **Rain** |
| 12/12/2022 | 11:10 | -2.7 | 0 | --- | 771 | 0 |
| 12/12/2022 | 11:20 | -2.6 | 0.5 | SW | 770.9 | 0 |
| 12/12/2022 | 11:30 | -2.3 | 0.7 | SW | 770.8 | 0 |
| 12/12/2022 | 11:40 | -2.1 | 0.8 | NW | 770.8 | 0 |
| 12/12/2022 | 11:50 | -2.1 | 0.9 | N | 771 | 0 |
| 12/12/2022 | 12:00 | -2.1 | 0.5 | WNW | 770.9 | 0 |
| 12/12/2022 | 12:10 | -2.1 | 0.6 | WNW | 770.8 | 0 |
| 12/12/2022 | 12:20 | -1.9 | 0.5 | NW | 770.7 | 0 |
| 12/12/2022 | 12:30 | -1.8 | 0.4 | NNW | 770.6 | 0 |

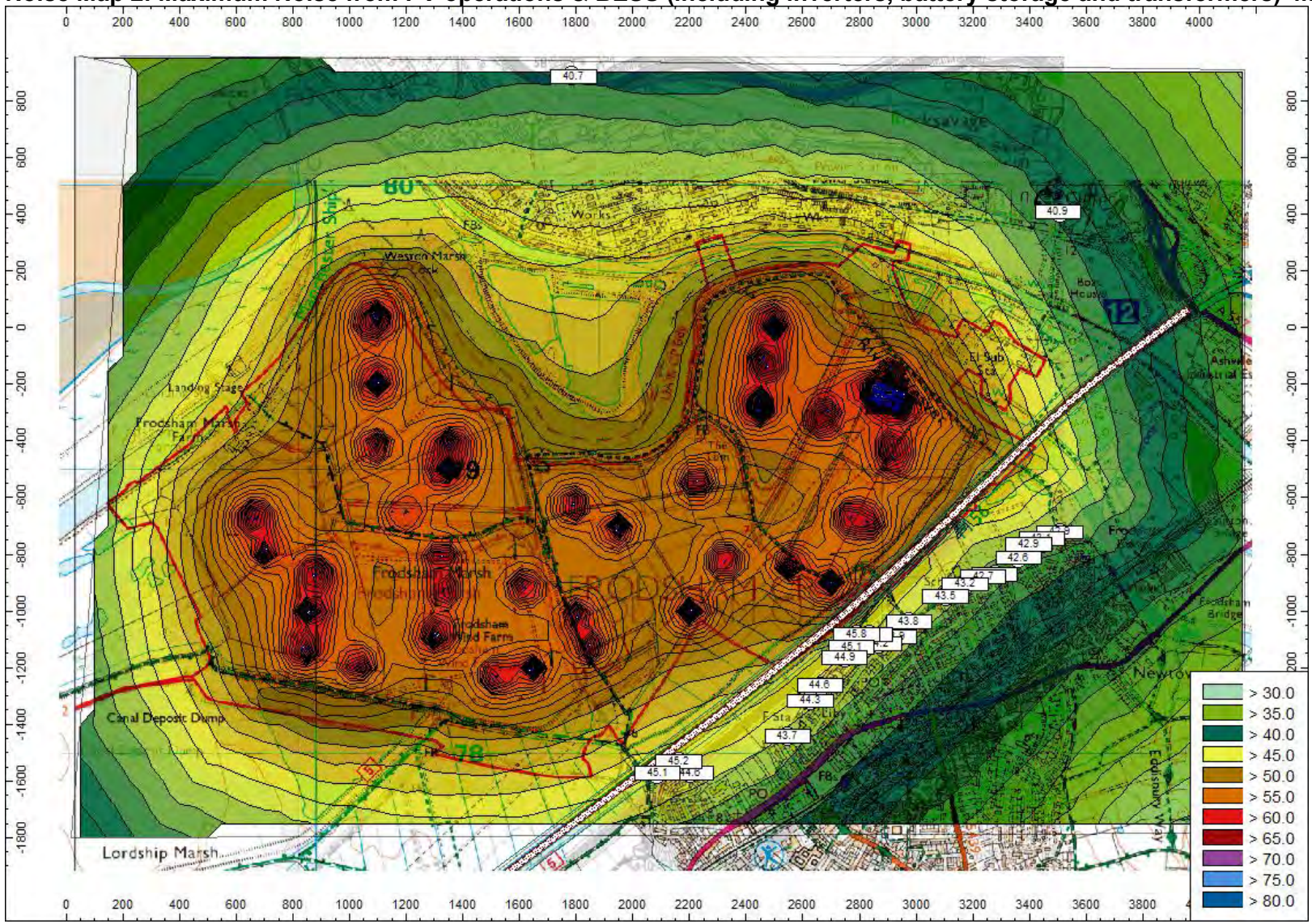
# Appendix 3

# Noise Mapping Results

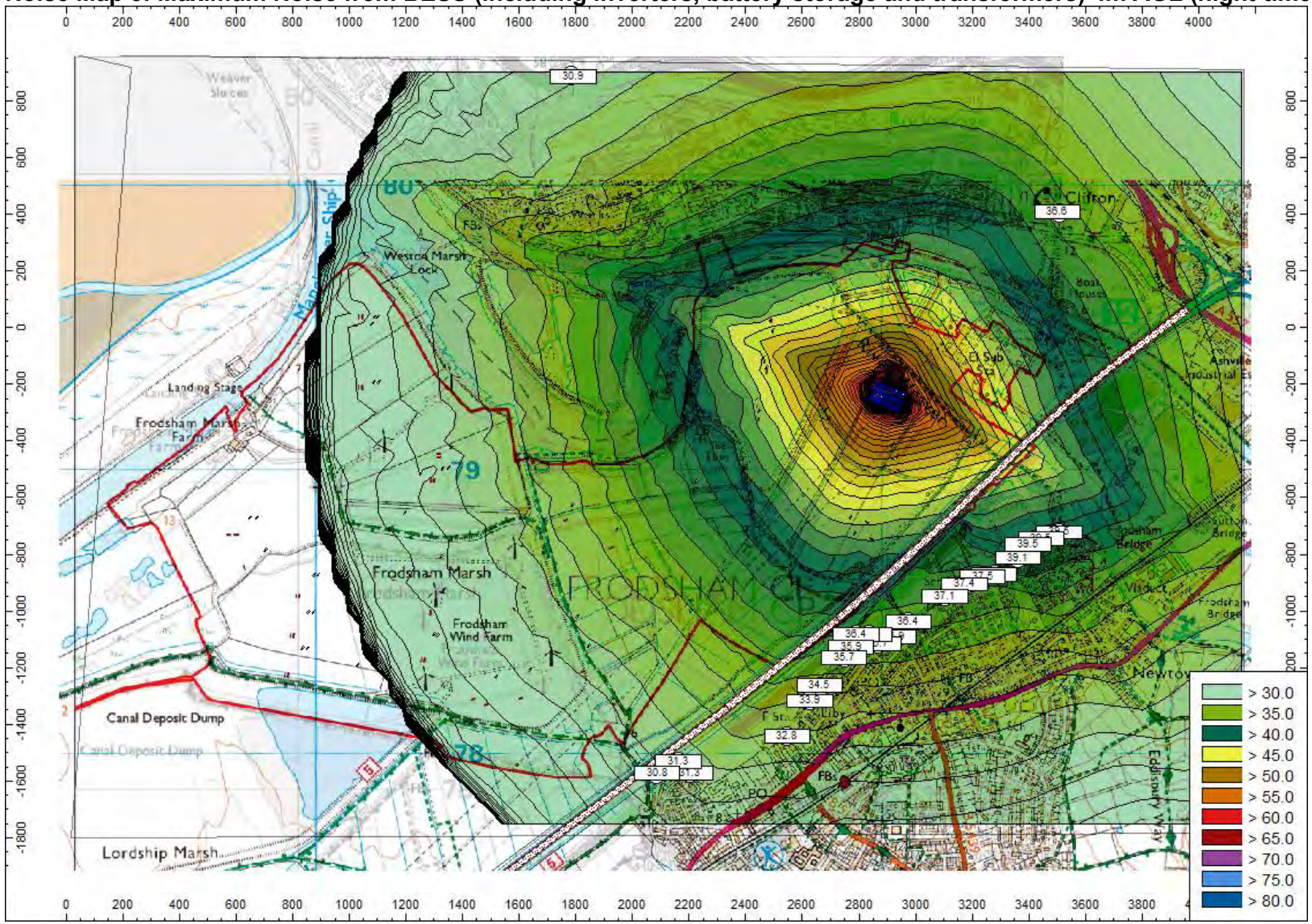
**Noise Map 1: Maximum Noise from PV operations & BESS (including inverters, battery storage and transformers) 1.5m AGL (Daytime)**



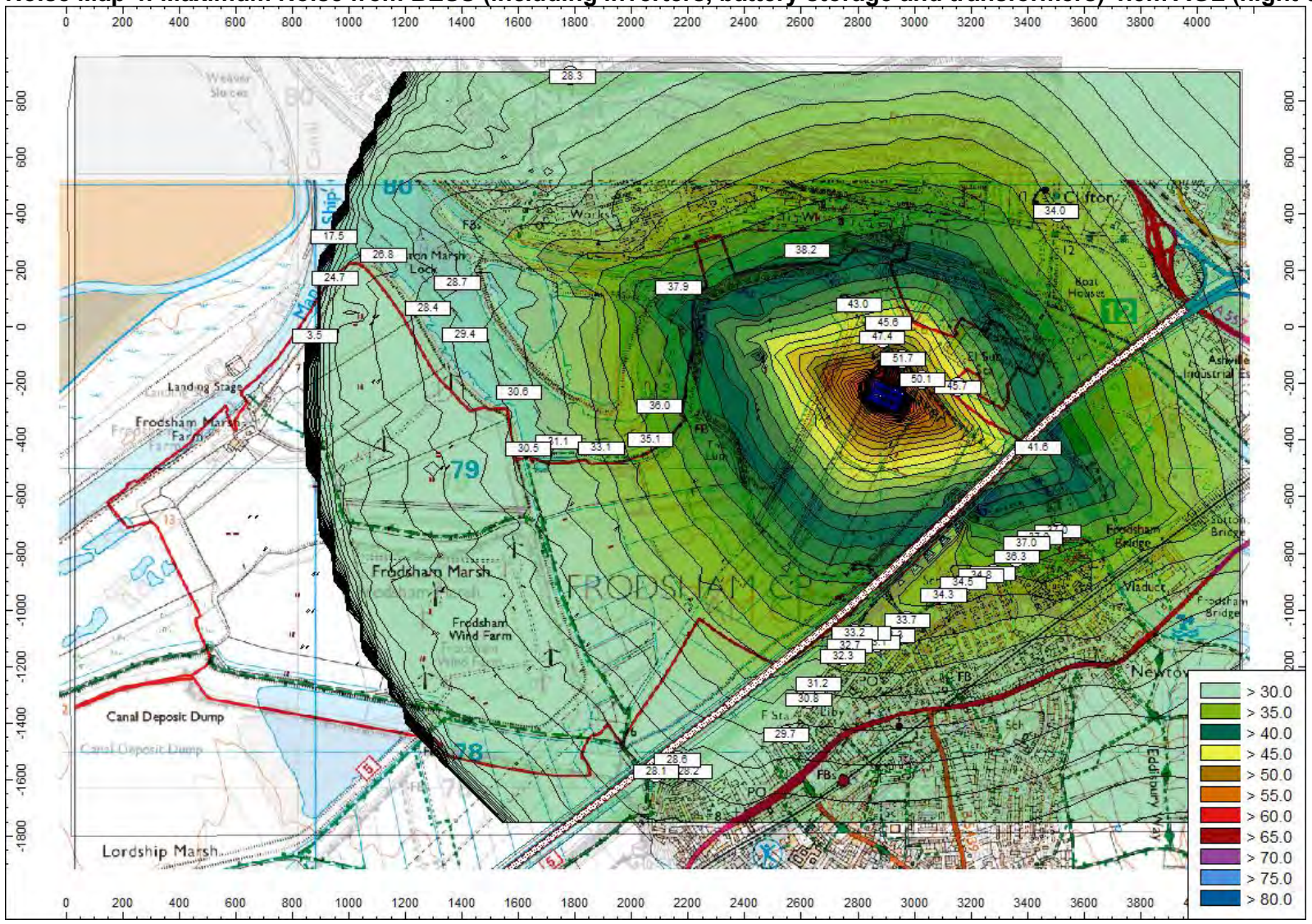
## Noise Map 2: Maximum Noise from PV operations & BESS (including inverters, battery storage and transformers) 4m AGL (Sunrise)



## Noise Map 3: Maximum Noise from BESS (including inverters, battery storage and transformers) 4m AGL (night-time)



## Noise Map 4: Maximum Noise from BESS (including inverters, battery storage and transformers) 1.5m AGL (night-time)



# Appendix 4

## Vibration Terminology

### Ground Borne Vibrations

For any source of vibration on or near the surface of the ground, energy propagates away from the source via:

a) Elastic body (or compression) waves – which radiate energy into the ground in all directions
b) Surface (or shear) waves – which carry energy along the ground surface, caused when body waves are reflected back into the ground at the ground-surface interface

Thus, at any point away from that source, the ground motion is the sum of all the wave motions at that point. When wave motion has been generated, the waves will be attenuated as they travel away from the source. The two main mechanisms for attenuation are:

a) Enlargement of the wavefront as the distance from the source increases, and
b) Internal damping of the transmitting medium (the ground)

Ground borne vibration is therefore made up of a combination of different waves, travelling in different directions, at different speeds and at different frequencies. The frequency component of the vibration will affect the rate at which attenuation occurs since the internal damping of the ground is frequency dependent.

Since vibration enters buildings through the foundations, the hard structure of the building is normally affected to a greater degree than by air borne vibration. Often ground borne vibrations are more noticeable when standing or sitting near the middle of suspended wooden floors.

### *Ground Borne Vibration Measurement Units*

Ground borne vibration is caused when the individual particles making up the strata are caused to oscillate by the passage of a pressure wave. The resulting vibration can be summarized in terms of 4 main parameters:

a) **Velocity** – how fast the particles move when they are oscillating. Since the velocity of these particles continually change as the pressure wave passes the most useful value that is often reported is the maximum or peak particle velocity (PPV). PPVs are usually expressed in terms of $ms^{-1}$ or $mms^{-1}$.

b) **Acceleration** – is the rate at which the particle velocity changes during oscillation. It is usually measured in $ms^{-2}$ $mms^{-2}$ or "g's". 1g is that acceleration imparted to an object by the earth's gravitational pull and is approximately 9.81 $ms^{-2}$.

c) **Displacement** – is the distance moved by oscillating particles. This is usually very small and measured in mm or even µm.

d) **Frequency** – is the number of oscillations per second which a particle undergoes due to the passage of a vibration wave. It is measured in cycles per second or Hertz (Hz).

The movement of particles induced to oscillate by vibration waves are usually measured in three mutually perpendicular directions to fully describe the vibration intensity, as particles will be oscillating in three dimensions. These are:

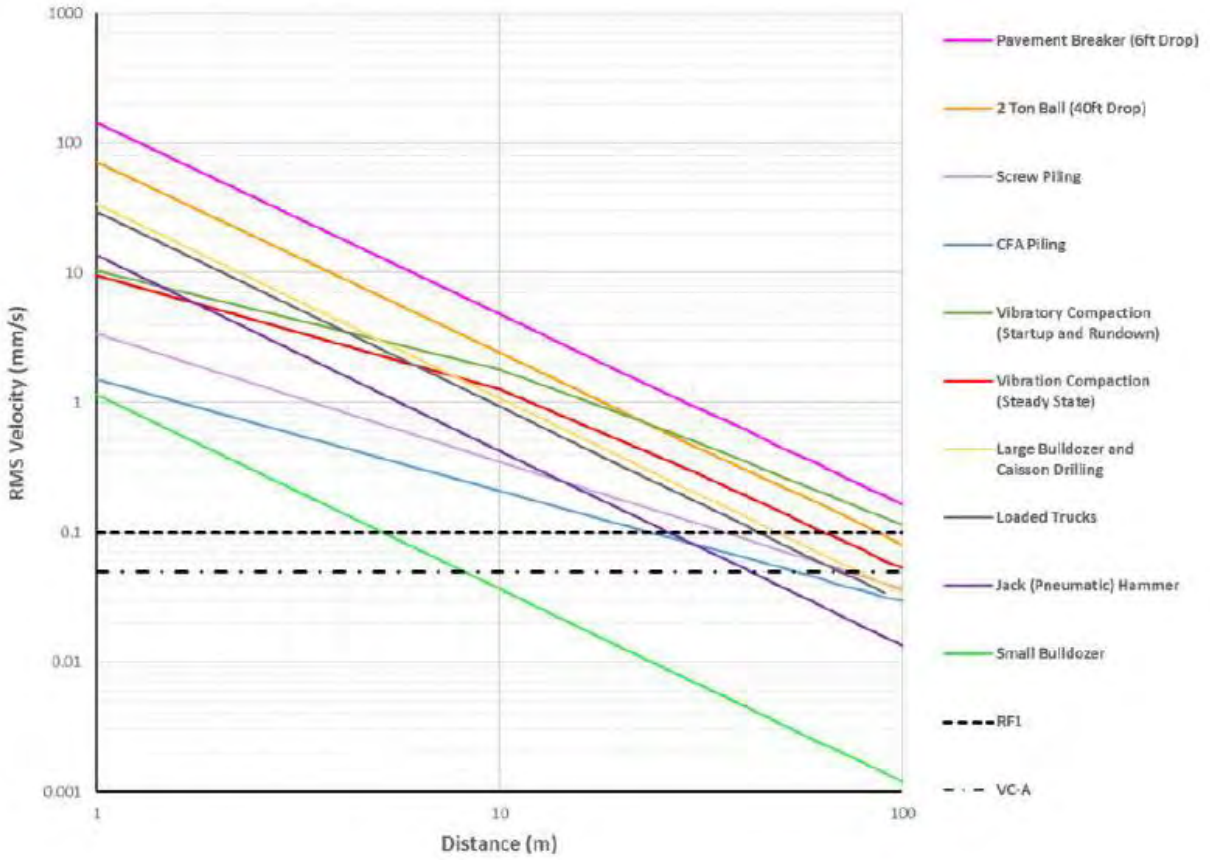
a) **Longitudinal** – back and forth particle movement in the same direction that the vibration wave is travelling.

b) **Vertical** – up and down movement perpendicular to the direction the vibration wave is travelling.

c) **Transverse** – left and right particle movement perpendicular to the direction the vibration wave is travelling.

# Appendix 5

## Vibration Levels from a Range of Construction Activities



# Appendix 6

## Plant Noise Levels

### Assumed Noise Levels for Site Plant

| Plant Type | Highest Likely Sound Pressure Level LAeq [dB] | Assumed % Operating Time | Example of mitigation | Period of Operation |
|---|---|---|---|---|
| Battery Storage Units | 65 @ 1m | 100 | Silencing of vent openings or design | Daytime & Night-time |
| Inverters for Batteries<br>Transformers (with inverters) | 81 @ 1m<br>65 @ 1m | 100 | Design of plant or inside enclosure | Daytime & Night-time |
| Solar Inverters/transformers | 81 @ 1m | 100 | Design of plant or inside enclosure | Daytime & Sunrise hours |
| Switchgear | 65 @ 1m | 100 | Design of plant or inside enclosure | Daytime & Night-time |
| HV Transformer | 55 @ 10m | 100 | Design of plant or inside enclosure | Daytime & Night-time |

# Appendix 7

# Consultant's Experience & Qualifications

**Consultant: Dean Robert Kettlewell - MSc MIOA MAE I.Eng**
**(Director - Principal Acoustic Consultant)**

## Précis

As Director and Principal Acoustic Consultant with Noise & Vibration Consultants Ltd, Dean has over 35 years background experience in a wide range of issues relating to environmental, industrial and commercial noise and vibration assessment. He currently manages corporate and unit specific contracts for:

- Assessment of Environmental & Industrial Noise
- Environmental Noise Impact Assessments
- Expert Witness representation for Deafness and `Vibration White Finger' Claims
- Integrated Pollution Prevention and Control (IPPC) Applications
- Industrial Noise Assessment and Control
- Planning Issues for Residential and Commercial Development
- Noise at Work Regulations Assessments
- Building Acoustics and Sound Insulation Tests
- Wind Farm Noise Impact Assessments
- Entertainment Noise Assessment and Control
- Architectural Acoustics
- Specialist knowledge in the Design of Noise Control Systems
- Ground borne vibration measurement and assessment
- Project Management of Noise Control Systems
- Hand-arm Vibration Assessments

## Relevant Work Experience

| | |
|---|---|
| Director & Principal Consultant - Noise & Vibration Consultants Ltd | 2001- to date |
| Senior Acoustic Consultant - Vibrock Limited | 1998 - 2001 |
| Associate & Principal Acoustic Consultant - John Savidge & Associates | 1994 - 1998 |
| Technical Manager – LBJ Limited (Noise Control Division) | 1990 - 1994 |
| Technical Engineer/Technical Manager (1988) - Vibac (Noise Control) Ltd | 1982 - 1990 |

## Qualifications and Education

M.Sc. Applied Acoustics (Derby University – Distinction)
HNC Electrical & Electronic Engineering
IOA Diploma in Acoustics & Noise Control
IOA Certificate in Law and Administration
Certificate of Competence in Workplace Noise Assessment
Certificate of Competence in Ground Vibration Monitoring

Affiliations: Member of Institute of Acoustics (MIOA)
Member of Academy of Experts (MAE)
Member of Association of Noise Consultants (ANC)
Incorporated Engineer (I.Eng)


NVC
Noise &
Vibration
Consultants Ltd.

# Appendix 16.1 – Baseline Air Quality

# AIR QUALITY: APPENDIX 16.1

# BASELINE AIR QUALITY DATA

## 1. Existing Baseline Air Quality

1.1. Information on background air quality has been obtained through a review of Defra data, CWACC annual air quality reports and available monitoring data. Available data for the locality is presented below.

1.2. Air Quality Review

1.2.1. As part of the LAQM process, CWACC has declared four Air Quality Management Areas (AQMAs) within the Council area, as detailed below in Table 1.1.

**Table 1.1: AQMAs declared by CWACC**

| AQMA Name | Location | Comment |
|---|---|---|
| Thornton-le-Moors | 70m southwest | declared due to exceedances of short-term $SO_2$ objective; due to industrial sources |
| Frodsham Fluin Lane | 530m south-southeast | declared due to exceedances of long-term $NO_2$ objective; due to vehicle emission sources |
| Whitby Road / Station Road | Ellesmere Port town centre; 4.5km west | |
| Chester City Centre | Chester city centre and ring road; 9.8km southwest | |

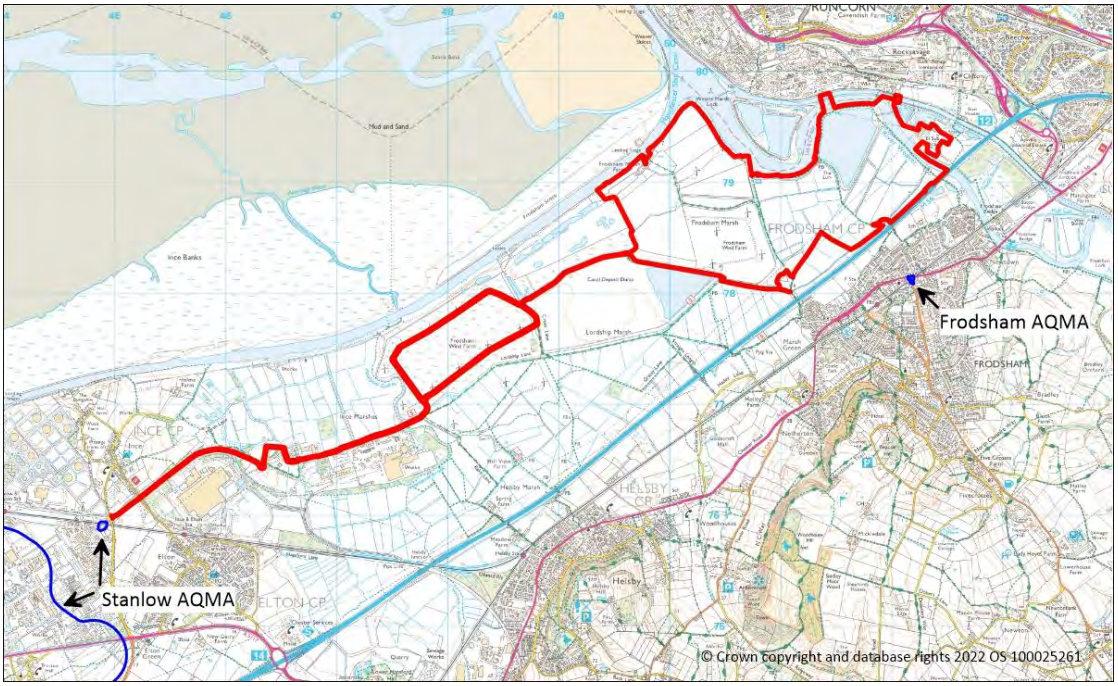
1: Location from given site boundary including access road

1.2.2. The nearest of these to the Site is the Thornton-le-Moors AQMA No 4 which was declared in 2016 due to exceedances of the UK short-term objective for sulphur dioxide ($SO_2$; 15-minute mean). The $SO_2$ arises from industrial sources and extends across the Stanlow refinery and nearby village of Thornton-le-Moors. The AQMA lies to the southwest of the Site and extends to within 70m at its closest point to the Site Boundary.

1.2.3. The next nearest AQMA is at the junction between Fluin Lane and the A56 within Frodsham, approximately 530m to the south-southeast of the boundary at its closest point. The AQMA was declared in 2015 for exceedances of $NO_2$ annual objective. The $NO_2$ arises from vehicle exhaust emissions.

1.2.4. The locations of the closest AQMAs in relation to the Site are provided in Figure 1.1.

**Figure 1.1: Site Location in relation to AQMAs**

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1.3. Predicted Background Data

1.3.1. Defra publishes estimated background pollutant concentration maps for the UK. The background maps are provided for 1km by 1km grid squares across the UK. These are updated on a regular basis due to updates in the underlying data, including emission factors. These are updated on a regular basis due to updates in background data such as vehicle emissions factors. The current maps were issued in 2020 and the predicted data is based on 2018 ambient monitoring and meteorological data. The maps incorporate revised information on the age and distribution of vehicles and emission factors and take into account existing local sources of emissions. Predicted data is provided by Defra for each year from 2018 to 2030[1].

1.3.2. Predicted background air quality data for the key potential pollutants associated with the Proposed Development has been obtained from the Defra website for the pollutants considered in this assessment ($NO_x$, $NO_2$, $PM_{10}$ and $PM_{2.5}$,). Data for the 1km x 1km grid squares in which the Site and receptors considered in the assessment are located is provided in Tables 1.2 and 1.3 below. Data is provided for 2023.

**Table 1.2: Predicted Background Air Quality Data in Site Grid Squares - 2023**

| x | y | Location | Predicted Annual Mean Concentrations (µg/m³) | | | |
|---|---|---|---|---|---|---|
| | | | $NO_2$ | $NO_x$ | $PM_{10}$ | $PM_{2.5}$ |
| 349500 | 379500 | Frodsham Marsh Farm | 10.11 | 13.32 | 9.86 | 6.63 |
| 350500 | 379500 | Weston Marsh | 10.26 | 13.52 | 10.45 | 6.78 |

[1] The projections in the 2018 LAQM background maps are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these maps do not reflect short- or longer-term impacts on emissions in 2020 and beyond resulting from behavioural change during the national or local lockdowns.

| x | y | Location | Predicted Annual Mean Concentrations (µg/m³) | | | |
|---|---|---|---|---|---|---|
| | | | $NO_2$ | $NO_x$ | $PM_{10}$ | $PM_{2.5}$ |
| 351500 | 379500 | River Weaver | 10.77 | 14.22 | 11.05 | 7.00 |
| 352500 | 379500 | River Weaver | 14.26 | 19.29 | 12.87 | 8.00 |
| 348500 | 378500 | Frodsham Score | 10.30 | 13.61 | 10.07 | 6.65 |
| 349500 | 378500 | Frodsham Marsh | 10.09 | 13.27 | 10.02 | 6.61 |
| 350500 | 378500 | Frodsham Marsh | 10.37 | 13.64 | 10.65 | 6.80 |
| 351500 | 378500 | Frodsham Marsh, M56 | 14.10 | 19.03 | 13.75 | 8.14 |
| 352500 | 378500 | Frodsham, M56 | 13.54 | 18.22 | 12.78 | 7.95 |
| 347500 | 377500 | Frodsham Wind Farm | 10.90 | 14.49 | 10.94 | 7.06 |
| 348500 | 377500 | Frodsham Wind Farm | 10.56 | 13.95 | 10.97 | 6.90 |
| 345500 | 376500 | Ince | 14.27 | 19.75 | 11.75 | 8.08 |
| 346500 | 376500 | Ince Marshes | 11.37 | 15.20 | 12.65 | 8.89 |
| 347500 | 376500 | Fertiliser works | 10.58 | 13.99 | 11.05 | 7.03 |
| | | maximum | **14.27** | **19.75** | **13.75** | **8.89** |
| | | **AQAL** | **40** | **30 (v)** | **40** | **25 (10 by 2040)** |

*Data downloaded from Defra website on 23rd February 2023; data released by Defra August 2020; CO and benzene data extrapolated to 2023 in accordance with Defra guidance*

1.3.3. The maximum concentrations of $NO_2$ and $NO_x$ in 2023 are predicted within the grid square of Ince. At 14.27 µg/m³ for $NO_2$ this is substantially below the relevant AQAL for the protection of human health of 40 µg/m³. At 19.75 µg/m³ for $NO_x$ this is below the relevant AQAL for the protection of ecosystems of 30 µg/m³.

1.3.4. The maximum concentrations of $PM_{10}$ and $PM_{2.5}$ in 2023 are similarly substantially below the relevant AQALs.

1.3.5. It should be noted that the data are effectively average concentrations across each 1km grid square. The pollutant concentrations will therefore be higher close to any significant sources, such as main roads, junctions and industrial facilities, including the M56 to the south and local industrial sources.

1.4. Local Authority Monitored Air Quality

1.4.1. CWACC undertakes ambient air quality monitoring within the Council area using a combination of continuous analysers and diffusion tubes. At the time of preparation of this report the latest available air quality report produced by CWACC was the 2022 ASR, which reports data up until the end of 2021. Monitoring considered of relevance to the assessment is discussed below.

*Continuous Monitoring*

1.4.2. During 2017-2021 CWACC undertook monitoring using continuous analysers at three locations in the area surrounding the Site as summarised below:

**Table 1.4: Locations of CWACC Continuous Monitoring**

| Location | Grid Reference | Type | Distance & Orientation from Site | Pollutants Monitored |
|---|---|---|---|---|
| Thornton-Le-Moors (TLP) | 344103 374330 | Industrial | 1.9km SW | $NO_x$ / $NO_2$, $PM_{10}$, $SO_2$ |
| Elton School Lane (ELT) | 345642 375522 | Industrial | 750m SE | $SO_2$ |
| Frodsham (FMH) | 352445 378031 | Urban background | 760m SE | $NO_2$ |

1.4.3. The locations of these monitors in relation to the Site are shown in Figures 1.2 and 1.3.

**Figure 1.2: Location of CWaCC Air Quality Monitoring - Stanlow**

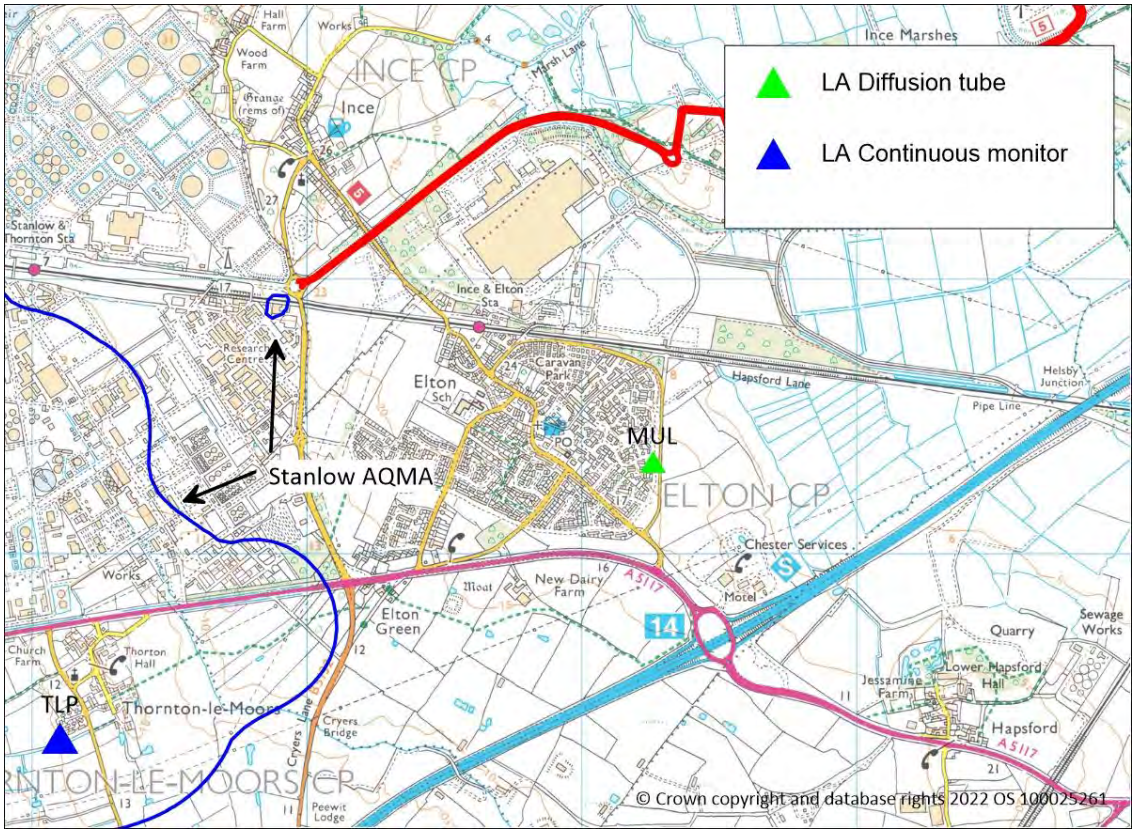


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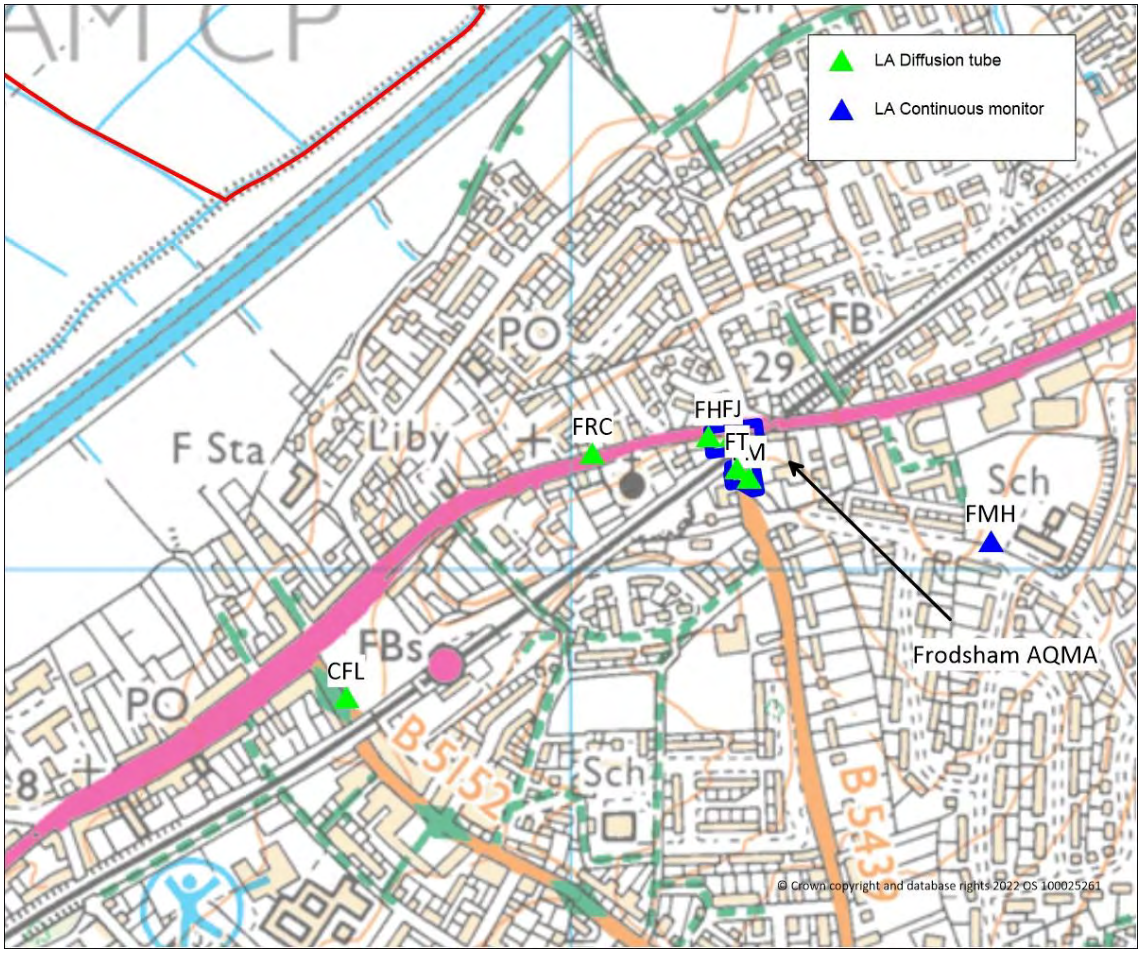
**Figure 1.3: Location of CWaCC Air Quality Monitoring - Frodsham**

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1.4.4. Monitoring data for pollutants over the period 2017-2021 is provided below:

**Table 1.5: Nitrogen Dioxide Monitoring Results**

| Monitor | Annual Means (µg/m$^3$) | | | | |
|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 |
| TLP | 13 | 13 | 13 | 9 | 11 |
| FMH | 14 | 14 | 15 | 13 | 15 |

**Table 1.6: Nitrogen Dioxide Monitoring Results**

| Monitor | Hourly means >200 µg/m$^3$ | | | | |
|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 |
| TLP | 0 | 0 | 0 | 0 | 0 |
| FMH | 0 | 0 | 0 | 0 | 0 |

Not to be exceeded more than 18 times a year

**Table 1.7: $PM_{10}$ Monitoring Results**

| Monitor | Annual Means (µg/m$^3$) | | | | |
|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 |
| TLP | 13 | 13 | 14 | 13 | 13 |
| FMH | 13 | 16 | 15 | 12 | 13 |

**Table 1.8: $PM_{10}$ Monitoring Results**

| Monitor | 24-hour means >50 µg/m$^3$ (90.4$^{th}$ %ile) | | | | |
|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 |
| TLP | 2 | 0 | 3 | 0 | 0 |
| FMH | 0 | 0 | 1 | 0 | 0 |

Not to be exceeded more than 35 times a year

*Diffusion Tubes*

1.4.5. CWACC undertakes non-automatic diffusion tube monitoring for $NO_2$ across its area. Information on the diffusion tubes utilised within the vicinity of the Site (all roadside monitoring sites) is provided below.

**Table 1.10: Diffusion Tube Site Information**

| Tube Ref | Grid Reference | Distance and Orientation from Site boundary |
|---|---|---|
| **FH** | 352146 378139 | 510m SE |
| **FJ** | 352171 378140 | 515m SE |
| **FM** | 352189 378094 | 570m SE |
| **FRC** | 352023 378121 | 440m SE |
| **FT** | 352176 378105 | 555m SE |
| **CFL** | 351762 377862 | 540m S |
| **MUL** | 346258 375321 | 1.1km S |

**Table 1.11: Summary of Diffusion Tube $NO_2$ Monitoring Data**

| Tube Ref | Annual Mean Concentrations (µg/m$^3$) | | | | |
|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 |
| **FH** | 39.4 | 38.5 | 36.9 | 27.4 | 28.8 |
| **FJ** | **40.5** | 38.2 | 36.9 | 28.6 | 28.3 |
| **FM** | 33.2 | 35.0 | 29.4 | 24.3 | 28.5 |
| **FRC** | n/a | 34.0 | 31.0 | 24.3 | 25.6 |
| **FT** | 34.2 | 21.1 | 29.8 | 23.7 | 24.1 |
| **CFL** | 30.4 | 30.5 | 29.9 | 21.6 | 23.3 |
| **MUL** | n/a | n/a | 16.8 | 13.4 | 14.2 |

1.5. Industrial Emissions and Other Sources

1.5.1. The Site is located in a mixed-use area with several existing industrial facilities in the vicinity as well as nearby residential areas. Such facilities include the former CF Fertilizers UK plant and Encirc Glass Ltd (a bottle manufacturing plant), to the immediate south of the access road. The Stanlow Refinery Complex, forming a significant industrial facility, extends to within 1.3 km to the west / southwest. Rocksavage Power Station is located approximately 230m north of the northeastern-most Site boundary. Air emissions from such existing facilities will be incorporated within existing monitoring data and modelling undertaken to inform Defra predicted background data.

1.5.2. Emissions from recently constructed facilities (2018 onwards), and any proposed facilities, will not be incorporated within the current Defra background dataset.

# Appendix 17.1 – Glint and Glare Assessment

PAGERPOWER
Urban & Renewables

# Glint and Glare Preliminary Work

## Axis P.E.D. Ltd

## Frodsham Solar

November 2022

# ADMINISTRATION PAGE

| | |
|---|---|
| **Job Reference:** | 11428B |
| **Date:** | November 2022 |
| **Author:** | Michael Sutton |
| **Telephone:** | [redacted] |
| **Email:** | [redacted] |

| | |
|---|---|
| **Reviewed By:** | [redacted] |
| **Email:** | [redacted] |

| Issue | Date | Detail of Changes |
|---|---|---|
| 1 | 03 November 2022 | Initial issue |
| 2 | 14 November 2022 | Assessment of entire site boundary |



*Stour Valley Business Centre, Brundon Lane, Sudbury, CO10 7GB*

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# INTRODUCTION

## Overview

Pager Power was retained to assess the possible effects of glint and glare from a solar photovoltaic (PV) development located northwest of Frodsham, Cheshire. This document presents preliminary glint and glare modelling and impact significance classification for the receptors to be included within the glint and glare topic of the DCO application.

This document pertains to the possible effects upon road safety, residential amenity and aviation activity associated with Liverpool John Lennon Airport.

The methodology and assumptions are not included within this document and will be included within the glint and glare assessment used for submission.

## Reflector Area

The assessed solar panel area is shown in Figure 1 below.


Figure 1 *Assessed reflector area*

# GEOMETRIC CALCULATION RESULTS

## Overview

The Pager Power and Forge model[1] have been used to determine whether reflections are possible. Intensity calculations (Forge Model) in line with the Sandia National Laboratories methodology have been undertaken for aviation receptors. These calculations are routinely required for solar photovoltaic developments on or near aerodromes. The intensity model calculates the expected intensity of a reflection with respect to the potential for an after-image (or worse) occurring. The designation used by the model is presented in Table 1 below along with the associated colour coding.

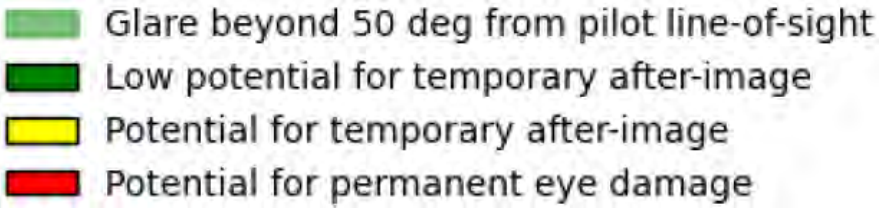
| Coding Used | Intensity Key |
|---|---|
| Glare beyond 50° |  |
| Low potential | |
| Potential | |
| Potential for permanent eye damage | |



Table 1 *Glare intensity designation*

This coding has been used in the table where a reflection has been calculated and is in accordance with Sandia National Laboratories' methodology.

In addition, the intensity model allows for the assessment of a variety of solar panel surface materials. In the first instance, a surface material of 'smooth glass without an anti-reflective coating' is assessed. This is the most reflective surface and allows for a 'worst case' assessment. Other surfaces that could be modelled include:

- Smooth glass with an anti-reflective coating;
- Light textured glass without an anti-reflective coating;
- Light textured glass with an anti-reflective coating; or
- Deeply textured glass.

If significant glare is predicted, modelling of less reflective surfaces could be undertaken. The tables in the following subsections summarise the time (am or pm) and intensity for a solar reflection that could be experienced by a receptor.

[1] Aviation receptors only.

## Geometric Calculation Results Overview – Liverpool John Lennon Airport

### ATC Tower

The results of the geometric calculation for the ATC Tower are presented in Table 2 below.

| Solar Reflection Geometrically Possible Toward the ATC Tower? (GMT) | | Glare Type | Comment |
|---|---|---|---|
| am | pm | | |
| No. | No. | N/A | No solar reflections geometrically possible.<br>No impact predicted. |

Table 2 *Geometric analysis results for the ATC tower*

### Runway Approaches

The results of the geometric calculations for the runway approaches are presented in Table 3 below.

| Approach | Solar Reflection Geometrically Possible Toward the Runway Approach? (GMT) | | Worst-Case Glare Type | Comment |
|---|---|---|---|---|
| | am | pm | | |
| 09 | No. | No. | N/A | No solar reflections geometrically possible.<br>No impact predicted. |
| 27 | | | | |

Table 3 *Geometric analysis results for the runway approaches*

### Visual Circuits

The results of the geometric calculations for the visual circuits are presented in Table 4 below.

| Circuit | Solar Reflection Geometrically Possible Toward the Visual Circuit? (GMT) | | Worst-Case Glare Type | Comment |
|---|---|---|---|---|
| | am | pm | | |
| 09 RH | Yes. | No. | | Solar reflections with a maximum of 'low potential for temporary after-image' predicted.<br>Low impact predicted. |

| Circuit | Solar Reflection Geometrically Possible Toward the Visual Circuit? (GMT) | | Worst-Case Glare Type | Comment |
|---|---|---|---|---|
| | am | pm | | |
| 27 RH | No. | No. | N/A | No solar reflections geometrically possible.<br>No impact predicted. |

Table 4 *Geometric analysis results for the visual circuits*

## Geometric Calculation Results Overview – Road Receptors

The results of the geometric calculations for the identified road receptors are presented in Table 5 below.

| Receptor | Solar Reflection Geometrically Possible Toward the Road Receptors? (GMT) | | Comment |
|---|---|---|---|
| | am | pm | |
| 1 – 3 | No. | No. | No solar reflections geometrically possible.<br>No impact predicted. |
| 4 – 36 | No. | Yes. | Solar reflections will be significantly obstructed by surrounding dwellings.<br>No impact predicted. |
| 37 – 45 | No. | No. | No solar reflections geometrically possible.<br>No impact predicted. |
| 46 – 55 | No. | Yes. | Solar reflections will be significantly obstructed by existing vegetation.<br>No impact predicted. |
| 56 | No. | Yes. | Views of the reflecting panels cannot be ruled out along this section of road.<br>Solar reflections are predicted to be experienced from outside a road user's primary horizontal field of view.<br>Low impact predicted. |

| Receptor | Solar Reflection Geometrically Possible Toward the Road Receptors? (GMT) | | Comment |
|---|---|---|---|
| | am | pm | |
| 57 | No. | Yes. | Views of the reflecting panels cannot be ruled out along this section of road.<br>Solar reflections are predicted to be experienced from inside a road user's primary horizontal field of view.<br>Moderate impact predicted. |
| 58 – 60 | No. | Yes. | Solar reflections will be significantly obstructed by existing vegetation.<br>No impact predicted. |
| 61 – 63 | No. | Yes. | Views of the reflecting panels cannot be ruled out along this section of road.<br>Solar reflections are predicted to be experienced from inside a road user's primary horizontal field of view.<br>Moderate impact predicted. |
| 64 | No. | Yes. | Solar reflections will be significantly obstructed by existing vegetation.<br>No impact predicted. |
| 65 – 71 | No. | Yes. | Views of the reflecting panels cannot be ruled out along this section of road.<br>Solar reflections are predicted to be experienced from outside a road user's primary horizontal field of view.<br>Low impact predicted. |
| 72 – 76 | No. | Yes. | Solar reflections will be significantly obstructed by existing vegetation.<br>No impact predicted. |

| Receptor | Solar Reflection Geometrically Possible Toward the Road Receptors? (GMT) | | Comment |
|---|---|---|---|
| | am | pm | |
| 77 – 129 | No. | No. | No solar reflections geometrically possible.<br>No impact predicted. |

Table 5 *Geometric analysis results for the identified road receptors*

## Geometric Calculation Results Overview – Dwelling Receptors

The results of the geometric calculations for the identified dwelling receptors are presented in Table 6 below.

| Receptor | Solar Reflection Geometrically Possible Toward the Dwelling Receptors? (GMT) | | Comment |
|---|---|---|---|
| | am | pm | |
| 1 – 11 | No. | No. | No solar reflections geometrically possible.<br>No impact predicted. |
| 12 – 36 | No. | Yes. | Solar reflections will be significantly obstructed by existing vegetation and surrounding dwellings.<br>No impact predicted. |
| 37 – 66 | No. | Yes. | Views of the reflecting panels cannot be ruled out for some dwellings associated with these receptors.<br>Solar reflections are predicted to be experienced for more than three months per year but less than 60 minutes per day.<br>Mitigating factors sufficiently reduce the level of impact.<br>Low impact predicted. |

| Receptor | Solar Reflection Geometrically Possible Toward the Dwelling Receptors? (GMT) | | Comment |
|---|---|---|---|
| | am | pm | |
| 67 – 91 | No. | Yes. | Views of the reflecting panels cannot be ruled out for some dwellings associated with these receptors.<br>Solar reflections are predicted to be experienced for more than three months per year but less than 60 minutes per day.<br>Moderate impact predicted. |
| 92 – 110 | No. | Yes. | Solar reflections will be significantly obstructed by existing vegetation and surrounding dwellings.<br>No impact predicted. |
| 111 – 113 | No. | Yes. | Solar reflections will be significantly obstructed by agricultural buildings and railway bridge.<br>No impact predicted. |
| 114 – 143 | No. | No. | No solar reflections geometrically possible.<br>No impact predicted. |

Table 6 *Geometric analysis results for the identified dwelling receptors*

# HIGH-LEVEL MITIGATION OVERVIEW

## Overview

Based on the results of the geometric modelling, the relevant reflecting areas that should be obscured from view (yellow icons) and potential screening locations (pink lines) have been defined in this section.

The required height will depend on the relative elevation of the receptors, the base of the planting itself, and the reflecting panels.

## Roads

The reflecting panel areas and potential screening locations for the road receptors are shown in Figure 2 below.

Views of the reflecting panels should be obstructed for general road users and elevated drivers as it is a dual carriageway.

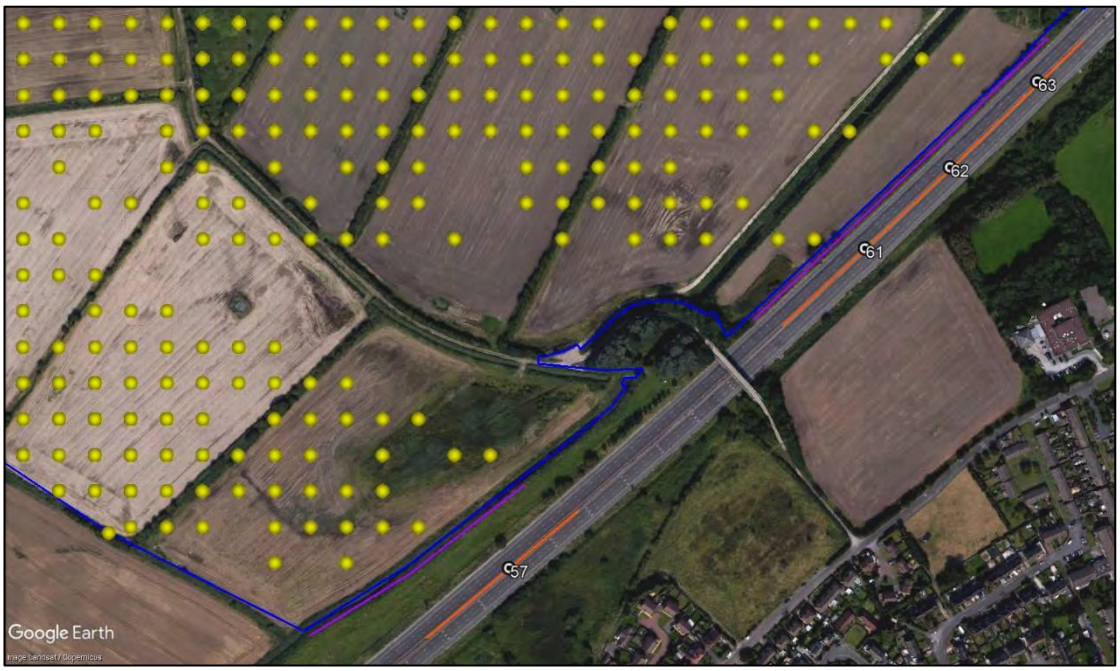



Figure 2 *Potential mitigation for road receptors*

## Dwellings

The reflecting panel areas and potential screening locations for the dwelling receptors are shown in Figure 3 on the following page.

Views of the reflecting panels should be obstructed from the ground floor at a minimum.


Figure 3 *Potential mitigation for dwelling receptors*

# PRELIMINARY CONCLUSIONS

## Assessment Results – Aviation

No solar reflections are geometrically possible towards the ATC Tower, the 2-mile approaches towards runway 09/27, and RWY27 right-hand visual circuit.

Solar reflections with a maximum of 'low potential for temporary after-image' are predicted towards the RWY09 right-hand visual circuit.

No significant impacts upon aviation activity associated with Liverpool John Lennon Airport are predicted.

## Assessment Result – Roads

The modelling has shown that solar reflections are geometrically possible towards road users along a total of approximately 6.2km across the M56, A56, Main Street, B5152, and B5394.

For road users along approximately 4.9km of the assessed roads, views of the reflecting panels are predicted to be significantly obstructed by screening in the form of existing vegetation and surrounding dwellings.

A low impact is predicted upon road users along approximately 800m of the assessed roads because all visible solar reflections are predicted to occur from outside a road user's primary horizontal field of view (50 degrees either side of the direction of travel). No mitigation is recommended.

A moderate impact is predicted upon road users along two sections of the M56, totalling approximately 500m. Mitigation for these sections of road is recommended.

## Assessment Results – Dwellings

The modelling has shown that solar reflections are geometrically possible towards 100 of the 143 assessed dwelling receptors.

For observers within 46 of these dwellings, views of the reflecting panels are predicted to be significantly obstructed due to screening in the form of existing vegetation, surrounding dwellings, agricultural buildings, and/or a railway bridge.

A low impact is predicted upon observers within 30 of the assessed dwellings because effects are predicted to be experienced for more than three months per year, yet there are sufficient mitigating factors that significantly reduce the level of impact. No mitigation is recommended.

A moderate impact is predicted upon observers within 24 of the assessed dwellings. Mitigation for these dwellings is recommended.

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# Appendix 17.2 – Agricultural Land Classification and Soil Resources Survey

April 2023

# Axis PED

# Agricultural Land Classification and Soil Resources

at

Frodsham Solar DCO, Frodsham, Cheshire

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**RG8 0RR**

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## Table of Contents

# 1 Introduction

1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Axis PED to investigate the Agricultural Land Classification (ALC) and soil resources of land at Frodsham Solar DCO, Frodsham, Cheshire, by means of a detailed survey of soil and site characteristics.

1.2 Guidance for assessing the quality of agricultural land in England and Wales is set out in the Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria for grading the quality of agricultural land[1], and summarised in Natural England's Technical Information Note (TIN) 049[2].

1.3 Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. The principal physical factors influencing grading are climate, site conditions and soil which, together with interactions between them, form the basis for classifying land into one of the five grades.

1.4 Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use. Grade 2 is very good quality agricultural land, with minor limitations which affect crop yield, cultivations or harvesting. Grade 3 land has moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield, and is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Grade 4 land is poor quality agricultural land with severe limitations which significantly restrict the range of crops and/or level of yields. Grade 5 is very poor quality land, with very severe limitations which restrict use to permanent pasture or rough grazing.

1.5 Land which is classified as Grades 1, 2 and 3a in the ALC system is defined as best and most versatile (BMV) agricultural land.

1.6 As explained in Natural England's TIN049, the whole of England and Wales was mapped from reconnaissance field surveys in the late 1960s and early 1970s, to provide general strategic guidance on agricultural land quality for planners. This Provisional Series of maps was published

[1] **MAFF (1988).** *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land*. MAFF Publications.

[2] **Natural England (2012).** *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land*, Second Edition.

on an Ordnance Survey base at a scale of One Inch to One Mile (1:63,360). The Provisional ALC map shows the site as Grade 3. However, TIN049 explains that:

> *"These maps are not sufficiently accurate for use in assessment of individual fields or development sites, and should not be used other than as general guidance. They show only five grades: their preparation preceded the subdivision of Grade 3 and the refinement of criteria, which occurred after 1976. They have not been updated and are out of print. A 1:250 000 scale map series based on the same information is available. These are more appropriate for the strategic use originally intended …"*

1.7 TIN049 goes on to explain that a definitive ALC grading should be obtained by undertaking a detailed survey according to the published guidelines, at an observation density of one boring per hectare. This survey follows the detailed methodology set out in the ALC guidelines.

## 2 Site and climatic conditions

### General features, land form and drainage

2.1 The site extends to 290.2ha of land on the north-western side of Frodsham and is mainly in agricultural use. Approximately 34ha in the north is non-agricultural land under trees and scrub, which is a former dredging deposit ground for the Weaver Navigation and has been left to scrub over. The area to the west is a former canal dredgings deposit ground and is used for sheep grazing, and includes the Frodsham Wind Farm. The central area is former agricultural land which is now used to create habitat to encourage wildfowl for shooting, with the land left fallow and some scrapes and ponds created within it. The area to the east is used for arable farming with some areas left fallow also for wildfowling.

2.2 The site is bounded to the east by the M56, to the north-west and north by the Manchester Ship Canal and the River Weaver respectively and to the south-west by other non-agricultural land, shown on the Ordnance Survey mapping as the 'Canal Deposit Dump'.

2.3 There is an overall very shallow slope across the site, from around 13m above Ordnance Datum (AOD) in the west to 5m AOD in the east. Drainage of the site is through the soil profile and through a network of ditches in the eastern half of the area. Water is directed toward the River Weaver.

## Agro-climatic conditions

2.4 Agro-climatic data for the site have been interpolated from the Meteorological Office's standard 5km grid point dataset at a representative altitude of 6m AOD, and are given in Table 1. The climate at the site is warm and moist. Moisture deficits are moderate. The number of Field Capacity Days is larger than is average for lowland England (150) and is unfavourable for providing opportunities for agricultural field work. There is no overriding climatic limitation to agricultural land quality.

**Table 1:** Local agro-climatic conditions

| Parameter | Value |
|---|---|
| Average Annual Rainfall | 750mm |
| Accumulated Temperatures >0°C | 1,453 day° |
| Field Capacity Days | 177 days |
| Average Moisture Deficit, wheat | 97mm |
| Average Moisture Deficit, potatoes | 87mm |

## Soil parent material and soil type

2.5 The underlying geology mapped by the British Geological Survey[3] comprises three formations belonging to the Sherwood Sandstone Group. The group includes red, yellow and brown, part pebbly sandstone.

2.6 Superficial tidal flat deposits are mapped across the site and include unconsolidated mud and/or sand.

2.7 The Soil Survey of England and Wales soil association mapping[4] (1:250,000 scale) shows the Downholland 2 association across the site, characterised by deep, stoneless, clayey soils developed in marine alluvium. The drainage status of the soils is dependent upon the type and extent of artificial drainage, and can vary from Wetness Class (WC) I to V[5].

[3] **British Geological Survey (2023).** *BGS Geology Viewer*, https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/

[4] **Soil Survey of England and Wales (1984).** *Soils of Northern England* (1:250,000), Sheet 1

[5] **Jarvis et al (1984).** *Soils and Their Use in Northern England*. Soil Survey of England and Wales Bulletin 10, Harpenden.

# 3 Agricultural land quality

### Soil survey methods

3.1 In total, 79 soil profiles were examined using an Edelman (Dutch) auger at an observation density of approximately one per hectare within the current agricultural areas but at a lower density in the western and central areas. Two soil pits were also excavated to examine subsoil structures and stone content. The locations of observations are indicated on Figure RAC/9921/1. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 120cm or any impenetrable layer:

- soil texture;
- significant stoniness;
- colour (including localised mottling);
- consistency;
- structural condition;
- free carbonate; and
- depth.

3.2 Two topsoil samples were submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are presented in Appendix 1.

3.3 Soil Wetness Class (WC) was determined from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling, and slowly permeable subsoil layers at least 15cm thick, in relation to the number of Field Capacity Days at the location.

3.4 Soil droughtiness was investigated by the calculation of moisture balance equations (given in Appendix 2). Crop-adjusted Available Profile Water (AP) is estimated from texture, stoniness and depth, and then compared to a calculated moisture deficit (MD) for the standard crops wheat and potatoes. The MD is a function of potential evapotranspiration and rainfall. Grading of the land can be affected if the AP is insufficient to balance the MD and droughtiness occurs.

**Agricultural land classification and site limitations**

3.5 Assessment of agricultural land quality has been carried out according to the revised ALC guidelines[1]. Soil profiles have been described according to Hodgson[6] which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.

3.6 Agricultural land quality across the site is limited by soil wetness to Subgrade 3b and Grade 4.

Subgrade 3b

3.7 The main soil type of Subgrade 3b includes topsoil of heavy clay loam or clay which is of 35-40cm depth and very dark brown or very dark grey (10YR2/2 or 10YR3/1 in the Munsell soil colour charts[7]). Upper subsoil horizons are clay or heavy clay loam which is mainly greyish brown (10YR5/2) although there is some minor variation between profiles. The upper subsoil is permeable but passes to slowly permeable silty clay or clay lower subsoil horizons which generally become more grey with depth (e.g. to 10YR3/1). The soil profiles are in WC II or III depending on the depth to the slowly permeable lower subsoil and are limited to Subgrade 3b due to the heavy topsoil textures.

3.8 A lighter soil type is also limited by wetness to Subgrade 3b and includes sandy clay loam or loamy medium sand topsoil. There is occasionally a distinct organic black (10YR2/1) surface layer of around 10cm thickness. The upper subsoil is loamy sand, sandy loam or sandy clay loam which is greyish brown or brown (10YR5/2 or 10YR5/3), and which passes to greyish slowly permeable clay at medium depth such that the profiles are in WC IV. The medium-textured topsoils result in a wetness limitation to Subgrade 3b.

Grade 4

3.9 There is one main soil type of Grade 4 found across the site in areas that were frequently observed to be waterlogged at the surface. The topsoil is silty clay, clay or heavy clay loam which is very dark brown, dark grey or very dark grey (10YR2/2, 10YR3/1 or 10YR4/1). The topsoil is mottled with ochreous stains and is often gleyed. The structure is weakly developed with medium subangular blocky peds. The topsoil had a firm consistency in the location of Pit 1 and a friable consistency at Pit 2. Many roots and pores were observable in both pits.

3.10 The upper subsoils are clay or silty clay and are dark greyish brown, greyish brown or dark grey (10YR4/2, 10YR5/2 or 2.5Y4/1). Occasionally there is a thin intermittent layer of sandier texture.

[6] **Hodgson, J. M. (Ed.) (1997).** *Soil survey field handbook.* Soil Survey Technical Monograph No. 5, Silsoe.

[7] **Munsell Color (2009).** *Munsell Soil Color Book*. Grand Rapids, MI, USA

The (silty) clay textured subsoils form coarse angular blocks and are slowly permeable. Lower subsoils are similar but become progressively more grey.

3.11 The soil profiles are in WC IV or occasionally in WC III. With heavy topsoil textures, there is a severe wetness limitation to Grade 4.

3.12 The ALC distribution within the site is shown in Figure RAC/9921/2 and the areas of each grade are given in Table 2. Photographs taken at the site are given in Appendix 3.

**Table 2:** ALC areas

| Grade | Description | Area (ha) | % |
|---|---|---|---|
| Subgrade 3b | Moderate quality | 47.7 | 16 |
| Grade 4 | Poor quality | 179.1 | 62 |
| Non-agricultural | | 63.4 | 22 |
| Total | | 290.2 | 100 |

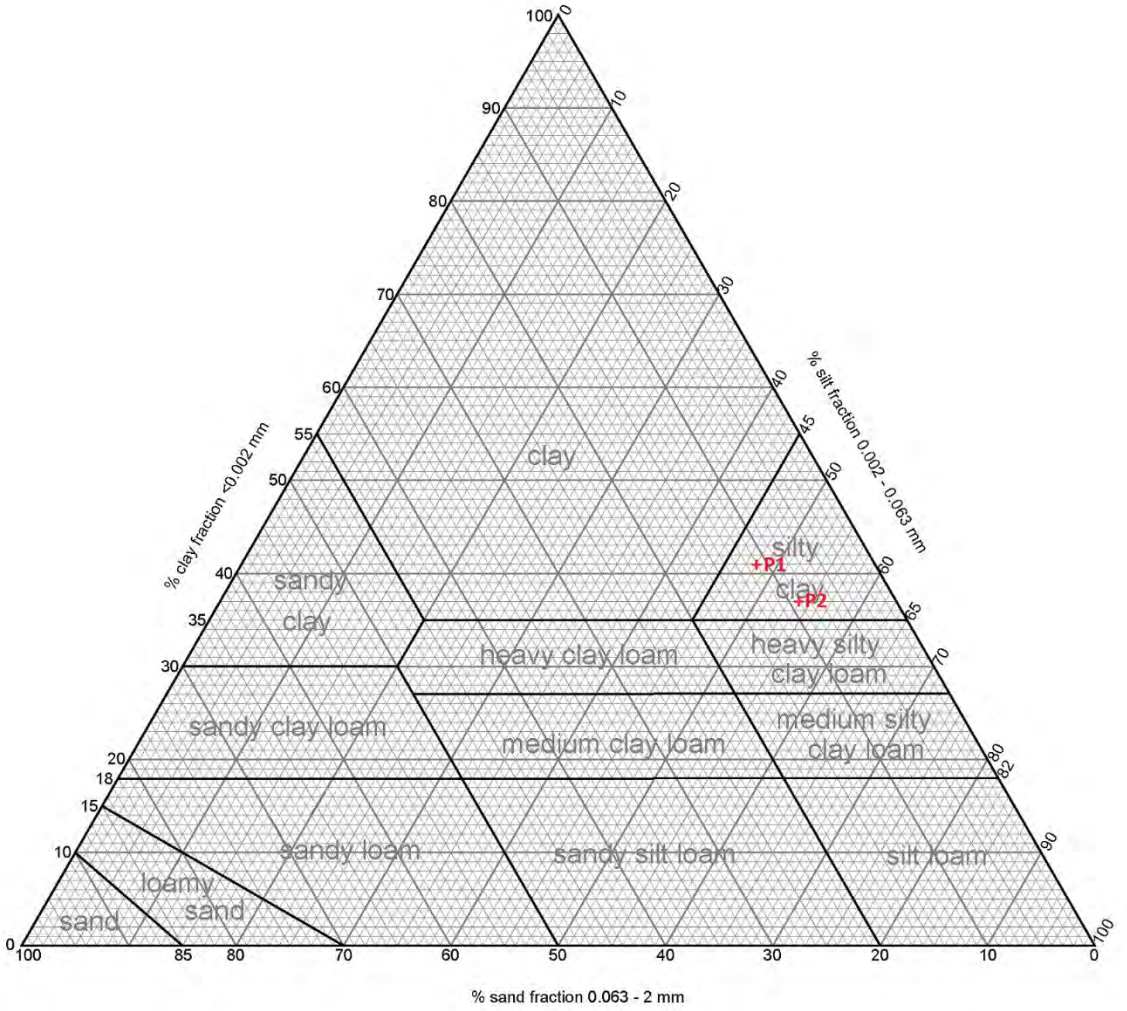
# Appendix 1: Laboratory Data

| Determinand | Pit 1 | Pit 2 | Units |
|---|---|---|---|
| Sand 2.00-0.063 mm | 11 | 9 | % w/w |
| Silt 0.063-0.002 mm | 48 | 54 | % w/w |
| Clay <0.002 mm | 41 | 37 | % w/w |
| Organic Matter | 7.8 | 5.2 | % w/w |
| Texture | Silty Clay | Silty Clay | |

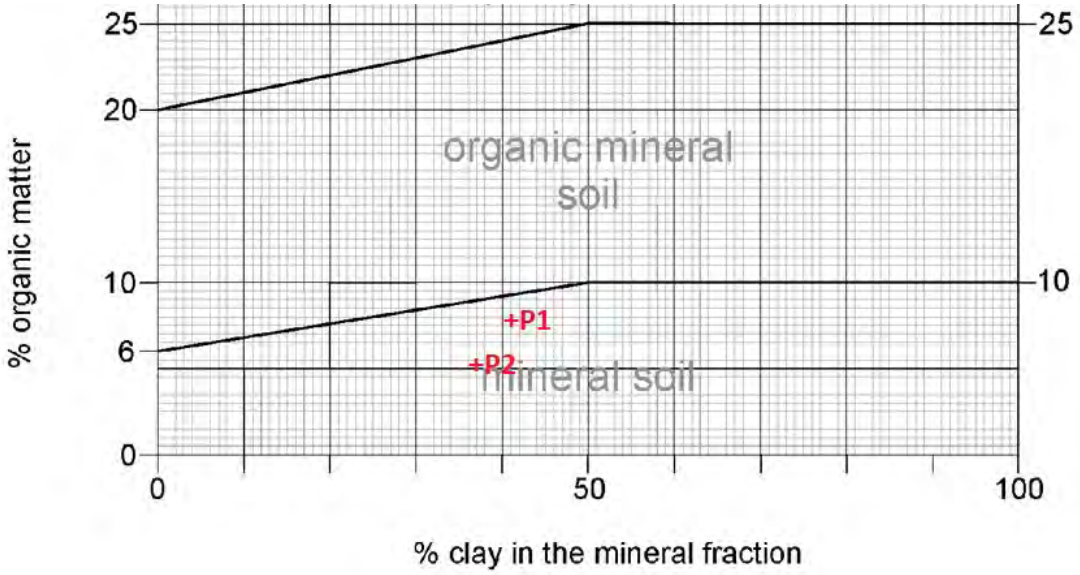
| Determinand | Pit 1 | Pit 2 | Units |
|---|---|---|---|
| Soil pH | 7.2 | 8.2 | |
| Phosphorus (P) | 59.0 | 87.4 | mg/l (av) |
| Potassium (K) | 209 | 298 | mg/l (av) |
| Magnesium (Mg) | 164 | 225 | mg/l (av) |

| Determinand | Pit 1 | Pit 2 | Units |
|---|---|---|---|
| Phosphorus (P) | 4 | 5 | ADAS Index |
| Potassium (K) | 2+ | 3 | ADAS Index |
| Magnesium (Mg) | 3 | 4 | ADAS Index |

## Soil Texture by Particle Size Analysis




## Organic Matter Class



# Appendix 2: Soil Profile Summaries and Droughtiness Calculations

Wetness / workability limitations are determined according to the methodology given in Appendix 3 of the ALC guidelines, MAFF 1988

Droughtiness calculations are made according to the methodology given in Appendix 4 of the ALC guidelines, MAFF 1988.

Grades are shown for drought, wetness and any other soil or site factors which are relevant. The overall Grade is set by the most limiting factor and shown on the right.

| **Stone types** | | |
|---|---|---|
| % | TAv | EAv |
| hard | 1 | 0.5 |
| chalk | 10 | 7 |

| **Climate Data** | |
|---|---|
| MDwheat | 97 |
| MDpotato | 87 |
| FCD | 177 |

| **Wetness Class Guidelines** | *II* | *III* | *IV* | *V* |
|---|---|---|---|---|
| SPL within 80cm, gleying within 40cm | >75cm | 47-75cm | <47cm | |
| SPL within 80cm, gleying at 40-70cm | >61cm | <61cm | | |
| No SPL but gleying within 40cm | coarse subsoil | *I* | other cases | *II* |

hard flint & pebble

Maximum depth of auger penetration is underlined

| Site No. | | Depth cm | | Texture | $CaCO_3$ | Colour | Mottle colour | abund-ance | stone% hard | stone% chalk | Struct-ure | APwheat mm | AP potato mm | Gley | SPL | WC | Wetness grade WE | Final Grade | Limiting Factor(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | T | 0 | 40 | hCL | | 10YR3/2 | och | mmd | 1 | | | 71 | 71 | (y) | n | *IV* | 4 | **4** | WE |
| | | 40 | 120 | C | | 10YR4/2 | och | mmd | 1 | | poor | 61 | 39 | y | y | | | | |
| | | | | | | | | | | | Total | **133** | **110** | | | | | | |
| | | | | | | | | | | | MD | 36 | 23 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | | 1 | 1 | | | | | | |
| **2** | T | 0 | 27 | hCL | | 10YR2/2 | och | fmd | 1 | | | 48 | 48 | n | n | *IV* | 4 | **4** | WE |
| | | 27 | 120 | C | | 10YR4/2 | och | cmp | 1 | | poor | 78 | 55 | y | y | | | | |
| | | | | | | | | | | | Total | **126** | **104** | | | | | | |
| | | | | | | | | | | | MD | 29 | 17 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | | 2 | 1 | | | | | | |
| **3/P1** | T | 0 | 28 | hCL | | 10YR2/2 | och | fmd | 1 | | | 50 | 50 | n | n | *IV* | 4 | **4** | WE |
| | | 28 | 120 | C | | 10YR4/2 | och | cmp | 1 | | poor | 77 | 54 | y | y | | | | |
| | | | | | | | | | | | Total | **127** | **104** | | | | | | |
| | | | | | | | | | | | MD | 30 | 17 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | | 1 | 1 | | | | | | |
| **4** | T | 0 | 28 | hCL | | 10YR2/2 | och | mmd | 1 | | | 50 | 50 | (y) | n | *IV* | 4 | **4** | WE |
| | | 28 | 120 | C | | 10YR3/2 | och | cmd | 1 | | poor | 77 | 54 | y | y | | | | |
| | | | | | | | | | | | Total | **127** | **104** | | | | | | |
| | | | | | | | | | | | MD | 30 | 17 | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **5** | T | 0 | 34 | hCL | 10YR2/2 | och | mmd | 1 | | 61 | 61 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 34 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 69 | 46 | y | y | | | | | |
| | | | | | | | | | Total | **130** | **107** | | | | | | | |
| | | | | | | | | | MD | 33 | 20 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **6** | T | 0 | 35 | hCL | 10YR2/2 | och | mmd | 1 | | 61 | 61 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 35 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 69 | 46 | y | y | | | | | |
| | | | | | | | | | Total | **130** | **107** | | | | | | | |
| | | | | | | | | | MD | 33 | 20 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **7** | T | 0 | 35 | hCL | 10YR2/2 | och | fmd | 1 | | 62 | 62 | n | n | *IV* | 4 | **4** | WE | |
| | | 35 | 120 | C | 10YR3/2 | och | cmd | 1 | poor | 68 | 45 | y | y | | | | | |
| | | | | | | | | | Total | **130** | **107** | | | | | | | |
| | | | | | | | | | MD | 33 | 20 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **8** | T | 0 | 40 | hCL | 10YR2/2 | och | mmd | 1 | | 71 | 71 | (y) | n | *III* | 3b | **3b** | WE | |
| | | 40 | 65 | C | 10YR3/2 | och | cmd | 1 | poor | 28 | 40 | (y) | y | | | | | |
| | | 65 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 38 | 6 | y | y | | | | | |
| | | | | | | | | | Total | **137** | **117** | | | | | | | |
| | | | | | | | | | MD | 40 | 30 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **9** | T | 0 | 40 | hCL | 10YR2/2 | och | mmd | 1 | | 71 | 71 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 40 | 120 | C | 10YR3/2 | och | cmd | 1 | poor | 61 | 39 | y | y | | | | | |
| | | | | | | | | | Total | **133** | **110** | | | | | | | |
| | | | | | | | | | MD | 36 | 23 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **10** | T | 0 | 24 | hCL | 10YR2/2 | och | mmd | 1 | | 43 | 43 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 24 | 62 | C | 10YR4/2 | och | cmd | 1 | poor | 42 | 49 | y | y | | | | | |
| | | 62 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | 40 | 10 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **101** | | | | | | | |
| | | | | | | | | | MD | 28 | 14 | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **11** | T | 0 | 20 | hCL | 10YR2/2 | och | mmd | 1 | | 36 | 36 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 20 | 45 | C | 10YR4/2 | och | cmd | 1 | poor | 32 | 32 | y | y | | | | | |
| | | 45 | 60 | C | 10YR4/2 | och | cmd | 1 | poor | 13 | 19 | y | y | | | | | |
| | | 60 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 42 | 13 | y | y | | | | | |
| | | | | | | | | | Total | **123** | **100** | | | | | | | |
| | | | | | | | | | MD | 26 | 13 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **12** | T | 0 | 28 | hCL | 10YR2/2 | och | mmd | 1 | | 50 | 50 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 28 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 77 | 54 | y | y | | | | | |
| | | | | | | | | | Total | **127** | **104** | | | | | | | |
| | | | | | | | | | MD | 30 | 17 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **13** | T | 0 | 30 | hCL | 10YR2/2 | och | mmd | 1 | | 53 | 53 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **128** | **105** | | | | | | | |
| | | | | | | | | | MD | 31 | 18 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **14** | T | 0 | 27 | hCL | 10YR2/2 | och | cmd | 1 | | 48 | 48 | n | n | *IV* | 4 | **4** | WE | |
| | | 27 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 78 | 55 | y | y | | | | | |
| | | | | | | | | | Total | **126** | **104** | | | | | | | |
| | | | | | | | | | MD | 29 | 17 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **15** | T | 0 | 27 | hCL | 10YR2/2 | och | cmd | 1 | | 48 | 48 | n | n | *IV* | 4 | **4** | WE | |
| | | 27 | 120 | hCL | 10YR4/3 | och | cmd | 1 | poor | 76 | 51 | y | y | | | | | |
| | | | | | | | | | Total | **124** | **99** | | | | | | | |
| | | | | | | | | | MD | 27 | 12 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **16** | T | 0 | 40 | hCL | 10YR2/2 | och | cmd | 1 | | 71 | 71 | n | n | *IV* | 4 | **4** | WE | |
| | | 40 | 120 | C | 10YR4/2 | och | cmp | 1 | poor | 61 | 39 | y | y | | | | | |
| | | | | | | | | | Total | **133** | **110** | | | | | | | |
| | | | | | | | | | MD | 36 | 23 | | | | | | | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **17** | T | 0 | 24 | C | 10YR2/2 | och | cmd | 1 | | | 40 | 40 | n | n | *IV* | 4 | **4** | WE | |
| | | 24 | 55 | C | 10YR4/2 | och | cmd | 1 | poor | | 37 | 40 | y | y | | | | | |
| | | 55 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | | 45 | 18 | y | y | | | | | |
| | | | | | | | | | | Total | **122** | **98** | | | | | | | |
| | | | | | | | | | | MD | 25 | 11 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **18** | T | 0 | 40 | C | 10YR2/2 | och | cmd | 1 | | | 67 | 67 | n | n | *IV* | 4 | **4** | WE | |
| | | 40 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | | 60 | 36 | y | y | | | | | |
| | | | | | | | | | | Total | **128** | **103** | | | | | | | |
| | | | | | | | | | | MD | 31 | 16 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **19** | T | 0 | 25 | hCL | 10YR2/2 | och | mmd | 1 | | | 45 | 45 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 25 | 50 | C | 10YR4/2 | och | cmd | 1 | poor | | 32 | 32 | y | y | | | | | |
| | | 50 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | | 49 | 24 | y | y | | | | | |
| | | | | | | | | | | Total | **125** | **101** | | | | | | | |
| | | | | | | | | | | MD | 28 | 14 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **20** | T | 0 | 30 | C | 10YR2/2 | och | mmd | 1 | | | 51 | 51 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | | 74 | 52 | y | y | | | | | |
| | | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **21** | T | 0 | 25 | C | 10YR2/2 | och | mmd | 1 | | | 42 | 42 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 25 | 50 | C | 10YR4/2 | och | cmd | 1 | poor | | 32 | 32 | y | y | | | | | |
| | | 50 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | | 49 | 24 | y | y | | | | | |
| | | | | | | | | | | Total | **123** | **98** | | | | | | | |
| | | | | | | | | | | MD | 26 | 11 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **22** | T | 0 | 20 | C | 10YR2/2 | och | mmd | 1 | | | 34 | 34 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 20 | 40 | C | 10YR4/2 | och | cmd | 1 | poor | | 26 | 26 | y | y | | | | | |
| | | 40 | 120 | SCL | 10YR4/2 | och | cmd | 1 | | | 84 | 45 | y | y | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Total | **144** | **104** | | | | | | | |
| | | | | | | | | | MD | 47 | 17 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **23** | T | 0 | 30 | C | 10YR2/2 | och | mmd | 1 | | 51 | 51 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **24** | T | 0 | 23 | C | 10YR2/2 | och | mmd | 1 | | 39 | 39 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 23 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | 81 | 56 | y | y | | | | | |
| | | | | | | | | | Total | **119** | **95** | | | | | | | |
| | | | | | | | | | MD | 22 | 8 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 2 | | | | | | | |
| **25** | T | 0 | 30 | C | 10YR2/2 | och | cmd | 1 | | 51 | 51 | n | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | 72 | 48 | y | y | | | | | |
| | | | | | | | | | Total | **123** | **98** | | | | | | | |
| | | | | | | | | | MD | 26 | 11 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **26** | T | 0 | 30 | C | 10YR2/2 | och | cmd | 1 | | 51 | 51 | n | n | *III* | 4 | **4** | WE | |
| | | 30 | 120 | C | 5YR4/4 | och | cmd | 1 | poor | 74 | 52 | n | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **27** | T | 0 | 38 | C | 10YR2/2 | och | mmd | 1 | | 64 | 64 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 38 | 120 | C | 10YR4/2 | och | cmp | 1 | poor | 64 | 41 | y | y | | | | | |
| | | | | | | | | | Total | **128** | **105** | | | | | | | |
| | | | | | | | | | MD | 31 | 18 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **28** | T | 0 | 30 | C | 2.5Y2/1 | och | mmd | 1 | | 51 | 51 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR4/2 | och | cmp | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **29** | T | 0 | 30 | C | 10YR4/1 | och | cmp | 1 | | 51 | 51 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 2.5Y4/1 | och | cmp | 1 | poor | 87 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **138** | **102** | | | | | | | |
| | | | | | | | | | MD | 41 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **30** | T | 0 | 30 | C | 10YR4/1 | och | cmp | 1 | | 51 | 51 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 2.5Y4/1 | och | cmp | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **31** | T | 0 | 30 | C | 10YR4/2 | och | cmd | 1 | | 51 | 51 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 2.5Y4/1 | och | cmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **32** | T | 0 | 31 | C | 10YR4/1 | och | mmd | 1 | | 52 | 52 | y | n | *IV* | 4 | **4** | WE | |
| | | 31 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 73 | 50 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **33** | T | 0 | 32 | C | 10YR4/1 | och | mmd | 1 | | 52 | 52 | y | n | *IV* | 4 | **4** | WE | |
| | | 31 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 73 | 50 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **34** | T | 0 | 31 | C | 10YR4/1 | och | mmd | 1 | | 52 | 52 | y | n | *IV* | 4 | **4** | WE | |
| | | 31 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 73 | 50 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | Waterlogged at surface | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **35** | T | 0 | 28 | C | 10YR4/1 | och | cmd | 1 | | 47 | 47 | y | n | *IV* | 4 | **4** | WE | |
| | | 28 | 60 | C | 10YR4/2 | och | cmd | 1 | poor | 35 | 41 | y | y | | | | | |
| | | 60 | 120 | C | 10YR5/2 | och | cmd | 1 | poor | 42 | 13 | y | y | | | | | |
| | | | | | | | | | Total | **124** | **101** | | | | | | | |
| | | | | | | | | | MD | 27 | 14 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **36** | T | 0 | 30 | hCL | 10YR4/1 | och | cmd | 1 | | 53 | 53 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 50 | C | 10YR4/2 | och | cmd | 1 | poor | 26 | 26 | y | y | | | | | |
| | | 50 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 49 | 26 | y | y | | | | | |
| | | | | | | | | | Total | **128** | **105** | | | | | | | |
| | | | | | | | | | MD | 31 | 18 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **37** | T | 0 | 33 | hCL | 10YR4/1 | och | cmd | 1 | | 59 | 59 | y | n | *IV* | 4 | **4** | WE | |
| | | 33 | 60 | C | 2.5Y4/1 | och | cmd | 1 | poor | 29 | 35 | y | y | | | | | |
| | | 60 | 120 | ZC | 2.5Y4/1 | och | cmd | 1 | poor | 42 | 12 | y | y | | | | | |
| | | | | | | | | | Total | **129** | **106** | | | | | | | |
| | | | | | | | | | MD | 32 | 19 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **38** | T | 0 | 30 | hCL | 10YR4/1 | och | cmd | 1 | | 53 | 53 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR4/2 | och | mmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **128** | **105** | | | | | | | |
| | | | | | | | | | MD | 31 | 18 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **39** | T | 0 | 30 | hCL | 10YR4/1 | och | mmd | 1 | | 53 | 53 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **128** | **105** | | | | | | | |
| | | | | | | | | | MD | 31 | 18 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **40** | T | 0 | 30 | hCL | 10YR4/1 | och | mmd | 1 | | 53 | 53 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR5/2 | och | cmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **128** | **105** | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | MD | 31 | 18 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **41** | T | 0 | 30 | hCL | 10YR4/1 | och | mmd | 1 | | 53 | 53 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR5/2 | och | cmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **128** | **105** | | | | | | | |
| | | | | | | | | | MD | 31 | 18 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **42** | T | 0 | 20 | C | 10YR4/1 | och | mmd | 1 | | 34 | 34 | y | n | *IV* | 4 | **4** | WE | |
| | | 20 | 120 | C | 2.5Y4/1 | och | cmd | 1 | poor | 87 | 64 | y | y | | | | | |
| | | | | | | | | | Total | **121** | **98** | | | | | | | |
| | | | | | | | | | MD | 24 | 11 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **43** | T | 0 | 30 | C | 10YR4/1 | och | mmd | 1 | | 51 | 51 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR4/2 | och | mmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **44** | T | 0 | 30 | hCL | 10YR4/1 | och | fmd | 1 | | 53 | 53 | n | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR4/2 | och | mmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **128** | **105** | | | | | | | |
| | | | | | | | | | MD | 31 | 18 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **45** | T | 0 | 30 | C | 10YR4/1 | och | mmd | 1 | | 51 | 51 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 120 | C | 10YR5/2 | och | cmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |
| **46** | T | 0 | 20 | hCL | 10YR4/1 | och | cmd | 1 | | 36 | 36 | y | n | *IV* | 4 | **4** | WE | |
| | | 20 | 120 | C | 10YR5/1 | och | cmd | 1 | poor | 87 | 64 | y | y | | | | | |
| | | | | | | | | | Total | **123** | **100** | | | | | | | |
| | | | | | | | | | MD | 26 | 13 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **47** | T | 0 | 30 | hCL | 10YR4/1 | och | cmp | 1 | | | 53 | 53 | y | n | *IV* | 4 | **4** | WE |
| | | 30 | 120 | C | 10YR5/1 | och | cmd | 1 | | poor | 74 | 52 | y | y | | | | |
| | | | | | | | | | | Total | **128** | **105** | | | | | | |
| | | | | | | | | | | MD | 31 | 18 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | |
| **48** | T | 0 | 25 | hCL | 10YR4/1 | och | cmd | 1 | | | 45 | 45 | y | n | *IV* | 4 | **4** | WE |
| | | 25 | 120 | C | 2.5Y5/2 | och | cmd | 1 | | poor | 81 | 58 | y | y | | | | |
| | | | | | | | | | | Total | **125** | **103** | | | | | | |
| | | | | | | | | | | MD | 28 | 16 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | |
| **49** | T | 0 | 20 | C | 2.5Y4/1 | och | cmd | 1 | | | 34 | 34 | y | n | *IV* | 4 | **4** | WE |
| | | 20 | 120 | C | 2.5Y5/2 | och | cmd | 1 | | poor | 87 | 64 | y | y | | | | |
| | | | | | | | | | | Total | **121** | **98** | | | | | | |
| | | | | | | | | | | MD | 24 | 11 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | |
| **50** | T | 0 | 40 | hCL | 10YR4/1 | och | mmd | 1 | | | 36 | 36 | y | n | *IV* | 4 | **4** | WE |
| | | 40 | 120 | C | 10YR4/2 | och | cmd | 1 | | poor | 87 | 64 | y | y | | | | |
| | | | | | | | | | | Total | **123** | **100** | | | | | | |
| | | | | | | | | | | MD | 26 | 13 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | |
| **51** | T | 0 | 30 | C | 10YR4/1 | och | mmd | 1 | | | 51 | 51 | y | n | *IV* | 4 | **4** | WE |
| | | 30 | 120 | C | 10YR4/2 | och | cmd | 1 | | poor | 74 | 52 | y | y | | | | |
| | | | | | | | | | | Total | **125** | **102** | | | | | | |
| | | | | | | | | | | MD | 28 | 15 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | |
| **52** | T | 0 | 30 | C | 10YR4/1 | och | mmd | 1 | | | 51 | 51 | y | n | *IV* | 4 | **4** | WE |
| | | 30 | 120 | C | 10YR4/2 | och | cmd | 1 | | poor | 74 | 52 | y | y | | | | |
| | | | | | | | | | | Total | **125** | **102** | | | | | | |
| | | | | | | | | | | MD | 28 | 15 | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | | 2 | 1 | | | | | | |
| **53** | T | 0 | 35 | C | 10YR3/1 | och | mmd | 1 | | | 59 | 59 | y | n | *II* | 3b | **3b** | WE |
| | | 35 | 80 | C | 10YR5/2 | och | cmd | 1 | | | 48 | 55 | y | n | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | 28 | 0 | y | y | | | | | |
| | | | | | | | | | Total | **134** | **114** | | | | | | | |
| | | | | | | | | | MD | 37 | 27 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **54** | T | 0 | 50 | C | 10YR3/1 | och | mmd | 1 | | 84 | 84 | (y) | n | *III* | 4 | **4** | WE | |
| | | 50 | 120 | C | 10YR3/1 | och | cmd | 1 | poor | 49 | 26 | n | y | | | | | |
| | | | | | | | | | Total | **133** | **110** | | | | | | | |
| | | | | | | | | | MD | 36 | 23 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **55** | T | 0 | 40 | C | 10YR3/1 | och | mmd | 1 | | 67 | 67 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 40 | 60 | C | 10YR4/1 | och | cmp | 1 | poor | 20 | 26 | y | y | | | | | |
| | | 60 | 120 | C | 10YR4/1 | och | cmp | 1 | poor | 42 | 13 | y | y | | | | | |
| | | | | | | | | | Total | **129** | **106** | | | | | | | |
| | | | | | | | | | MD | 32 | 19 | | | | | | | |
| **56** | T | 0 | 40 | C | 10YR3/1 | och | mmf | 1 | | 67 | 67 | y | n | *IV* | 4 | **4** | WE | |
| | | 40 | 120 | C | 10YR4/2 | och | mmd | 1 | poor | 61 | 39 | y | y | | | | | |
| | | | | | | | | | Total | **129** | **106** | | | | | | Waterlogged @ approx 50 | |
| | | | | | | | | | MD | 32 | 19 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **57** | T | 0 | 35 | hCL | 10YR3/1 | och | fff | 1 | | 62 | 62 | n | n | *III* | 3b | **3b** | WE | |
| | | 35 | 60 | hCL | 10YR4/2 | och | mmd | 1 | | 34 | 40 | y | n | | | | | |
| | | 60 | 120 | ZC | 10YR3/1 | och | mmd | 1 | poor | 42 | 12 | y | y | | | | | |
| | | | | | | | | | Total | **138** | **114** | | | | | | | |
| | | | | | | | | | MD | 41 | 27 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **58** | T | 0 | 40 | hCL | 10YR3/1 | och | cmd | 1 | | 71 | 71 | n | n | *IV* | 4 | **4** | WE | |
| | | 40 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | 60 | 36 | y | y | | | | | |
| | | | | | | | | | Total | **132** | **107** | | | | | | | |
| | | | | | | | | | MD | 35 | 20 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **59** | T | 0 | 45 | hCL | 10YR3/1 | och | mmd | 1 | | 80 | 80 | (y) | n | *IV* | 4 | **4** | WE | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 45 | 120 | C | 10YR4/2 | och | mmd | 1 | poor | 55 | 32 | y | y | | | | | |
| | | | | | | | | | Total | **135** | **112** | | | | | | | |
| | | | | | | | | | MD | 38 | 25 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **60** | T | 0 | 30 | LmS | 10YR4/2 | och | mmd | 1 | | 39 | 39 | y | n | *III* | 3a | **3a** | WE | |
| | | 30 | 60 | SCL | 10YR5/2 | och | mmd | 1 | | 40 | 45 | y | n | | | | | |
| | | 60 | 80 | C | 10YR4/1 | och | mmd | 1 | poor | 14 | 13 | y | y | | | | | |
| | | 80 | 120 | C | 10YR4/1 | och | mmd | 1 | | 32 | 0 | y | n | | | | | |
| | | | | | | | | | Total | **124** | **96** | | | | | | | |
| | | | | | | | | | MD | 27 | 9 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 2 | 2 | | | | | | | |
| **61** | T | 0 | 30 | C | 10YR3/1 | och | mmd | 1 | | 51 | 51 | (y) | n | *III* | 4 | **4** | WE | |
| | | 30 | 50 | LmS | 5YR4/4 | och | cmd | 1 | | 18 | 18 | y | n | | | | | |
| | | 50 | 120 | C | 10YR4/2 | och | cmd | 1 | poor | 55 | 32 | y | y | | | | | |
| | | | | | | | | | Total | **124** | **100** | | | | | | | |
| | | | | | | | | | MD | 27 | 13 | | LS Mixed C&S | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 2 | 1 | | | | | | | |
| **62** | T | 0 | 40 | hCL | 10YR3/1 | och | mmd | 1 | | 71 | 71 | (y) | n | *III* | 3b | **3b** | WE | |
| | | 40 | 60 | LmS | 10YR5/3 | och | mmd | 1 | | 15 | 18 | y | n | | | | | |
| | | 60 | 120 | ZC | 10YR4/2 | och | cmd | 1 | poor | 48 | 15 | y | y | | | | | |
| | | | | | | | | | Total | **134** | **104** | | | | | | | |
| | | | | | | | | | MD | 37 | 17 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **63** | T | 0 | 40 | hCL | 10YR3/1 | och | mmd | 1 | | 71 | 71 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 40 | 55 | C | 10YR4/2 | och | mmd | 1 | poor | 16 | 19 | y | y | | | | | |
| | | 55 | 120 | LmS | 10YR5/2 | och | cmd | 1 | | 39 | 13 | y | n | | | | | |
| | | | | | | | | | Total | **126** | **104** | | | Waterlogged SS | | | | |
| | | | | | | | | | MD | 29 | 17 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **64** | T | 0 | 40 | SCL | 10YR3/1 | och | mmd | 1 | | 67 | 67 | (y) | | *IV* | 3b | **3b** | WE | |
| | | 40 | 65 | C | 10YR4/2 | och | fmd | 1 | poor | 23 | 32 | n | y | | | | | |
| | | 65 | 120 | LmS | 10YR5/2 | och | cmd | 1 | | 33 | 4 | y | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Total | **123** | **104** | | | | | | | |
| | | | | | | | | | MD | 26 | 17 | | | Waterlogged SS | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **65** | T | 0 | 30 | LmS | 10YR4/2 | och | mmf | 1 | | 39 | 39 | y | n | *II* | 2 | **3b** | GW | |
| | | 30 | 120 | LmS | 10YR5/2 | och | mmd | 1 | | 59 | 36 | y | n | | | | | |
| | | | | | | | | | Total | **98** | **74** | | | | | | | |
| | | | | | | | | | MD | 1 | -13 | | | Wet | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **66** | T | 0 | 10 | LmS | 10YR3/1 | och | mmd | 1 | | 13 | 13 | (y) | n | *IV* | 3b | **3b** | WE | |
| | | 10 | 40 | SL | 10YR5/2 | och | fmf | 1 | | 45 | 45 | n | n | | | | | |
| | | 40 | 60 | C | 2.5Y4/1 | och | mmd | 1 | poor | 20 | 26 | y | y | | | | | |
| | | 60 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 42 | 13 | y | y | | | | | |
| | | | | | | | | | Total | **119** | **96** | | | Waterlogged | | | | |
| | | | | | | | | | MD | 22 | 9 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **67** | T | 0 | 40 | C | 10YR3/1 | och | mmd | 1 | | 67 | 67 | (y) | n | *II* | 3b | **3b** | WE GW | |
| | | 40 | 50 | SL | 10YR5/2 | och | mmd | 1 | | 15 | 15 | y | n | | | | | |
| | | 50 | 120 | SZL | 10YR5/2 | och | mmd | 1 | | 76 | 34 | y | n | | | | | |
| | | | | | | | | | Total | **158** | **116** | | | Waterlogged | | | | |
| | | | | | | | | | MD | 61 | 29 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **68** | T | 0 | 30 | hCL | 10YR3/1 | och | fmd | 1 | | 53 | 53 | n | n | *III* | 3b | **3b** | WE | |
| | | 30 | 55 | LmS | 10YR5/2 | och | mmd | 1 | | 21 | 22 | y | n | | | | | |
| | | 55 | 120 | C | 10YR4/2 | och | mmd | 1 | poor | 45 | 19 | y | y | | | | | |
| | | | | | | | | | Total | **119** | **95** | | | | | | | |
| | | | | | | | | | MD | 22 | 8 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **69** | T | 0 | 20 | hCL | 10YR3/1 | och | fmd | 1 | | 36 | 36 | n | n | *IV* | 4 | **4** | WE | |
| | | 20 | 40 | SL | 10YR5/2 | och | cmp | 1 | | 30 | 30 | y | n | | | | | |
| | | 40 | 55 | C | 10YR4/2 | och | mmd | 1 | poor | 16 | 19 | y | y | | | | | |
| | | 55 | 120 | LmS | 10YR5/2 | och | mmd | 1 | | 39 | 13 | y | n | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Total | **120** | **98** | | | | | | | |
| | | | | | | | | | MD | 23 | 11 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **70** | T | 0 | 10 | SCL | 10YR2/1 | och | mmd | 1 | | 17 | 17 | (y) | n | *IV* | 3b | **3b** | WE | |
| | | 10 | 30 | LmS | 10YR5/3 | och | cmp | 1 | | 18 | 18 | y | n | | | | | |
| | | 30 | 120 | C | 2.5Y4/2 | och | cmd | 1 | poor | 74 | 52 | y | y | | | | | |
| | | | | | | | | | Total | **109** | **86** | | | | | | | |
| | | | | | | | | | MD | 12 | -1 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **71** | T | 0 | 40 | C | 10YR3/1 | och | cmd | 1 | | 67 | 67 | n | n | *IV* | 4 | **4** | WE | |
| | | 40 | 120 | C | 2.5Y3/1 | och | cmd | 1 | poor | 61 | 39 | n | y | | | | | |
| | | | | | | | | | Total | **129** | **106** | | | | | | | |
| | | | | | | | | | MD | 32 | 19 | Waterlogged at 40 | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **72** | T | 0 | 20 | C | 10YR3/1 | och | mff | 1 | | 34 | 34 | (y) | n | *III* | 4 | **4** | WE | |
| | | 20 | 50 | ZC | 2.5Y3/1 | och | mmd | 1 | poor | 36 | 36 | (y) | y | | | | | |
| | | 50 | 120 | ZC | 2.5Y3/1 | och | mmd | 1 | poor | 49 | 24 | (y) | y | | | | | |
| | | | | | | | | | Total | **118** | **93** | | | | | | | |
| | | | | | | | | | MD | 21 | 6 | Waterlogged at 50 | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **73** | T | 0 | 30 | C | 10YR3/1 | och | mmd | 1 | | 51 | 51 | (y) | n | *IV* | 4 | **4** | WE | |
| | | 30 | 50 | C | 2.5Y4/1 | och | mmd | 1 | poor | 26 | 26 | y | y | | | | | |
| | | 50 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 49 | 26 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | | | Waterlogged from surface | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **74** | T | 0 | 40 | C | 10YR3/1 | och | cmd | 1 | | 67 | 67 | n | n | *IV* | 4 | **4** | WE | |
| | | 40 | 120 | C | 2.5Y4/2 | och | cmd | 1 | poor | 61 | 39 | y | y | | | | | |
| | | | | | | | | | Total | **129** | **106** | | | | | | | |
| | | | | | | | | | MD | 32 | 19 | | | | | | | |
| | | | | | | | | **Droughtiness grade (DR)** | | 1 | 1 | | | | | | | |
| **75** | T | 0 | 30 | C | 10YR3/1 | och | mmd | 1 | | 51 | 51 | (y) | n | *IV* | 4 | **4** | WE | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | 120 | ZC | 2.5Y4/2 | och | cmd | 1 | poor | 72 | 48 | y | y | | | | | |
| | | | | | | | | | Total | **123** | **98** | | | | | | | |
| | | | | | | | | | MD | 26 | 11 | | | | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **76** | T | 0 | 30 | C | 10YR4/1 | och | mmd | 1 | | 51 | 51 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 50 | C | 2.5Y4/1 | och | mmd | 1 | poor | 26 | 26 | y | y | | | | | |
| | | 50 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 49 | 26 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | Waterlogged | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **77** | T | 0 | 30 | C | 10YR4/1 | och | mmd | 1 | | 51 | 51 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 50 | C | 2.5Y4/1 | och | mmd | 1 | poor | 26 | 26 | y | y | | | | | |
| | | 50 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 49 | 26 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | Waterlogged | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **78** | T | 0 | 30 | C | 10YR4/1 | och | mmd | 1 | | 51 | 51 | y | n | *IV* | 4 | **4** | WE | |
| | | 30 | 50 | C | 2.5Y4/1 | och | mmd | 1 | poor | 26 | 26 | y | y | | | | | |
| | | 50 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 49 | 26 | y | y | | | | | |
| | | | | | | | | | Total | **125** | **102** | | | | | | | |
| | | | | | | | | | MD | 28 | 15 | | | Waterlogged | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |
| **79/P2** | T | 0 | 30 | C | 10YR3/1 | och | mmd | 1 | | 51 | 51 | (y) | n | *III* | 4 | **4** | WE | |
| | | 30 | 50 | LmS | 10YR5/2 | och | cmp | 1 | | 18 | 18 | y | n | | | | | |
| | | 50 | 120 | C | 2.5Y4/1 | och | mmd | 1 | poor | 49 | 26 | y | y | | | | | |
| | | | | | | | | | Total | **117** | **94** | | | | | | | |
| | | | | | | | | | MD | 20 | 7 | | | Waterlogged from surface | | | | |
| | | | | | | | | | **Droughtiness grade (DR)** | 1 | 1 | | | | | | | |

## Appendix 3: Soil Pit Photographs

Pit 1

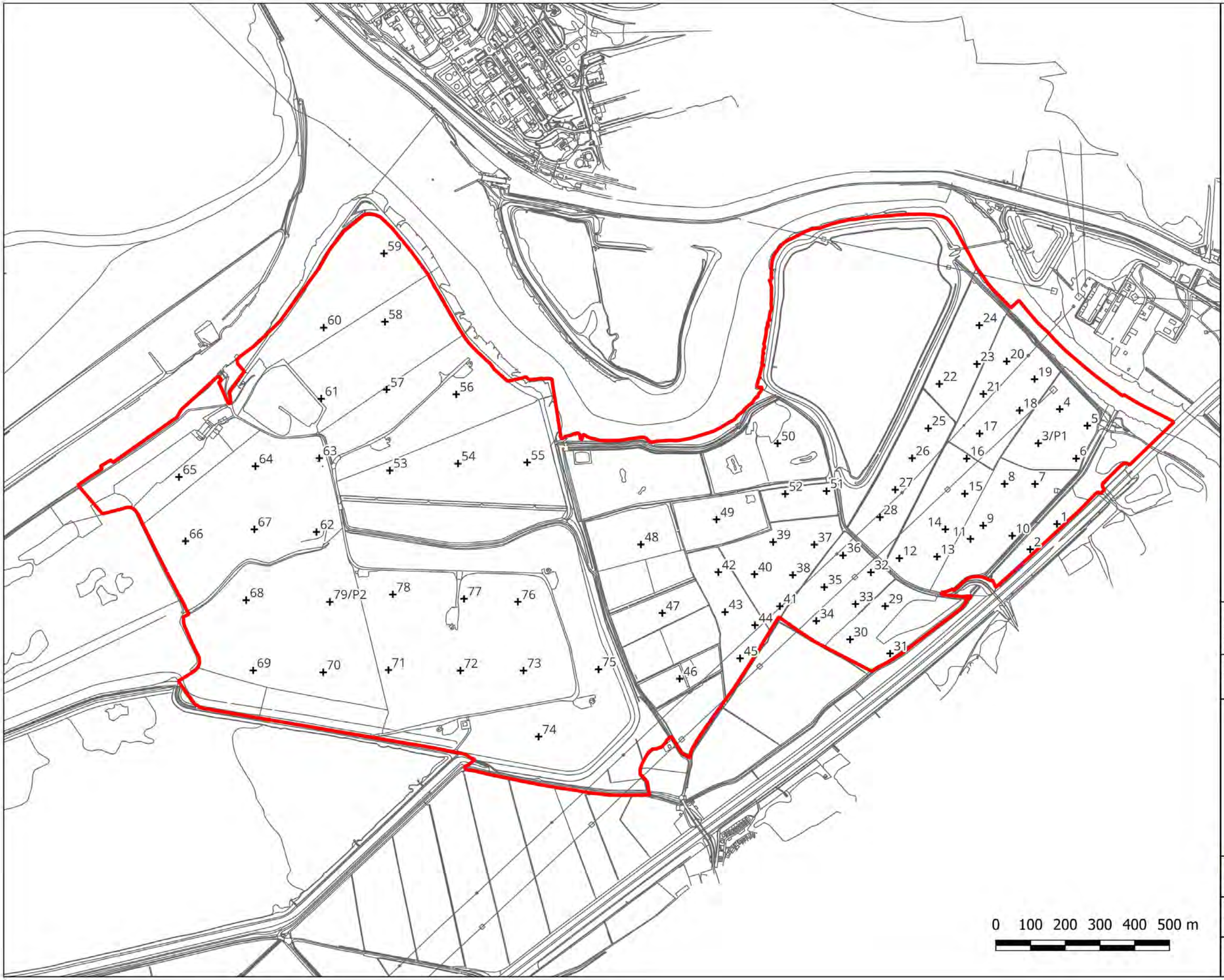
Pit 1 topsoil

Pit 1 subsoil

Pit 2

Pit 2 topsoil

Pit 2 subsoil




N

KEY

Survey boundary

+ 1 Observation

+ P Pit



Title
OBSERVATION MAPPING

Reading Agricultural Consultants Ltd
Gate House
Beechwood Court
Long Toll
Woodcote
RG8 0RR
01491 684233
www.reading-ag.com

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| Ref | Rev. |
|---|---|
| RAC/9921/1 | |
| Drawn by AGM | Checked by AIF |
| Scales 1:10,000@A3 | Date 04/2023 |

N

Agricultural Land Classification

- Grade 1
- Grade 2
- Subgrade 3a
- Subgrade 3b
- Grade 4
- Grade 5
- Non-agricultural
- Not present

0 100 200 300 400 500 m



Title
AGRICULTURAL LAND CLASSIFICATION

Reading Agricultural Consultants Ltd
Gate House
Beechwood Court
Long Toll
Woodcote
RG8 0RR
01491 684233
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| Drawn by AGM | Checked by AIF |
| Scales 1:10,000@A3 | Date 04/2023 |