SUNNICA ENERGY FARM

EN010106

Volume 6

6.2 Appendix 9C Flood Risk Assessment

APFP Regulation 5(2)(e)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Sunnica Energy Farm

Environmental Statement
Appendix 9C: Flood Risk Assessment

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Rev 00	18 November 2021	Application Version
Rev 01	21 January 2022	Update in response to Section 51 advice received from the Planning Inspectorate

Executive Summary

Background

This document provides a Flood Risk Assessment (FRA) and outline Drainage Strategy (DS) for Sunnica Energy Farm (hereafter referred to as the Scheme) to support an application for a Development Consent Order (DCO) for the Scheme. The Scheme is located within the counties of Cambridgeshire and Suffolk, and in the administrative areas of East Cambridgeshire District Council (ECDC) and West Suffolk Council (WSC).

In summary, the Scheme comprises photovoltaic (PV) panels, solar stations, battery energy storage systems (BESS), substations and related equipment, permanent and temporary compound areas, and connection / access routes. Chapter 3 of the Environmental Statement describes the Scheme in detail.

Electricity will be generated at four sites: Sunnica East Site A, near Isleham in Cambridgeshire; Sunnica East B, near Worlington and Freckenham in Suffolk; Sunnica West Site A near Chippenham and Kennett in Cambridgeshire; and Sunnica West Site B, near Snailwell in Cambridgeshire (the Sites). These Sites will be connected by Grid Connection Routes A and B to the existing Burwell National Grid Substation which is proposed to be extended. Land for the Scheme is collectively referred to as the Order limits.

This FRA has been prepared in accordance with the requirements of the National Planning Policy Framework, 2021 (NPPF) and, primarily, the Overarching National Policy Statement for Energy (EN-1) and the National Policy Statement for Electricity Network Infrastructure (EN-5). The proposed use is classed as ‘Essential Infrastructure’.

The majority of the Scheme will be located within Flood Zone 1. Three main rivers, the River Lark, the Lee Brook and the River Snail, and one ordinary watercourse divide the Sites. Fluvial risk increases in the locality of these watercourses, with these areas in Flood Zone 3b, with low lying areas in proximity being at risk within Flood Zones 2 and 3a.

The Scheme will not increase the risk of flooding on or off site. Surface water runoff from the Scheme will be captured and treated by infiltration SuDS techniques; swales and basins to mimic existing drainage conditions and accommodate the 1 in 100 year return period storm event plus a 40% increase allowance for climate change.

When considered within the context of national and local planning policy in respect of development and flood risk, the assessment concludes that the Scheme remains safe, does not increase flood risk elsewhere, and fulfils the Government’s wider criteria for sustainable development.

On this basis, it is concluded that flood risk considerations and appropriate tests have been met and, therefore, support granting of DCO consent.

Flood Risk Summary

The following table summarises the flood risk within the Order limits.

Flood Risk Source	Pre-Development Risk	Post Development Risk	Comments
Fluvial	Low	Low (Residual)	The majority of the land within the Order limits is in Flood Zone 1, but certain areas lie in Flood Zone 2, 3a, 3b. No development will occur in Flood Zone 3b.
Tidal	None	None	Not in a tidal area
Pluvial (Surface Water)	Low	Low	Surface water risk varies throughout the Order limits indicating areas which are susceptible to surface water flooding. However, flooding is localised and generally shallow (low risk).
Groundwater	Medium	Medium	Groundwater risk also varies within the Order limits between <25% and >75%. Sunnica East Site B and Sunnica West Sites A and B are shown to be within a Source Protection Zone III, with small areas of Source Protection Zone II. Further ground investigation, groundwater monitoring and infiltration testing is proposed to confirm groundwater levels. Infiltration techniques must ensure mitigation measures are put in effect to protect groundwater interaction in these areas.
Sewers	Low	Low	There are no confirmed sewers in the vicinity of the proposed compound areas within the Order limits of the Scheme (confirmed via the DigDat service, May 2021). Sewer flooding maps in both West Suffolk Council and ECDC's Strategic Flood Risk Assessments (SFRA) show no historical sewer flooding across or adjacent to the Order limits.

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1 Introduction

1.1 Introduction

1.1.1 This document provides a Flood Risk Assessment (FRA) and outline Drainage Strategy (DS) for Sunnica Energy Farm (hereafter referred to as the Scheme) as part of an application for a Development Consent Order (DCO) for the Scheme. The Scheme is located within the counties of Cambridgeshire and Suffolk, and in the administrative areas of East Cambridgeshire District Council (ECDC) and West Suffolk Council (WSC),

1.1.2 In summary, the Scheme comprises photovoltaic (PV) panels, solar stations, battery energy storage systems (BESS), substations and related equipment, permanent and temporary compound areas, and connection / access routes. Chapter 3 of the Environmental Statement describes the Scheme in detail.

1.1.3 Electricity will be generated at four sites: Sunnica East Site A, near Isleham in Cambridgeshire; Sunnica East B, near Worlington and Freckenham in Suffolk; Sunnica West Site A near Chippenham and Kennett in Cambridgeshire; and Sunnica West Site B, near Snailwell in Cambridgeshire (the Sites). These Sites will be connected by Grid Connection Routes A and B to the existing Burwell National Grid Substation which is proposed to be extended. Land for the Scheme is collectively referred to as the Order limits.

1.1.4 The Order limits (shown in Figure 1) cover an area of approximately 1,113 hectares, comprising arable fields interspersed with tree shelter belts (linear), small woodland and copses, agricultural fields, and farm access tracks and farm buildings.

1.1.5 The location and Scheme components are described in more detail in **Chapters 2** and **3** of the Environmental Statement **[EN010106/APP/6.1]**, respectively. The DS has been produced detailing the proposed drainage strategy for the Scheme and is located in Annex F – Drainage of this report.

1.2 FRA Objectives

1.2.1 The minimum requirements for FRAs as outlined in the Overarching National Policy Statement for Energy (NPS) (EN-1) (paragraph 5.7.5) are to:

a. Be proportionate to the risk and appropriate to the scale, nature and location of the project;

b. Consider the risk of flooding arising from the project in addition to the risk of flooding to the project;

c. Take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;

d. Be undertaken by competent people, as early as possible in the process of preparing the proposal;

e. Consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood

storage areas and other artificial features, together with the consequences of their failure;

f. Consider the vulnerability of those using the site, including arrangements for safe access;

g. Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;

h. Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;

i. Include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project;

j. Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems;

k. Consider if there is a need to be safe and remain operational during a worst case flood event over the development's lifetime; and

l. Be supported by appropriate data and information, including historical information on previous events.

1.2.2 The principle objectives of the FRA inclusive of the above are to:

a. Identify potential forms of flooding including rivers, watercourses, surface water flooding, groundwater flooding, flooding from sewer systems and other forms of flooding;

b. Establish the risk of flooding to the Scheme;

c. Determine the effects of the development on flooding elsewhere either through displacement of floodwaters or increased runoff; and

d. Suggest appropriate flood mitigation measures, including a strategy for disposal of surface water run-off following the principles of SuDS.

1.3 Scope of Work

1.3.1 In preparing the FRA, AECOM has:

a. Obtained relevant data and information from statutory and other authorities;

b. Considered the potential sources of flooding;

c. Assessed the risk of flooding to the site;

d. Assessed the impact of off-site flooding (displaced water) on third parties;

e. Considered the impact of climate change; and

f. Considered likely mitigation requirements and any residual risk.

1.4 Description of the Order Limits

1.4.1 Electricity will be generated at four sites: Sunnica East Site A, near Isleham in Cambridgeshire; Sunnica East B, near Worlington and Freckenham in Suffolk; Sunnica West Site A near Chippenham and Kennett in Cambridgeshire; and Sunnica West Site B, near Snailwell in Cambridgeshire (the Sites). These Sites will be connected by Grid Connection Routes A and B to the existing Burwell National Grid Substation which is proposed to be extended. Land for the Scheme is collectively referred to as the Order limits. The Order limits is shown in **Figure 1**.

1.4.2 The Sunnica East Site A is located approximately 3.5 kilometres (km) east of Mildenhall, 0.5km south-east of Isleham and 0.6km south-west of West Row. The Sunnica East Site A straddles the boundary between the counties of Cambridgeshire and Suffolk and is therefore within the administrative areas of Cambridgeshire County Council (CCC); Suffolk County Council (SCC), ECDC, and WSC.

1.4.3 Sunnica East Site B is located approximately 1.5km south-east of Mildenhall, 1.5km east of Freckenham, and immediately south of Worlington. Sunnica East Site B falls within county of Suffolk and is therefore within the administrative areas of SCC and WSC.

1.4.4 The landscape features within Sunnica East Sites A and B consist of individual trees, hedgerow, tree belts (linear) small woodland block, agricultural fields (arable), farm access tracks, and local roads such as B1085. The hedgerows within Sunnica East Sites A and B range between lengths of dense tall vegetation (shrub and tree species), and thin lines of vegetation with sporadic trees present, although the former is a dominant feature. The arable fields are of small to moderate size, some of which are of irregular shape.

1.4.5 The landscape features immediately surrounding Sunnica East Sites A and B comprise a number of small rural villages, including Worlington to the north, Barton Mills to the north-east, Red Lodge to the south, and Freckenham to the west. Industrial land uses adjoin the A11 to the south of Sunnica East Site B, associated with the property identified on mapping as Bay Farm. An industrial installation of a 7.5 MW solar farm is situated adjacent to the south-eastern extent of the eastern parcel of Sunnica East Site B. An Anaerobic Digestion (AD) plant is located to the south of Sunnica East Site B, immediately east of Bay Farm.

1.4.6 Sunnica West Site A is located approximately 1km south of Chippenham and 1.5km west of Kennett, immediately north of the A14 at Newmarket. Sunnica West Site B is approximately 5.5km to the east of Burwell and 0.5km north of Snailwell. Sunnica West Sites A and B lie within the county of Cambridgeshire and are within the CCC and the ECDC administrative areas.

1.4.7 The land within Sunnica West Sites A and B consists of trees, managed hedgerows, tree shelter belts (linear), small woodland and copses, agricultural fields, and farm access tracks. A straight tree-lined avenue bisects Sunnica West

Site A and forms part of a former carriageway to Chippenham Hall, which is located to the north. This land is protected under the register of Historic Parks and Gardens by Historic England. The southern boundary of Sunnica West Site A is formed by a post and rail fence and sporadic sparse vegetation. Sounds Plantation is a deciduous copse and is located towards the eastern extent of Sunnica West Site A.

1.4.8 The surrounding landscape comprises arable fields interspersed with managed hedgerows, tall shelter belts of trees and in the Chippenham Hall area, a parkland landscape with mature individual trees. Avenue planting is a characteristic of the immediate area, with mature trees present within Sunnica West Sites A and B, and newer tree planting evident along the Chippenham Road to the north of the Sites. Much of the area is also characterised by grazed paddocks, horse gallops and exercise tracks, and the British Racing School is located to the south, beyond the A14.

1.4.9 The cable route for Grid Connection Route A will run between Sunnica East Site A, Sunnica East Site B, and Sunnica West Site A, crossing agricultural fields, the B1102 road and River Kennett. The cable route for Grid Connection Route B traverses between Sunnica West Site A and Sunnica West Site B and then onto Burwell National Grid Substation, crossing agricultural fields, a railway line, a number of watercourses and a number of roads, including the A142 and B1102.

1.4.10 The existing Burwell National Grid Substation is located west of the village of Burwell off Weirs Drove and Newham Drove. Two potential areas identified for the Burwell National Grid Substation Extension are currently agricultural fields. Option 1 is within National Grid land ownership 70m east of the existing substation, adjacent to Weirs Drove, approximately 200m west of Burwell. Option 2 is to the north of Newham Drove and the existing substation approximately 450m from Burwell.

1.5 Study Area

1.5.1 As previously stated, the Scheme is located at four Sites along with a proposed cable corridor that connect the Sites to the Burwell National Grid Substation Extension. For the purpose of assessing the Scheme's flood risk, the Scheme will be separated into the following areas:

a. Sunnica East Site A;

b. Sunnica East Site B;

c. Sunnica West Site A;

d. Sunnica West Site B;

e. Grid Connection Route A – Proposed connection route between Sunnica East A and Sunnica East B and Sunnica West A;

f. Grid Connection Route B – Proposed connection route between Sunnica West A, Sunnica West B and Burwell National Grid Substation; and

g. Burwell National Grid Substation Extension.

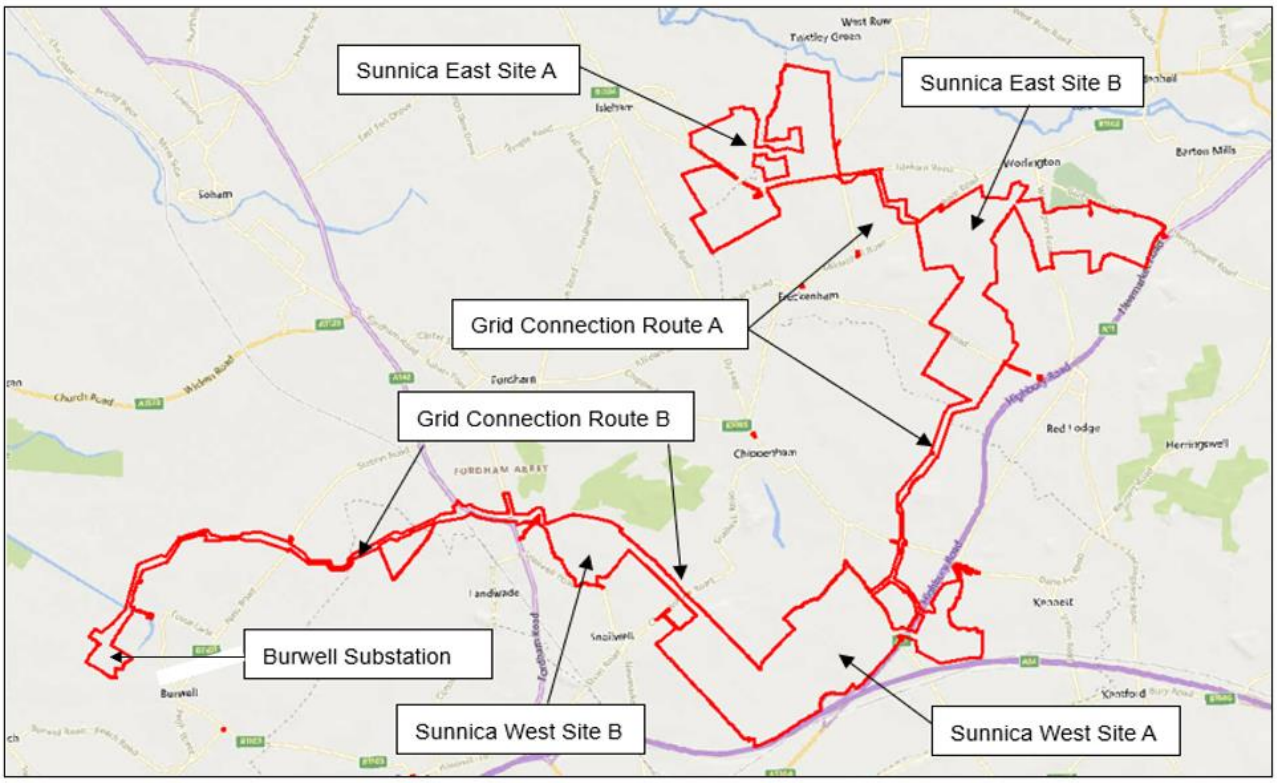


Figure 1: The Order Limits

1.6 Existing Land Use

1.6.1 Most of the land within the Order limits is used for arable farming. Dwellings and commercial/agricultural buildings are located sparsely across the Order limits but are largely outside any fluvial flood risk areas.

1.6.2 **Table 1** below provides the existing permeable and impermeable areas within the Order limits:

Table 1: Contributing Areas

	Total Area (ha)	Permeable Area (ha)	Impermeable Areas (ha)	Percentage Impermeable
Order limits	1,113	1,101.88	11.13	1%

1.7 Development Proposals

1.7.1 The Scheme comprises:

a. Solar PV modules;

b. PV module mounting structures;

c. Inverters;

d. Transformers;

e. Switchgears;

f. Onsite cabling;

g. One or more Battery Energy Storage Systems (BESS) (expected to be formed of lithium ion batteries storing electrical energy);

h. An electrical compound comprising a substation and control building (Sunnica East Site A, Sunnica East Site B and Sunnica West Site A only);

i. New substation at Burwell National Grid Substation to facilitate the connection to National Grid;

j. Office/warehouse (Sunnica East Site A and Sunnica East Site B only)

k. Fencing and security measures;

l. Drainage;

m. Internal access roads and car parking;

n. Landscaping including habitat creation areas; and

o. Construction laydown areas.

1.7.2 Please refer to Annex B – Development Parameter Plans for an indication of the layout of the Scheme. The DCO application seeks a consent with a proportionate degree of flexibility. The Flood Risk Assessment takes into account the degree of flexibility sought using a Rochdale Envelope approach

1.7.3 It is proposed the Scheme will be in operation for 40 years, with earliest operation from 2025 and decommissioning is assumed to be no earlier than in 2065. Flood risk and sustainable drainage designs will incorporate the appropriate epoch for the anticipated design life.

1.8 Parties Involved

1.8.1 Consultation has been undertaken with the following risk management authorities when undertaking this FRA. Comments received have been reviewed and addressed as required in this report. Full comments and responses can be found within **Chapter 9** of the **Environmental Statement [EN010106/APP/6.1]**:

a. Lead Local Flood Authorities – Cambridgeshire County Council and Suffolk County Council.

b. The Environment Agency.

c. Swaffham Internal Drainage Board.

2 Existing Legislation and Policy

2.1 National Policy

Overarching National Policy Statement (NPS) for Energy (EN-1), including overview of the Draft NPS (EN-1)

2.1.1 The Overarching National Policy Statement for Energy (NPS) (EN-1) sets out the Government's policy for the development of nationally significant energy infrastructure projects requiring a DCO.

2.1.2 Paragraph 5.7.4 expects applications for energy projects of 1 hectare or greater in Flood Zone 1 and all proposals for energy projects located in Flood Zones 2 and 3 to be accompanied by a Flood Risk Assessment (FRA). The FRA needs to "*identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account"*. Paragraph 5.7.5 sets out the minimum requirements for FRAs as follows:

a. *"Be proportionate to the risk and appropriate to the scale, nature and location of the project;*

b. *Consider the risk of flooding arising from the project in addition to the risk of flooding to the project; take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;*

c. *Be undertaken by competent people, as early as possible in the process of preparing the proposal;*

d. *Consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure;*

e. *Consider the vulnerability of those using the site, including arrangements for safe access;*

f. *Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;*

g. *Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;*

h. *Include the assessment of the remaining (known as „residual") risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project;*

i. Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems

j. *Consider if there is a need to be safe and remain operational during a worst case flood event over the development's lifetime; and*

k. *Be supported by appropriate data and information, including historical information on previous events".;'*

2.1.3 NPS EN-1 states at paragraph 5.7.12 that the Infrastructure Planning Commission (IPC) (now, for the purposes of this application, the appointed Examining Authority with the Secretary of State for Business Energy and Industrial Strategy being the decision maker) should not recommend and consent development in Flood Zone 2 in England unless satisfied that the Sequential Test requirements have been met and that consent should not be granted for development in Flood Zone 3 unless it is satisfied that the Sequential and Exception Test requirements have been met. For the Sequential Test, it states at paragraph 5.7.13 the following:

a. *"Preference should be given to locating projects in Flood Zone 1 in England or Zone A in Wales. If there is no reasonably available site in Flood Zone 1 or Zone A, then projects can be located in Flood Zone 2 or Zone B. If there is no reasonably available site in Flood Zones 1 or 2 or Zones A & B, then nationally significant energy infrastructure projects can be located in Flood Zone 3 or Zone C subject to the Exception Test."*

2.1.4 Paragraph 5.7.7 recommends that applicants should arrange pre-application discussions with the EA, and, where relevant, other bodies such as Internal Drainage Boards and sewerage undertakers to identify the likelihood and possible extent and nature of the flood risk, help scope the FRA, identify the information that will be required, and address concerns, where proposed development is affected by flood risk or is likely to increase flood risk elsewhere.

2.1.5 NPS EN-1 (at paragraphs 5.7.14 and 5.7.15) also outlines the Sequential and Exception Tests to be followed:

a. *"If, following application of the sequential test, it is not possible, consistent with wider sustainability objectives, for the project to be located in zones of lower probability of flooding than Flood Zone 3 or Zone C, the Exception Test can be applied. The test provides a method of managing flood risk while still allowing necessary development to occur.*

b. *The Exception Test is only appropriate for use where the sequential test alone cannot deliver an acceptable site, taking into account the need for energy infrastructure to remain operational during floods. It may also be appropriate to use it where as a result of the alternative site(s) at lower risk of flooding being subject to national designations such as landscape, heritage and nature conservation designations, for example Areas of Outstanding Natural Beauty (AONBs), Sites of Special Scientific Interest (SSSIs) and World Heritage Sites (WHS) it would not be appropriate to require the development to be located on the alternative site(s)."*

2.1.6 At paragraphs 5.7.16 and 5.7.17 NPS EN-1 states

a. *"All three elements of the test will have to be passed for development to be consented. For the Exception Test to be passed:*

(i) *It must be demonstrated that the project provides wider sustainability benefits to the community that outweigh flood risk;*

(ii) *The project should be on developable, previously developed land or, if it is not on previously developed land, that there are no reasonable alternative sites on developable previously developed land subject to any exceptions set out in the technology-specific NPSs; and*

(iii) *A FRA must demonstrate that the project will be safe, without increasing flood risk elsewhere subject to the exception below and, where possible, will reduce flood risk overall.*

b. *Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the IPC may grant consent if it is satisfied that the increase in present and future flood risk can be mitigated to an acceptable level and taking account of the benefits of, including the need for, nationally significant energy infrastructure as set out in Part 3 above. In any such case the IPC should make clear how, in reaching its decision, it has weighed up the increased flood risk against the benefits of the project, taking account of the nature and degree of the risk, the future impacts on climate change, and advice provided by the EA and other relevant bodies."*

2.1.7 Paragraph 5.7.23 of NPS EN-1 also requires a sequential approach to be applied to the layout and design of projects with more vulnerable uses being located on parts of the site at lower probability and residual risk of flooding by using Sustainable Urban Drainage Systems (SuDS).

2.1.8 Paragraph 5.7.24 and 5.7.25 require "Essential energy infrastructure which has to be located in flood risk areas should be designed to remain operational when floods occur" and that "the receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding".

2.1.9 Paragraph 5.7.19 explains the range of sustainable approaches to surface water drainage management and paragraph 5.7.21 requires "*surface water drainage arrangements for any project to be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project, unless specific off-site arrangements are made and result in the same net effect".*

2.1.10 Paragraph 5.7.22 also states that it "*may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration facilities or attenuation storage to be provided outside the project site, if necessary through the use of a planning obligation*".

National Policy Statement for Electricity Networks Infrastructure (EN-5)

2.1.11 National Policy Statement for Electricity Networks Infrastructure (EN-5) (NPS EN-5) principally concerns high voltage long distance transmission and distribution infrastructure however also relates to electrical infrastructure such as cabling, solar stations and substations associated with nationally significant energy infrastructure projects.

2.1.12 Paragraph 2.4.1 of NPS EN-5 explains that as climate change is likely to increase risks to the resilience of electrical infrastructure it requires applicants to "*set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it would be resilient to flooding, particularly for substations that are vital for the electricity transmission and distribution network"*.

National Planning Policy Framework (NPPF)

2.1.13 The NPPF was first published in March 2012, superseding national planning policy statements and guidance. The NPPF was revised in July 2021 and this FRA accords with the revised version of the NPPF. Flood Risk and Coastal Change Planning Practice Guidance (PPG) was also published in 2014 to provide guidance to support the implementation of the NPPF policies.

2.1.14 Section 14 of the NPPF entitled Meeting the Challenge of Climate Change, Flooding and Coastal Change (paragraphs. 152-173) sets out the requirements to assess flood risk and climate change for developments. Paragraph 169 expects "major developments to incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should: a) take account of advice from the lead local flood authority; b) have appropriate proposed minimum operational standards; c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and d) where possible, provide multifunctional benefits".

2.1.15 NPPF flood risk policy is supported by the Planning Practice Guidance and Table 1 of the PPG defines the flood zones.

Table 2: Flood Zones - Table 1 of the PPG 2014

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

2.1.16 Annex 3 of the NPPF classifies the Flood Risk Vulnerability of various land uses in Table 3 below. The More Vulnerable classification encompasses usages such as hospitals and buildings used for dwellings. Less Vulnerable applies to buildings used for general industry, storage and distribution.

Table 3: Flood Risk Vulnerability Classification – Adapted from Annex 3 of the NPPF 2021

Development Type	Classification
Essential infrastructure	a. Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. b. Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. c. Wind turbines. d. Solar farms.
Highly vulnerable	a. Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. b. Emergency dispersal points. c. Basement dwellings. d. Caravans, mobile homes and park homes intended for permanent residential use. e. Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “Essential Infrastructure”)
More vulnerable	a. Hospitals. b. Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. c. Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. d. Non–residential uses for health services, nurseries and educational establishments. e. Landfill and sites used for waste management facilities for hazardous waste. f. Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan
Less vulnerable	a. Police, ambulance and fire stations which are not required to be operational during flooding.

Development Type	Classification
	b. Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in “more vulnerable”, and assembly and leisure. c. Land and buildings used for agriculture and forestry. d. Waste treatment (except landfill and hazardous waste facilities). e. Minerals working and processing (except for sand and gravel working). f. Water treatment works which do not need to remain operational during times of flood. g. Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water-compatible development	a. Flood control infrastructure. b. Water transmission infrastructure and pumping stations. c. Sewage transmission infrastructure and pumping stations. d. Sand and gravel working. e. Docks, marinas and wharves. f. Navigation facilities. g. Ministry of Defence installations. h. Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. i. Water-based recreation (excluding sleeping accommodation). j. Lifeguard and coastguard stations. k. Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. l. Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

2.1.17 The NPPF sets out the Sequential Test, which is a risk-based test that should be applied at all stages of development. The aim of the test is to steer new development to areas with the lowest probability of flooding (Zone 1). Local Planning Authorities apply this test in their strategic planning processes by means of a Strategic Flood Risk Assessment (SFRA). Where there are no reasonably available sites within Flood Zone 1, Flood Zones 2 and 3 may be

considered, subject to passing the Exception Test, as required and set out in **Table 4** below.

2.1.18 The NPPF also requires large sites partially affected by Flood Zones 2 and 3 to be developed sequentially, placing the most vulnerable land uses in the areas with lowest risk of flooding.

2.1.19 If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the NPPF requires the Exception Test to be applied. The need for the Exception Test will depend on the potential vulnerability of the location of development and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.

2.1.20 The NPPF states that to pass the Exception Test it should be demonstrated that:

a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

2.1.21 NPS EN-1 was published in July 2011, prior to the first release of the NPPF in 2012. With regard to the Exception Test, the NPPF which was subsequently updated in 2021, only requires two of the three requirements referred to in NPS EN-1. The requirement for projects to be located on developable or previously developed land should no alternative site on previously developed land be available is not referred to in the NPPF. Whilst NPS EN-1 relates specifically to nationally significant energy infrastructure projects, planning policy relating to development and flood risk listed in NPPF provides more up to date government policy.

2.1.22 The draft NPS EN-1, published in September 2021 has been reviewed for this FRA, and does not change the approach to the assessment.

Table 4: Flood Risk Vulnerability and Flood Zone Compatibility - Table 3 of the PPG 2014

		Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	Exception Test Required	✓	✓	✓
	Zone 3a	Exception Test Required	×	Exception Test Required	✓	✓
	Zone 3b functional floodplain	Exception Test Required	×	×	✓	×

✓	Development is appropriate
×	Development should not be permitted
	Flood Zones the Scheme Sits Within for the Vulnerability classification applied.

2.2 Local Planning Policy

2.2.1 The Scheme is located within four administrative areas: CCC, SCC, ECDC, and WSC.

2.2.2 The following key planning documents and salient policies have been consulted to inform this FRA:

a. West Suffolk Local Plan (consisting of the former Forest Heath and St Edmundsbury areas)

   i. Forest Heath District Council (FHDC) Core Strategy (Adopted 2010)

      (i) Policy CS-4 Reduce Emission, Mitigate and Adapt to future Climate Change
      (ii) Spatial Objective ENV2

   ii. Forest Heath and St Edmundsbury Local Plan: Joint Development Management Policies Document (Last updated February 2015)

      (i) Policy DM6 Flooding and Sustainable Drainage
      (ii) Policy DM14 Protecting and Enhancing Natural Resources, Minimising Pollution and Safeguarding from Hazards.

   WSC have commenced a review of the local plan which will set out the long term planning and land use policies for the area, however this is at a very early stage.

b. ECDC; Local Plan, Adopted April 2015

   i. Policy ENV 8 Flood Risk

c. ECDC, Cambridgeshire Flood and Water Supplementary Planning Document, Adopted March 2016

d. ECDC Spatial Development Plan Renewable Energy Development (Commercial Scale), October 2014

   i. Policy CS6 Environment, noting opportunities to limit water pollution, improve water quality, and minimised flooding
   ii. Policy EN8 Pollution.

2.2.3 Other supporting local evidence documents relating to flood risk include:

a. Forest Heath District Council and St Edmundsbury Borough Council Strategic Flood Risk Assessment and Water Cycle Study Level 1; August 2009

b. FHDC Strategic Flood Risk Assessment Level 2; October 2011

c. ECDC Level 1 and Level 2 Strategic Flood Risk Assessment, October 2017

d. West Suffolk Council Strategic Flood Risk Assessment, Level 1, 2021

   i. Climate change mapping still uses 20% climate change. However, the Scheme is not in an area where climate change may have an impact on development.

3 Supporting Information

3.1 Contributing Areas

3.1.1 The area contributing to surface discharge from the Order limits was estimated for both the proposed and existing site area, as shown in **Table 5** below:

Table 5: Contributing Areas

	Total Area (ha)	Pre-Development PIMP*	Post-Development PIMP	Pre-Development Contributing Area (ha)	Post-Development Contributing Area (ha)
Order limits	1,113	1%	8%	11.18	92.3

*- Percentage Impermeable (PIMP)

3.2 Flood Risk Mapping

3.2.1 The following section will discuss the existing flood risk in each area of the Order limits.

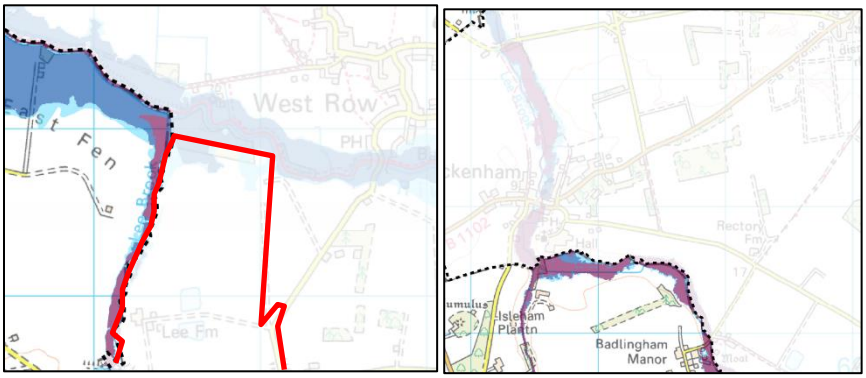
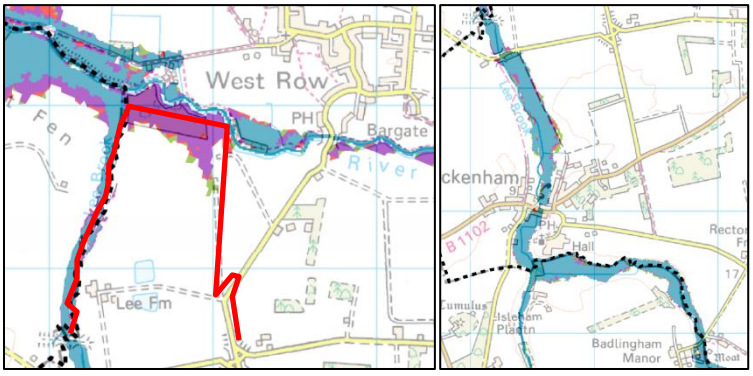
3.2.2 No noted historic events are detailed within FHDC&SE and ECDC SFRAs within the Order limits.

3.2.3 The Order limits have been marked indicatively on the plan extracts in the following tables.

Sunnica East Site A

Table 6: Flood Risk Assessment - Sunnica East Site A

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (Majority) Medium – high (North West side)	**Source: *EA Flood Zone Dataset*** The majority of Sunnica East Site A lies in Flood Zone 1, however, Flood Zones 2 and 3a are shown to encroach into the Sites north west corner; from the Lee Brook (Main River) west of the Site in a north/south direction, and north from the River Lark (Main River), refer to Figure 2 and Figure 3 below. **Source: *FHDC&SE SFRA 2009*** SFRA mapping corroborates the EA mapping above. Flood Zones 2 and 3 are shown to be within a defined Flood Warning Area, with properties within the catchment of the River Lark shown to be benefiting from flood defences. **Source: *FHDC SFRA 2011*** No further information provided for the area. **Source: *ECDC SFRA 2017***

Flood Risk Source	Flood Risk Level	Comments
		SFRA mapping corroborates the EA mapping above. However, the SFRA also identifies Flood Zone 3b is present along the Lee Brook as shown in Figure 2. The areas of Flood Zones 2 and 3 encroaching into the Sites northern boundary from the River Lark retain that designation. The SFRA climate change mapping in Figure 3 shows a slight modification in the location of Flood Zone 3a encroachment, however, this is a negligible increase in extent of this zone. Flood defences are also shown running down the Lee Brook from the River Lark, designed to the 1 in 10 year event **Summary:** The majority of the Site lies in Flood Zone 1, however, an area of Flood Zone 3b is identified along to the Lee Brook running through the west of the Site in a north/south direction and bordering its north west boundary. The Flood Zone 2 and 3a areas continue along the northern boundary of the Sites north east corner originating from the River Lark. Development should not be permitted within the Flood Zone 3b area unless it is water compatible or essential infrastructure as set out in Table 1 of the NPPF PPG. Refer to figures overleaf for relevant map extracts of latest SFRA mapping.  **Figure 2: ECDC 2017 Flood Zone mapping – Flood Zone 3b (Purple), Flood Zone 3 (Dark Blue), Flood Zone 2 (Light Blue)**  **Figure 3: ECDC 2017 Climate Change mapping – 1 in 100 year (Blue), 1 in 100 year +CC**
Tidal	Low	Not in a Tidal area

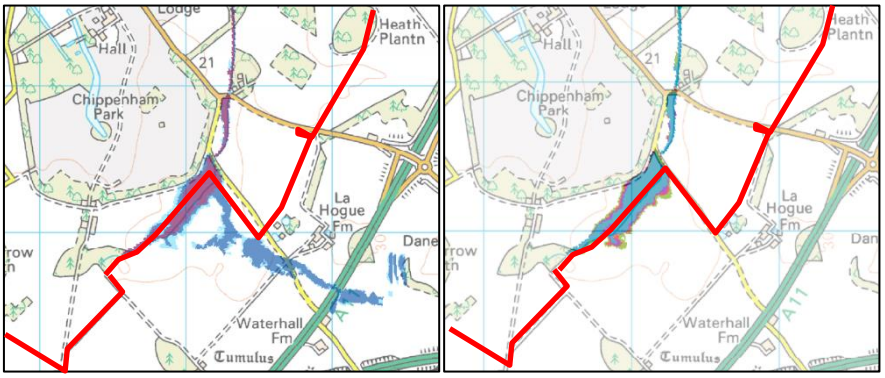
Flood Risk Source	Flood Risk Level	Comments
Pluvial (Surface Water)	Very Low	**Source: *GOV.uk Flood Risk from Surface Water; FHDC SFRA 2011; ECDC SFRA 2017*** All reference sources indicate that patches of Sunnica East Site A are susceptible to surface water flooding; however, flooding is generally very localised and generally shallow (low risk). Some larger patches are located within the north eastern portion of the site which are at a high risk. Several field ditches displayed within the site are also shown to be susceptible to surface water flooding. However, the majority of the site is at very low risk of surface water flooding.
Groundwater	Low (East side) - Medium (North West side)	**Source: *FHDC&SE SFRA 2009*** No mapping available at the time of writing this report. However, Figure 5-3 of the SFRA displays no record of groundwater flooding on the site, and the Environment Agency response; Ref EAn/2019/136538, dated 30 August 2019, also states they have no records of groundwater flooding. **Source: *FHDC SFRA 2011 and ECDC SFRA 2017*** Figure 8-2 and Appendix E of the SFRA displays groundwater risk mapping showing the eastern half of the Site to be within 1km by 1km grid squares of 0% to <25% risk of groundwater emergence. The western portion of the Site graduates from 0% in the south to >=50% <75% in the north in proximity to the River Lark.
Sewers	Low	**Source: *FHDC&SE SFRA 2009 and FHDC SFRA 2011 / DigDat Online*** There are no confirmed sewers in the vicinity of the proposed site compound areas of the Scheme (confirmed via the DigDat service, May 2021). The Forest Heath Water Cycle Study has no records of flooding within the site, however, historic external flooding is noted within West Row to the north. Due to the greenfield nature of the site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low.
Artificial Sources	Very Low (residual)	The site is not within or near any registered reservoirs (assumed with volumes >25,000m^3) or other artificial sources. The site is at very low risk of flooding from artificial sources.

Sunnica East Site B

3.2.4 Review of the FHDC&SE SFRA 2009 shows Sunnica East Site B within Flood Zone 1 and at low risk from all sources. Pluvial risk in Sunnica East Site B is similar to that outlined in Sunnica East Site A and is to be accommodated through the use of SuDS. The Forest Heath Water Cycle Study has no records of flooding within the site, however, historic internal and external flooding is noted within Red Lodge to the east.

Sunnica West Site A

Table 7: Flood Risk Assessment - Sunnica West Site A

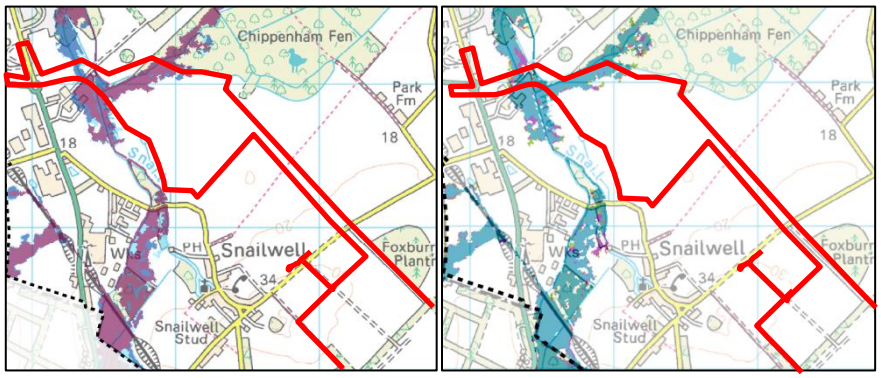
Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (Majority), Medium – High (West side)	**Source: *EA Flood Zone Dataset*** The majority of the Sunnica West Site A lies in Flood Zone 1, however, an area of Flood Zones 2 and 3a encroaches into the site from an ordinary watercourse along the site's northern boundary (a tributary of the Lee Brook). These Flood Zones then extend further into the site in a south easterly direction perpendicular to the ordinary watercourse for approximately 1.6km. Refer to Figure 4 below. **Source: *FHDC&SE SFRA 2009*** SFRA mapping shows no flood risk to the area. **Source: *ECDC SFRA 2017*** SFRA mapping corroborates the EA mapping. However, an area of Flood Zone 3b is shown in proximity to the ordinary watercourse as shown in Figure 4. The SFRA climate change mapping in Figure 4 below shows no major difference in Flood Zone 3a area in proximity to the ordinary watercourse, however the 1.6km encroachment in a south east direction is not shown. As such, a worst-case approach will be used for this assessment. **Summary:** The majority of the site lies in Flood Zone 1, however, an area of Flood Zone 3b is located in proximity to an ordinary watercourse along the northern boundary of the site overlaying Flood Zones 2 and 3a. The Flood Zone extends further into the site in a south eastern direction for 1.6km, designated as Flood Zone 2 and 3a. Development will not be permitted within the Flood Zone 3b area unless it is water compatible or essential infrastructure as set out in Table 1 of the NPPF PPG. Refer to figures below for relevant map extracts of latest SFRA mapping.  **Figure 4: ECDC 2017 Flood Zone (Left) and Climate Change (Right) mapping**
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Very Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate that areas of the site are susceptible to surface water flooding however, flooding is localised and generally shallow (low risk). The majority of the site is at very low risk of surface water flooding.
Groundwater	Low (East side),	**Source: *ECDC SFRA 2017***

Flood Risk Source	Flood Risk Level	Comments
	Medium - High (West side)	Appendix E of the SFRA displays groundwater risk mapping showing the eastern quarter of the site to be within 1km by 1km grid squares of 0% to <25% risk of groundwater emergence. This risk level increases westward to >=75%. **Source: *FHDC&SE SFRA 2009*** Two locations of historic groundwater flooding are noted between the site's southern border and Newmarket. **Source: *BGS and MAGIC maps*** The ground makeup of the site therefore has the potential to have a relatively good infiltration capacity making shallow infiltration SuDS a possibility, subject to further ground investigation, groundwater monitoring and infiltration testing. The majority of the site lies in a Source Protection Zone III, with a portion of the site in the west-eastern corner designated Source Protection Zone II. Therefore, any infiltration techniques must ensure mitigation measures are put in effect to protect these zones.
Sewers	Low	**Source: *ECDC SFRA 2017 / DigDat Online*** There are no confirmed sewers in the vicinity of the proposed site compound areas of the Scheme (confirmed via the DigDat service, May 2021). The Forest Heath Water Cycle Study has no records of flooding within the site, however, historic external flooding is noted within West Row to the north. Due to the greenfield nature of the site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low.
Artificial Sources	Very Low (residual)	The site is not within or near any registered reservoirs (assumed with volumes >25,000m^3) or artificial sources of flooding. The site is at very low risk of flooding from artificial sources and reservoirs.

Sunnica West Site B

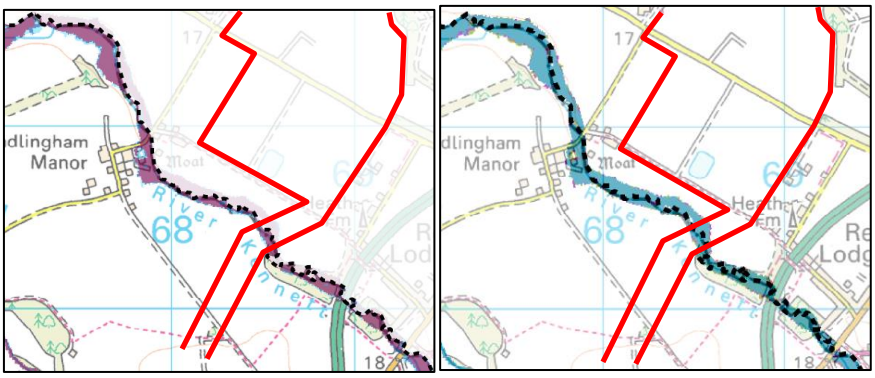
Table 8: Flood Risk Assessment - Sunnica West Site B

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (Majority) Medium – high (North West side)	**Source: *EA Flood Zone Dataset*** The majority of the Sunnica West Site B lies in Flood Zone 1, however, an area of Flood Zones 2 and 3a encroaches from the River Snail, running alongside the south western and north western boundaries of the site. **Source: *FHDC&SE SFRA 2009*** No flood risk is shown. **Source: *ECDC Level 1 and Level 2 Strategic Flood Risk Assessment, October 2017*** SFRA mapping corroborates the EA mapping. However, Flood Zone 3b is present overlaying large parts of the Flood Zone 3a areas as shown in Figure 5. The SFRA climate change mapping, as shown in Figure 5, shows the Flood Zone 3a extents effectively matching that of the Flood Zone 2. **Summary:**

Flood Risk Source	Flood Risk Level	Comments
		The majority of the Site lies in Flood Zone 1, however, an area of Flood Zone 3b from the River Snail is located along the south western and north western boundaries of the site. Development will not be permitted within the Flood Zone 3b area unless it is water compatible or essential infrastructure as set out in Table 1 of the NPPF PPG. Refer to figures below for relevant map extracts of latest SFRA mapping.  **Figure 5: ECDC 2017 Flood Zone (Left) and Climate Change (Right) mapping**
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Very Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate that areas of the site is susceptible to surface water flooding however, flooding is localised and generally shallow (low risk). Several field ditches displayed within the site are also shown to be susceptible to surface water flooding. The majority of the site is at very low risk of surface water flooding.
Groundwater	Low (East side) - Medium (West side)	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk mapping showing the majority of the site lies within 1km by 1km grid squares of >=50% to >75%. A small area to the north of the site and east of the A11 displays a lower risk (<25%). **Source: *BGS and MAGIC maps*** The ground makeup of the site therefore presents limited potential for infiltration SuDS but may be suitable for shallow infiltration SuDS. However, this is subject to further ground investigation, groundwater monitoring and infiltration testing. The site lies in a Source Protection Zone III. Therefore, any infiltration techniques must ensure mitigation measures are put in effect to protect this zone.
Sewers	Low	**Source: *ECDC SFRA 2017 / DigDat Online*** There are no confirmed sewers in the vicinity of the proposed site compound areas of the scheme (confirmed via the DigDat service, May 2021). The Forest Heath Water Cycle Study has no records of flooding within the site, however, historic external flooding is noted within West Row to the north. Due to the greenfield nature of the site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low.
Artificial Sources	Very Low (residual)	The site is not within or near any registered reservoirs (assumed with volumes >25,000m^3) or other artificial sources. The site is at very low risk of flooding from reservoirs and artificial sources.

Grid Connection Route A (Connecting Sunnica East Site A to West Site A)

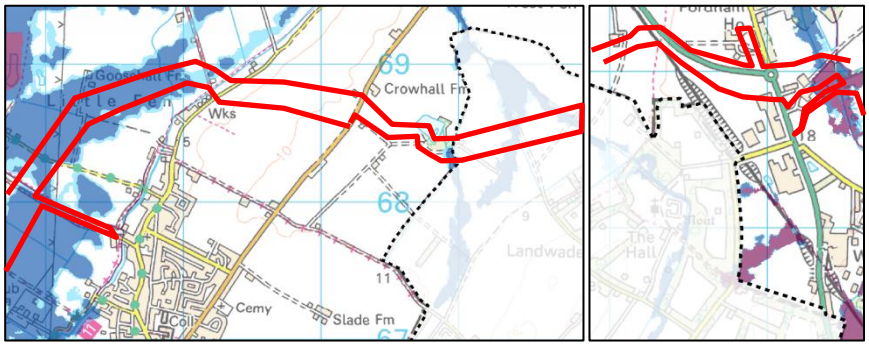
Table 9: Flood Risk Assessment - Grid Connection Route A

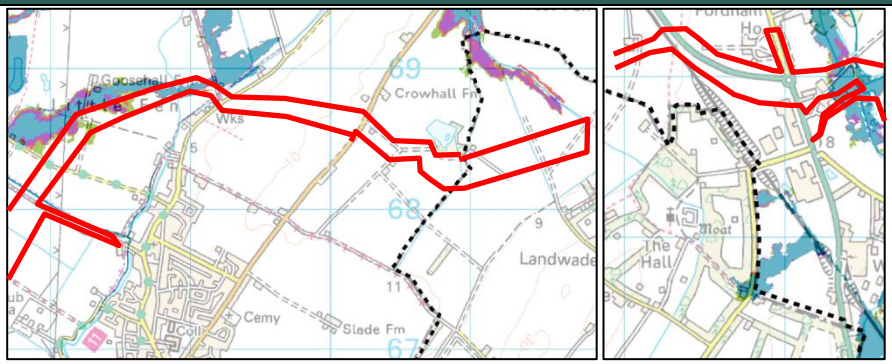
Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low	**Source: *EA Flood Zone Dataset, ECDC SFRA 2017*** The majority of site is situated within Flood Zone 1, however, an area of Flood Zones 2 and 3a crosses the connection route – the floodplain of the River Kennet and the River Kennett itself. **Source: *FHDC&SE SFRA 2009*** SFRA mapping corroborates the EA mapping above. **Source: *ECDC Level 1 and Level 2 Strategic Flood Risk Assessment, October 2017*** SFRA mapping corroborates the EA mapping. However, Flood Zone 3b is present overlaying large parts of the Flood Zone 3a areas as shown in Figure 6. The SFRA climate change mapping and shows the Flood Zone 3a extents effectively matching that of Flood Zone 2. **Summary:** The majority of the Site lies in Flood Zone 1, however, an area of Flood Zone 3b from the River Kennet is near the Site. Development is not permitted within the Flood Zone 3b area unless it is water compatible or essential infrastructure as set out in Table 1 of the NPPF PPG. Refer to figures below for map extracts of latest SFRA mapping.  **Figure 6: ECDC 2017 Flood Zone (Left) and Climate Change (Right) mapping**
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Very Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both sources indicate that areas of the site are susceptible to surface water flooding; however, flooding is localised and generally shallow (low risk). A higher risk area adjacent to the connection route, approximately 160m perpendicular to the B1085 is shown. This is considered a larger depression. The majority of the site is at very low risk of surface water flooding.
Groundwater	Low	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk mapping showing that the majority of the site lies within 1km by 1km grid squares of 0% groundwater risk. The lower portion of the site increases in risk shown as >=25% <50% groundwater risk.
Sewers	Low	**Source: *ECDC SFRA 2017 / DigDat Online***

Flood Risk Source	Flood Risk Level	Comments
		The Grid Connection Route A will not impact existing sewer flood risk, there will be no connections as part of the cable routes. There are no confirmed sewers in the vicinity of the proposed site areas of the Scheme (confirmed via the DigDat service, May 2021). The Forest Heath Water Cycle Study has no records of flooding within the site. There is no history of sewer flooding noted in SFRA within the site area. Sewers may be present, e.g. trunk mains, in the site area and these will be identified before any construction takes place. However, it is not proposed to connect to a public sewer so the risk will remain low.
Artificial Sources	Very Low (residual)	The site is not within or near any registered reservoirs (assumed with volumes >25,000m^3) or other artificial sources. The site is at very low risk of flooding from reservoirs and artificial sources.

Grid Connection Route B (Connecting Sunnica West Site A to Burwell National Grid Substation Extension)

Table 10: Flood Risk Assessment - Grid Connection Route B

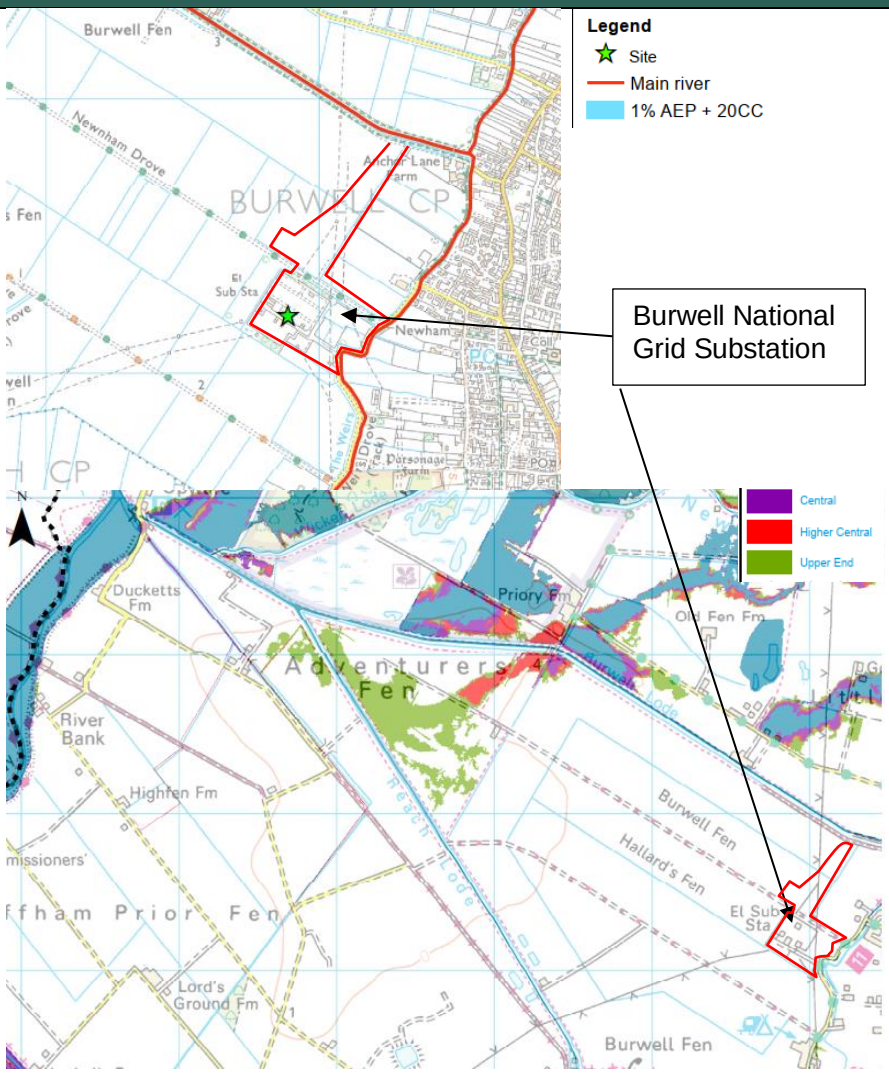
Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low	**Source:** ***EA Flood Zone Dataset, FHDC&SE SFRA 2009 and ECDC SFRA 2017*** The route is situated largely within Flood Zone 1 but passes through areas of Flood Zones 2 and 3a as shown in Figure 7. The western extent, an area in the centre and the western connection to the Sunnica West Site B is within Flood Zones 2 and 3a. The western extent is within an area of Defended Flood Zone 3a and the edge of the Sunnica West Site B is designated Flood Zone 3b. The SFRA climate change mapping appears to indicate large reductions in the Flood Zone 3a area. It is currently unclear as to the reasons for this; as such, until this is confirmed with the EA, a worst-case approach will be used for this assessment. Refer to figures below for relevant map extracts of latest SFRA mapping.  **Figure 7: ECDC 2017 Flood Zone mapping (image on the left shows Burwell and image on the right shows the area to the wet of Sunnica West B)**

Flood Risk Source	Flood Risk Level	Comments
		 **Figure 8: ECDC 2017 Climate Change mapping (image on the left shows Burwell and image on the right shows the area to the wet of Sunnica West B)** The SFRA also shows that the Site is not within the Fenland flood defence breach model for Q100 year and Q100 year + Climate Change extents.
Tidal	Low	**Source: *ECDC SFRA 2017*** Not within the Tidal Hazard Mapping (Tidal Great Ouse Breach Modelling) for Q200 and Q200 + Climate Change breach extents.
Pluvial (Surface Water)	Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate patches of the site which are susceptible to surface water flooding, however, flooding is localised and generally shallow (low risk). Several field ditches displayed within the site are also shown to be susceptible to surface water flooding. The majority of the connection route is at low risk of surface water flooding.
Groundwater	Medium - High (Majority)	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk is shown to be generally high (>75%) west of Sunnica West Site B, lowering in some areas to >=50% <75%, however, low risk (<25%) between Sunnica West Sites A and B.
Sewers	Low	**Source: *ECDC SFRA 2017 / DigDat Online*** The Grid Connection Route B will not impact existing sewer flood risk, there will be no connections as part of the routes There are no confirmed sewers in the vicinity of Grid Connection Route B (confirmed via the DigDat service, May 2021). The Forest Heath Water Cycle Study has no records of flooding within the site. However, there is no history of sewer flooding noted in SFRA within the site area. Sewers may be present, e.g. trunk mains, in the site area and these will be identified before any construction takes place. However, it is not proposed to connect to a public sewer so the risk will remain low.
Artificial Sources	Very Low (residual)	The site is not within or near any registered reservoirs (assumed with volumes >25,000m^3) or other artificial sources. The site is at very low risk of flooding from reservoirs and artificial sources.

Burwell National Grid Substation Extension

Table 11: Flood Risk Assessment – Burwell National Grid Substation Extension (Applies to both Option 1 and 2 locations)

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low	**Source: *EA Flood Zone Dataset, Accessed, ECDC SFRA 2017*** The majority of the Burwell National Grid Substation Extension is shown to be in Defended Flood Zone 3a, although the gov.uk long term flood risk map locates the substation in Flood Zone 2 (Low Risk). However, the latest Product 4 Data from the Environment Agency, provided 9 July 2021, indicates the site is in Flood Zone 1 (including from the 20% climate change level of 2.19m AOD) and also from the 1 in 1000 year levels at the nearest model node (WE950) shown as 2.25AOD. The Burwell Site also appears to be surrounded by raised ground in the form of embankments or flood defences, up to a level of 3.20m AOD, according to the topographic survey. The ECDC (2017) SFRA climate change maps also indicate large reductions in Flood Zone 3a and 2 areas and exclude the site from Flood Zone 2 and 3, i.e. the site is within Flood Zone 1. The mapping includes modelling of the Cam Lodes. The lowest Burwell Lode Flood Defence level provided is 2.79m AOD. Although this indicates a 1 in 50 year standard of defence, the level would appear to corroborate the EFDC mapping. It is assumed the refined flood extents are a result of finer scale modelling of watercourses and better level data, whereas the older EA floodplain map is a broadscale map that does not take into account watercourse detail at a macro scale. The SFRA also shows that the site is not within the Fenland flood defence breach model for Q100 year and Q100 year + Climate Change extents. Figure 9 below indicates the flood risk, including climate change, from the ECDC SFRA. In this case it is proposed the site lies within Flood Zone 1, low risk. Refer to Figure 9 below for relevant map extracts of latest mapping (ECDC mapping includes 65% climate change extents for the Upper End).

Flood Risk Source	Flood Risk Level	Comments
		 **Figure 9: EA Product 4 Data (Top) (Provided 9 July 2021) and Figure ECDC_40 of the ECDC 2017 with the modelled 65% Climate Change extent indicated in green shading (Bottom)**
Tidal	Low	**Source: *ECDC SFRA 2017*** Not within the Tidal Hazard Mapping (Tidal Great Ouse Breach Modelling) for Q200 and Q200 + Climate Change breach extents.
Pluvial (Surface Water)	Very Low - Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate patches of the site which are susceptible to surface water flooding, however, flooding is localised and shallow (low risk). The majority of the site is at very low risk of surface water flooding.
Groundwater	High	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk is shown to be high (>75%).
Sewers	Low	**Source: *ECDC SFRA 2017 / DigDat online***

Flood Risk Source	Flood Risk Level	Comments
		There are no confirmed sewers in the vicinity of Burwell National Grid Substation Extension (confirmed via the DigDat service, May 2021). However, there will be no sewer connections required as part of the substation extension. The Forest Heath Water Cycle Study has no records of flooding within the Site. However, there is no history of sewer flooding noted in SFRA within the site area. Sewers may be present, e.g. trunk mains, in the site area and these will be identified before any construction takes place. However, it is not proposed to connect to a public sewer so the risk will remain low.
Artificial Sources	Very Low (residual)	The site is not within or near any registered reservoirs (assumed with volumes >25,000m^3) or other artificial sources. The site is at very low risk of flooding from reservoirs and artificial sources.

3.3 Watercourses

3.3.1 Three main rivers and one ordinary watercourse are shown within or in close proximity to the Order limits:

Main River

a. The River Lark running in an east / west direction along the northern border of Sunnica East Site A;

b. The Kennett / Lee Brook, a tributary of the River Lark, running in a south / north direction through the west of the Sunnica East Site A, named as the River Kennet in proximity to the southern border of the Sunnica East Site B, before its confluence with the Lee Brook.

c. The River Snail running in a south / north direction along the southern border of the Sunnica West Site B; and

Ordinary Watercourse

d. An ordinary watercourse (Lee Brook) running along the north-western border of the Sunnica West Site A.

3.4 Geology and Hydrogeology

3.4.1 A desk top assessment has been completed to determine bedrock and superficial geology within the Order limits. These maps indicate the Order limits are underlain by a mix of Sand and Gravel members; Head, River Terrace Deposits and Alluvium Superficial Deposits atop Chalk Bedrock. Large portions of the Order limits are however absent of Superficial Deposits and are directly underlain by the Chalk Bedrock.

3.4.2 The Bedrock covering the majority of the Order limits is Holywell Nodular Chalk Formation And New Pit Chalk Formation and Zig Zag Chalk Formation, with seams of the Melbourn Rock Member.

3.4.3 The EA's Online Interactive Maps for Groundwater shows the furthest eastern and western extents of Sunnica East Site B and the entirety of the Sunnica West Sites A and B to be situated within a Groundwater Source Protection Zone (SPZ) 3 (Total Catchment Zone). A small portion of the Sunnica West Sites A and B is also within a Groundwater SPZ 2 (Outer Protection Zone). An SPZ typically means there is an underlying aquifer supplying a borehole for potable use; an SPZ 2 is defined by a 400 day travel time from a point below the water table and an SPZ 3 is defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source.

3.4.4 Refer to Annex E – Additional Mapping for further information.

4 Assessment of Flood Risk

4.1 Flood Risk from all Sources

4.1.1 This section assesses the flood risk, to the Scheme and off site, from the following sources against the illustrative parameter plans shown within Annex B – Development Parameter Plans:

a. Fluvial (Rivers and the Sea);

b. Surface Water;

c. Sewers;

d. Groundwater; and

e. Artificial waterbodies.

4.1.2 The Scheme will ensure it does not materially impact the flood risk off site.

4.1.3 The methodology used to assess the flood risk is detailed below:

a. Low: where little risk is identified or any theoretical risk identified is classified as low within Local Authority SFRAs and/or EA flood risk mapping extents, with very low probability of flooding occurring.

b. Medium: where risk is identified within Local Authority SFRA and/or EA flood risk mapping extents indicating a medium probability, but manageable flood risk with little to no mitigation required.

c. High: where modelled levels within Local Authority SFRA and/or EA flood risk mapping extents show risk to development as a high probability of flood risk and where mitigation needs to be considered and residual risks controlled.

4.1.4 As previously mentioned, the Scheme covers a considerable area and the flood risk affecting different proposed areas of the Scheme varies according to each area. Section 5 discusses the flood risk affecting each area of development within the Order limits individually, using parcel references presented within the Scheme parameter plans, for example, W01 for the Sunnica West Site A and E01 for the Sunnica East Site A. It is therefore recommended to refer to these plans in Annex B – Development Parameter Plans when reading the below sections.

4.1.5 Through the sequential process and design iterations, all operational compounds and battery storage units have been located out of flood zones. Infrastructure shown to be at flood risk is to be mitigated as discussed in the below tables and in Section 6 – Residual Risks and Mitigation.

4.1.6 The following sections reference SuDS measures that will be employed, as set out within the accompanying Drainage Strategy, to mitigate risks from surface water flooding, and fluvial flooding downstream of the Sites. For further information, please refer to the Drainage Technical Note within Annex F – Drainage .

4.1.7 Mitigation for the construction of PV Panels located in flood zones will be controlled through the Construction Environment Management Plan (CEMP) (Framework CEMP provided in **Appendix 16C** of the Environmental Statement **[EN010106/APP/6.2]**). The panels will sit on narrow piled frames with no other excavation of ground required. The majority of cable routes will be trenched via intrusive methods, however, non-intrusive methods will be required for crossing of identified constraints such as certain watercourses, roads and the railway line). Trenching for the cable routes will be undertaken during dry weather and backfilled. Construction methods will ensure no runoff is washed off site into watercourses by silt trapping methods and other measures as identified in the CEMP. Refer to Table 3-2 in Chapter 3 of the ES for the list of trenchless crossings proposed.

4.1.8 No permanent, above ground development / PV panels will be located within 8m of a main river or flood defence structure.

4.1.9 **Tables 12** to **16** below assess flood risk as a result of the Scheme, for the particular areas noted to be at risk of flooding.

4.1.10 Various water features are noted in **Chapter 9** of the Environmental Statement **[EN010106/APP/6.2],** paragraph 9.6.23. The only raised surface water feature within the Order limits is the storage reservoir adjacent to E19 and E22. Two raised storage reservoirs that are located outside of the Order limits, adjacent to Sites E08, E09, E10, and E33 appear to be large enough to fall within a Statutory Reservoir limit (25,000m3). However, if any were to fail, ground levels suggest it would flow away from the site toward the River Kennett. All other features noted in or outside of the Order limits noted are not considered to be raised above ground and, therefore, not considered to impact the Scheme in terms of pluvial flood risk.

4.1.11 The storage reservoir within the Order limits is discussed in **Table 12** below.

Climate Change

4.1.12 The design life of the development is 40 years and is anticipated to be commissioned for use in 2025, at the earliest. In assessing climate change for the scheme, Essential Infrastructure is required to be assessed for the “Upper End” of the climate change allowances (according to the latest climate change guidance). For the “2040 to 2069” epoch, the Upper End climate change to take into account according to ‘Table 9 – Anglian River Basin District Climate Change Allowances’ from West Suffolk Council’s SFRA (April 2021 Issue) is 35%. The FRA initially assessed the site for the longer-term epoch (2070-2125), which has an allowance of 65

4.1.13 However, as of October 2021, the climate change allowances have changed, and now propose allowances based on Water Framework Directive catchment areas, The Environment Agency Website ‘Climate change allowances for peak river flow in England’ has been consulted to check and confirm the revised climate change allowances for the catchment areas that cover the Order limits. The revised guidance indicates using the “Higher Central” allowance for design, with a sensitivity review for significant developments, to check against the Upper End allowance.

4.1.14 The revised “Higher Central” limit, for Scheme design, is 19%, and the “Upper End” allowance value for each site across the scheme is now 45%, a reduction of 20% in peak river flow. The FRA uses these revised values to assess climate change to the Scheme, as set out in Figures 10 to 13 below.

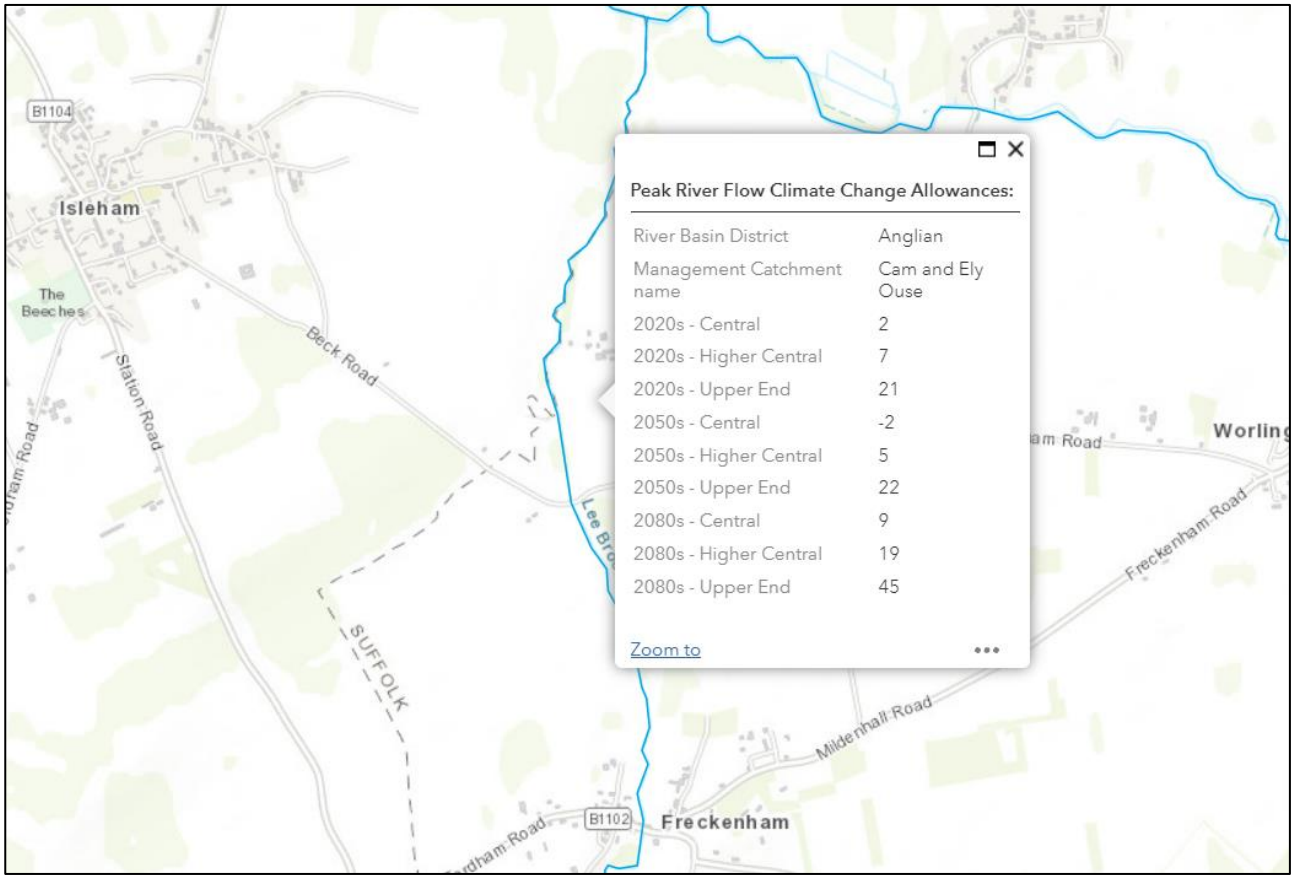


Figure 10 – Sunnica East Site A - East Environment Agency Climate Change Allowances for Peak river flow in England

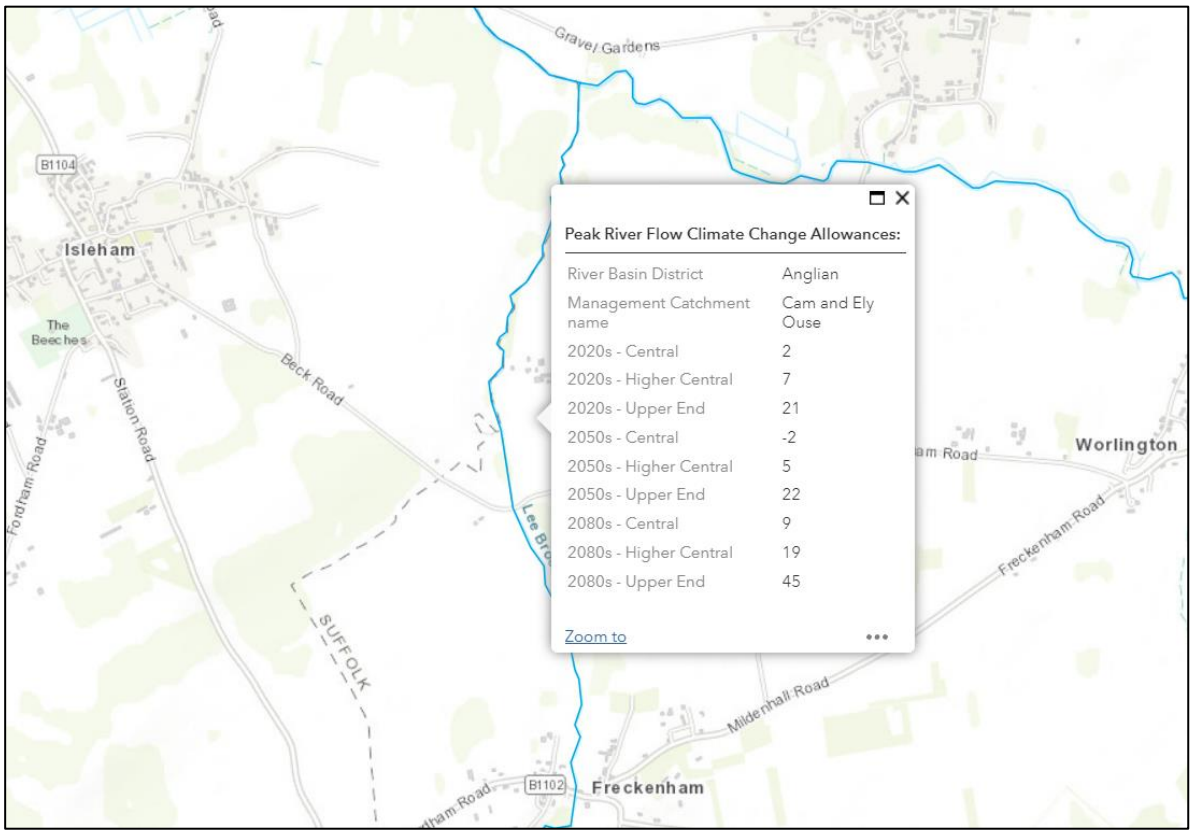


Figure 11 - Sunnica East Site B - East Environment Agency Climate Change Allowances for Peak river flow in England

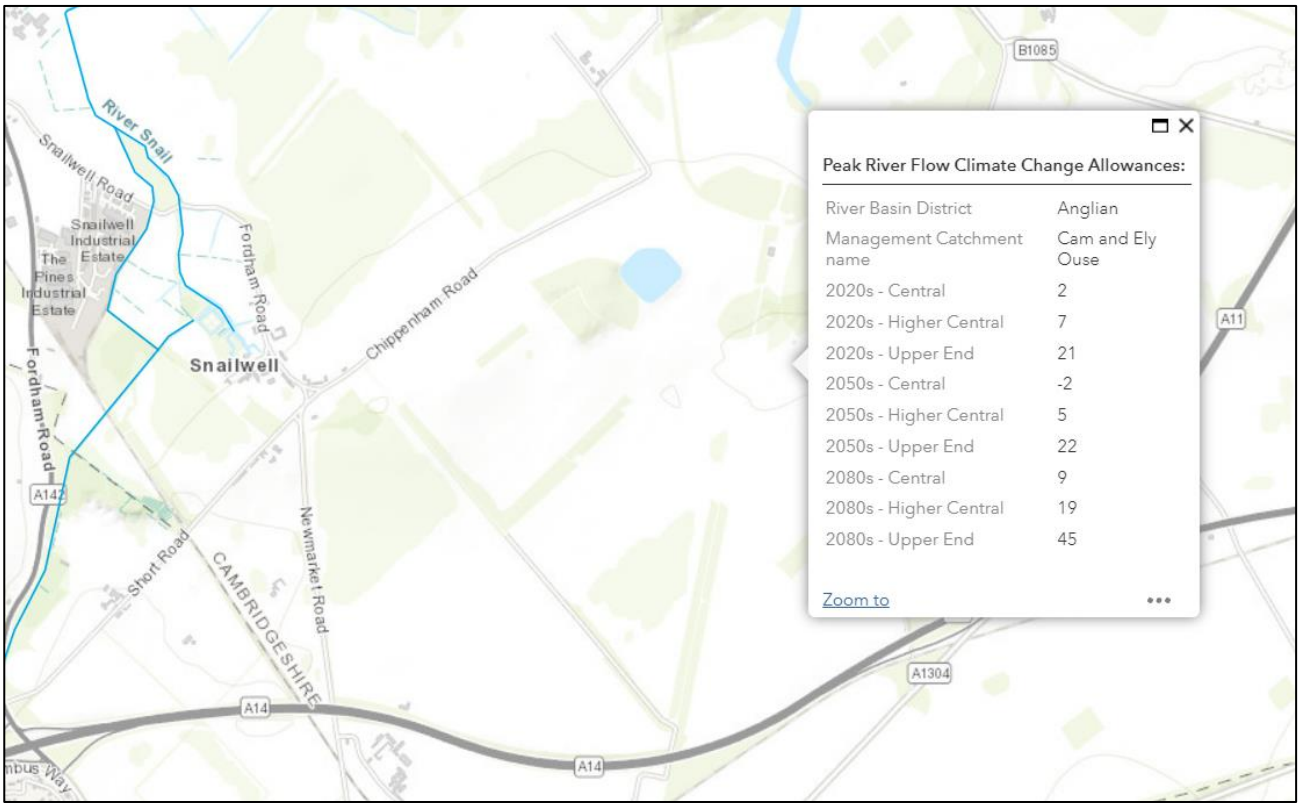


Figure 12 - Sunnica West Site A - East Environment Agency Climate Change Allowances for Peak river flow in England

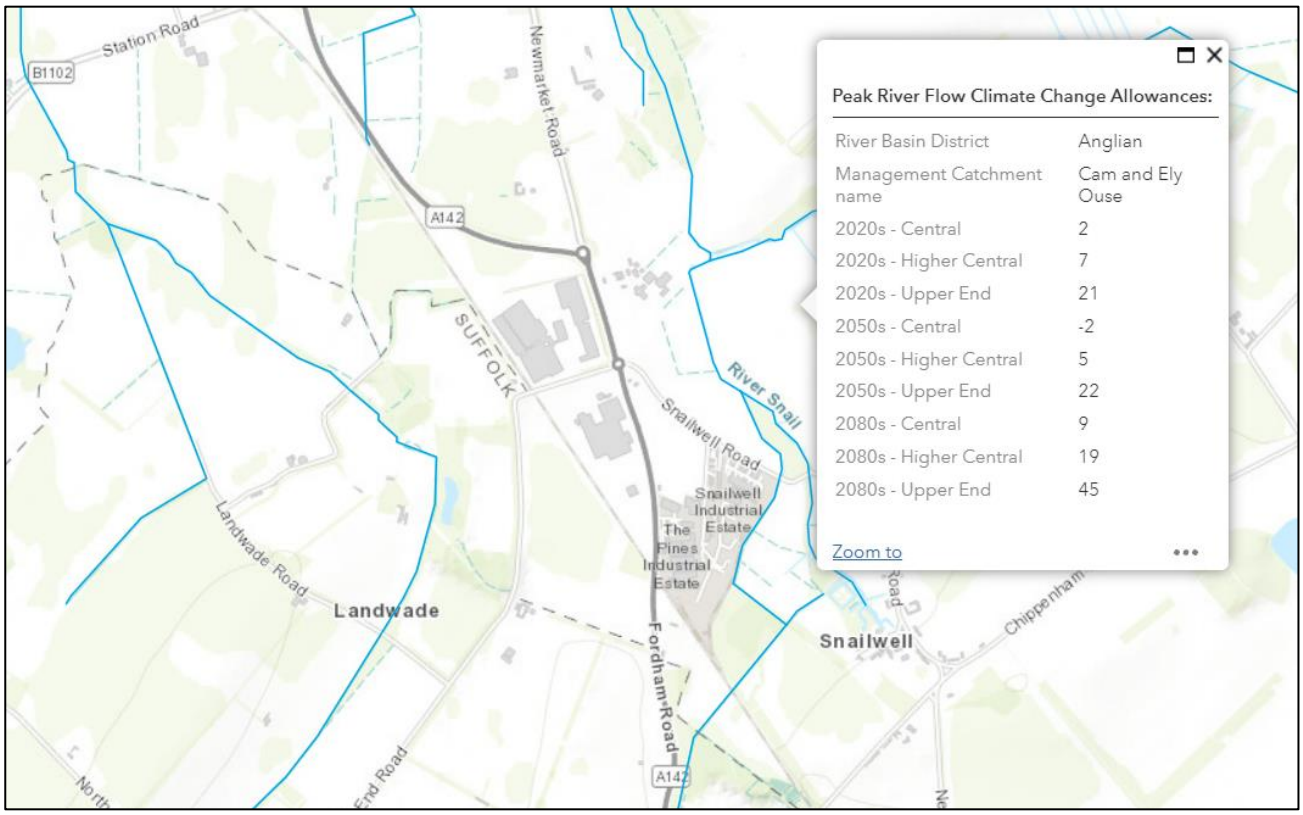


Figure 13 - Sunnica West Site B - East Environment Agency Climate Change Allowances for Peak river flow in England

Sunnica East Site A

4.1.15 With the exception of sections E01, E02, E03 and E05, the remainder of Sunnica East Site A and B (including Compound and BESS areas) are considered to be at low residual risk from all sources of flooding, with mitigation for residual surface water flood risk incorporated. Refer to Annex B – Development Parameter Plans and Annex C – Flood Risk Mapping for layout and areas with identified flood risk, and Annex D – Drainage Technical Note for surface water flood risk mitigation.

4.1.16 Tables 12 to16 below assess flood risk to the entire Sunnica East Site A, with relevant attention to PV areas, as listed in each table, where it is considered there is a higher residual fluvial flood risk.

Table 12: Flood Risk Assessment - PV Panels Structure (Areas E01, E02, E03, E05)

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (Majority)	**(E01)** The majority of the panels lie in Flood Zone 1, however, Zones 2 and 3a encroaches from the north western corner from the Lee Brook and River Lark. However, SFRA climate change mapping shown in Figure 3 indicates a decrease in Flood Zone 3a area in this location.

Flood Risk Source	Flood Risk Level	Comments
	Medium – High (Proximity to the River Lark and Lee Brook)	**(E02)** The majority of panels lie in Flood Zone 2, from the River Lark. The remaining area lies in Flood Zone 1. However, SFRA climate change mapping shown in Figure 3 indicates much of the Flood Zone 2 area as Flood Zone 3a. **(E03)** The majority of the panels lie in Flood Zone 1, however, an area of Flood Zones 2 and 3a is shown to encroach from the western boundary from the Lee Brook. Flood Zone 3b is shown to occupy approximately half of the Flood Zone 3 area. **(E05)** The majority of panels lie in Flood Zone 1; however, an area of Flood Zone 2 is shown to encroach from the south eastern corner of from the Lee Brook as shown in Figure 2. SFRA climate change mapping shown in Figure 2 shows negligible change in Flood Zone 3a area. The Flood Zone 3b outlined in Figure 2 does not impact PV panels in Areas E01, E02 and E05.
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Low	It is envisaged PV panels will increase surface water runoff locally, between the panels. In lieu of detailed ground investigation, shallow infiltration SuDS will be implemented to reduce peak rates and peak runoff volumes leaving the Areas E01, E02, E03, E05 during storm events; reducing pluvial flood risk on and off-site and reducing downstream flood risk. Similar mitigation measures will be made for the site compound; however, further pollution control measures may need to be included when the compound layout and content is confirmed. Refer to Annex F – Drainage Technical Note for more detail.
Groundwater	Medium	**(E01, E02)** The PV panels are located in a region of >=50% <75% risk of groundwater emergence. However, there is no known record of groundwater flooding. **(E03, E05)** The PV panels are located between 1km by 1km grid squares of >25% to <75%. However, there is no known record of groundwater flooding. According to BGS geology mapping, three Chalk formations make up the bedrock of the site; the West Melbury Marly Chalk Formation, the Totternhoe Stone Member and Zig Zag Chalk Formation. The superficial geology varies between Peat and Alluvium in proximity to the Lee Brook, with the remainder of the site as None Recorded. Chalk has a generally low infiltration capacity; however, Head has the potential to have a relatively good infiltration capacity. Shallow Infiltration SuDS are currently proposed for the development, subject to further ground investigation, groundwater monitoring and infiltration testing.
Sewers	Low	This flood risk is assessed as not increasing as a result of the construction or operation of the Scheme.
Artificial Sources	Low (residual)	This flood risk is assessed as not increasing as a result of the construction or operation of the Scheme for Areas E01, E02, E03, E05. Residual flood risk from a smaller irrigation lagoon, adjacent to solar area E22 (in Flood Zone 1), for farming purposes, has been assessed individually and is considered to be low, as the ground levels indicate any breach would flow towards the Kennett / Lee Brook and away from the site. It is expected that this lagoon is maintained to a high standard. Residual risk is very low.

Sunnica East Site B

4.1.17 Sunnica East Site B is shown to lie wholly within Flood Zone 1, low risk, and to be at low risk from all other sources, (as listed in 5.1.1) with no impact from construction or operation of the Scheme. Pluvial risk in Site B is consistent with Site A and is to be managed in the same manner, via SuDS measures, as set out in Annex F – Drainage Technical Note.

Sunnica West Site A

4.1.18 With the exception of W08, W10, W11, W12 and W15, the remainder of the Sunnica West Site A is situated within Flood Zone 1 and not under fluvial influence.

4.1.19 Surface water risks are again shown to have little impact to the Scheme and can be mitigated via the use of above ground SuDS features, as set out in Annex F – Drainage Technical Note.

4.1.20 Remaining PV panel areas and Compound / BESS areas are considered to present no increase to existing flood risk, during construction or operation of the Scheme; therefore, flood risk mitigation measures are not required.

Table 13: Flood Risk Assessment - PV Panels Structure (Areas W08, W10, W11, W12 and W15 with car parking in W11)

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (Majority) Medium – High (Proximity to an ordinary water-course	**(W08)** The majority of panels lie in Flood Zone 1, however, a portion is covered by Flood Zones 2 and 3a encroaching from the ordinary watercourse on the northern boundary. Furthermore, the Flood Zone along the ordinary watercourse is shown to be Flood Zone 3b. **(W10)** The majority of panels lie partially in Flood Zone 1, with approximately half of the site covered by Flood Zones 2 and 3a, encroaching from the ordinary watercourse on the northern boundary. Approximately half of the Flood Zone 3a along the ordinary watercourse is shown to be Flood Zone 3b (SFRA mapping). **(W11)** The majority of panels lie in Flood Zone 1, however, a portion is covered by Flood Zones 2 and 3 encroaching from the ordinary watercourse on the northern boundary. The area also contains a parking area which is shown to be in majority Flood Zone 2 and 3. **(W12)** The majority of panels lie in Flood Zone 1, however, the northern corner is covered by Flood Zones 2 and 3a encroaching from the ordinary watercourse on the northern boundary. **(W15)** The majority of panels lie in Flood Zone 1, however, large patches of the western portion is covered by Flood Zone 2 and 3a encroaching from the ordinary watercourse on the western boundary. The Flood Zone 3b outlined in Figure 3 does not impact PV panels in Areas W11, W12 and W15. Two solar stations; within **(W10)** and **(W15)**, are placed within Flood Zone 3, with two more in very close proximity; within **(W11)** and **(W15)**. These four solar stations within flood risk areas will need to be of the enclosed option and raised above predicted flood levels. Any raising is to be completed via stilted feet and considered to pose no material impact to existing Flood Zones extents.

Flood Risk Source	Flood Risk Level	Comments
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Low	It is envisaged PV panels will increase surface water runoff locally, between the panels. In lieu of detailed ground investigation, shallow infiltration SuDS will be implemented to reduce peak rates and peak runoff volumes leaving the site during storm events; reducing pluvial flood risk on and off-site and reducing downstream flood risk. Similar mitigation measures will be made for the site compound; however, further pollution control measures may need to be included when the compound layout and content is confirmed. Refer to Annex F – Drainage Technical Note for details.
Groundwater	Medium	**(W08)** The PV panels are located within a 1km by 1km grid square of >75% risk of groundwater emergence. However, there is no record of groundwater flooding. However, no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits. Chalk has a generally low infiltration capacity; however, River Terrace Deposits have relatively good infiltration capacity. **(W10)** The PV panels are located within 1km by 1km grid squares of >=25% to <75% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits and None Recorded. Chalk can have limited infiltration capacity; however, River Terrace Deposits have relatively good infiltration capacity. **(W11)** The PV panels and permeable parking area are located within 1km by 1km grid squares of >=25% to <75% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits, Lowestoft Formation and None Recorded. Chalk has a generally low infiltration capacity, however, remaining ground makeup have relatively good infiltration capacity. **(W12)** The PV panels are located within 1km by 1km grid squares of >=50% <75% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits. Chalk has a generally low infiltration capacity, however, River Terrace Deposits has relatively good infiltration capacity. **(W15)** The PV panels are located within 1km by 1km grid squares of <25% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits, Head, Lowestoft Formation and None Recorded. Chalk has a generally low infiltration capacity, however, the remaining ground makeup has relatively good infiltration capacity

Flood Risk Source	Flood Risk Level	Comments
		Shallow Infiltration SuDS are currently proposed for the development, subject to further ground investigation, groundwater monitoring and infiltration testing. Furthermore, as all areas are within a Source Protection Zone III, infiltration techniques must ensure mitigation measures are put in effect to protect these zones methods.
Sewers	Low	This flood risk is assessed as not increasing as a result of the construction or operation of the Scheme.
Artificial Sources	Low (residual)	This flood risk is assessed as not increasing as a result of the construction or operation of the Scheme.

Sunnica West Site B

4.1.21 With the exception of W01, the remainder of the Sunnica West Site B (W02) is situated within Flood Zone 1 and not under fluvial influence.

Table 14: Flood Risk Assessment - PV Panels Structure (Sunnica West Site B)

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (Majority) Medium – High (Proximity to the River Snail)	**(W01)** The majority of the Sunnica West Site B lies in Flood Zone 1, however, Flood Zone 3b as shown in Figure 4 is located in proximity to the River Snail along the western and northern boundaries of the site, overlaying Flood Zone 2 and 3a.
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Low	It is envisaged PV panels will increase surface water runoff locally, between the panels. In lieu of detailed ground investigation, shallow infiltration SuDS will be implemented to reduce peak rates and peak runoff volumes leaving the Site during storm events; reducing pluvial flood risk on and off-site and reducing downstream flood risk. No site compound is noted in this site. As such, no further pollution control measures are required. Refer to Annex F – Drainage Technical Note for details.
Groundwater	Medium	**(W01 and W02)** The majority of PV panels are located within 1km by 1km grid squares of >=50% <75% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, three Chalk formations make up the bedrock of the Site; the Zig Zag Chalk Formation, the Melbourn Rock Member and the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated). The superficial geology varies between Alluvium and None Recorded. Chalk has a generally low infiltration capacity, however, Alluvium has relatively good infiltration capacity. Shallow Infiltration SuDS are currently proposed for the development, subject to further ground investigation, groundwater monitoring and infiltration testing. Furthermore, as the Site is within a Source Protection Zone III, infiltration techniques must ensure mitigation measures are put in effect to protect these zones methods.

Flood Risk Source	Flood Risk Level	Comments
Sewers	Low	This flood risk is assessed as not increasing as a result of the construction or operation of the Scheme
Artificial Sources	Low (residual)	This flood risk is assessed as not increasing as a result of the construction or operation of the Scheme

Grid Connection Route A

4.1.22 The cable routes, post development, will have no residual flood risk associated with them, as they will be buried. Tables 15 and 16 below for Grid Connection Routes A and B, assess the construction phase and will inform the construction method statements and risk assessments to ensure flood risk is taken into account and mitigated during construction to avoid increasing the risk of flooding from all sources to nearby areas or downstream. Please refer to **Appendix 16C: Framework Construction Environmental Management Plan** of this Environmental Statement **[EN010106/APP/6.2]** for detail of control measures.

Table 15: Flood Risk Assessment – Grid Connection Route A (Connecting Sunnica East Site A To Sunnica West Site B)

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low	**Source: EA Flood Zone Dataset, ECDC SFRA 2017** The route is situated within Flood Zone 1.
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Low	**Source: GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017** Both sources indicate patches of the site that are susceptible to surface water flooding; however, flooding is localised and generally shallow (low risk). A higher risk area adjacent to the connection route, approximately 160m perpendicular to the B1085 is shown. This area is outside of the Order limits and is not considered to pose a risk to the Site. The site is at very low risk of surface water flooding.
Groundwater	Low (East side) Medium (West side)	**Source: ECDC SFRA 2017** Appendix E of the SFRA displays groundwater risk mapping showing the majority of the site lies within 1km by 1km grid squares of 0%. The lower portion of the site increases in risk shown as >=25% <50%. Groundwater flooding may be risk during excavation and laying of cables. Further investigation will be carried out to inform the construction methods for the cable routes and where they cross watercourses.
Sewers	Low	**Source: ECDC SFRA 2017** There are no confirmed sewers in the vicinity of the proposed site compound areas of the scheme (confirmed via the DigDat service, May 2021). The Forest Heath Water Cycle Study has no records of flooding within the Site. However, there is no history of sewer flooding noted in SFRA within the site area. Sewers may be present, e.g. trunk mains, in the site area and these will be identified before any construction takes place. However, it is not proposed to connect to a public sewer so the risk will remain low.
Artificial Sources	Low (residual)	Grid Connection Route A is not within or near any registered reservoirs (assumed with volumes >25,000m^3). Site is at very low risk of flooding from reservoirs.

Grid Connection Route B (Connecting Sunnica West Site A To Burwell Substation Extension)

Table 16: Flood Risk Assessment - Grid Connection Route B

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low	**Source: EA Flood Zone Dataset** The route is situated largely within Flood Zone 1, but crosses through areas of Flood Zones 2 and 3a as shown in Figure 5. The western extent, an area in the centre and the western connection to the Sunnica West Site B is within the Flood Zones 2 and 3a. ECDC (2107) SFRA climate change maps indicate large reductions in Flood Zone 3a and 2 areas and exclude the site form Flood Zone 2 and 3, i.e. the site is within Flood Zone 1. The mapping includes modelling of the Cam Lodes. It is assumed to be a result of finer scale modelling of watercourses, whereas the older EA floodplan map is a broadscale map that does not take into account watercourse detail at a macro scale.
Tidal	Low	**Source: ECDC SFRA 2017** Not within the Tidal Hazard Mapping (Tidal Great Ouse Breach Modelling) for Q200 and Q200 + Climate Change breach extents.
Pluvial (Surface Water)	Low	**Source: GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017** Both reference sources indicate patches of Grid Connection Route B which are susceptible to surface water flooding, however, flooding is localised and generally shallow (low risk). Several field ditches displayed within the site are also shown to be susceptible to surface water flooding. Surface water risk increases to patches of high in proximity to Burwell. The majority of Grid Connection Route B is at very low risk of surface water flooding.
Groundwater	Low (East side) Medium (West side)	**Source: ECDC SFRA 2017** Appendix E of the SFRA displays groundwater risk is shown to be generally high (>75%) west of Sunnica West Site B, lowering in some areas to >=50% <75%, however, low risk (<25%) between Sunnica West Sites' A and B. Groundwater flooding may be a risk during excavation and laying of cables. Further investigation will be carried out to inform the construction methods for the cable routes and where they cross watercourses.
Sewers	Low	**Source: ECDC SFRA 2017** There are no confirmed sewers in the vicinity of Grid Connection Route B (confirmed via the DigDat service, May 2021). The Forest Heath Water Cycle Study has no records of flooding within the site. However, there is no history of sewer flooding noted in SFRA within the site area. Sewers may be present, e.g. trunk mains, in the site area and these will be identified before any construction takes place. However, it is not proposed to connect to a public sewer so the risk will remain low.
Artificial Sources	Low (residual)	Grid Connection Route B is not within or near any registered reservoirs (assumed with volumes >25,000m^3). It is at very low risk of flooding from reservoirs.

Burwell Substation Extension

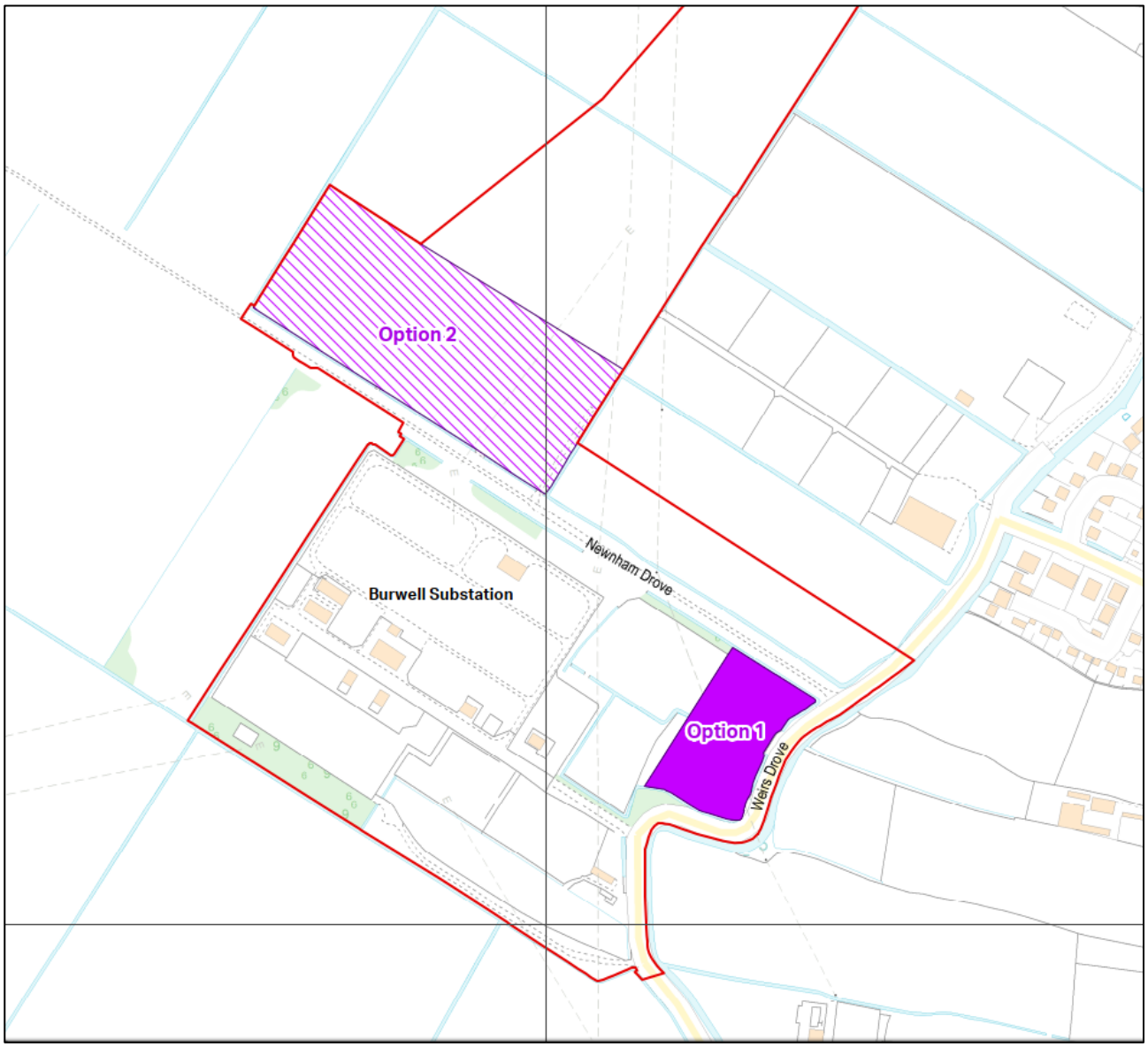


Figure 14: Options 1 and 2 for the Burwell National Grid Substation Extension

Fluvial Risk (Assessment below applies to both Options 1 and 2)

4.1.23 According to the ECDC SFRA modelling and subsequent mapping, the Burwell National Grid Substation Extension lies within Flood Zone 1. According to the online long-term flood risk flood map, the site lies within Flood Zone 2, although the Environment Agency online mapping suggests the site is in Flood Zone 3a (defended). The recent (2017) ECDC SFRA mapping (Figure 9), which takes into account current day climate change predictions, is considered to supersede the online mapping.

4.1.24 The ECDC SFRA outputs (including model outputs) includes a review of current formal flood defences (as of 2017), their condition and the impact to and from them from climate change. The Cam Lodes are included and set out in Figure 7.4 of the SFRA. The modelling that was undertaken incorporated existing hydraulic models and projected them for future climate change scenarios (including the Cam Lodes).

4.1.25 The River Great Ouse has a tidal flood defence level of between 1 in 500 year and 1 in 1000 year. The Great Ouse Tidal River Breach Baseline Report (2017), incorporated within the ECDC SFRA mapping, indicates the Burwell National Grid Substation Extension is also not at risk of tidal flooding, or at risk of a tidal breach, for the 1 in 200 year plus climate change event.

4.1.26 The ECDC mapping includes 65% climate change allowance for the Upper End allowance. The Scheme is proposed to be in commission until approximately 2065, which places it within the design for “Upper Central” of 5%, and a sensitivity for the “Upper End” of 22% to account for climate change (for Essential Infrastructure). However, the Scheme has been assessed, conservatively, with the higher epoch of 2070-2125, that has an “Higher Central” design requirement of 19% and an “Upper End” of 45%. Therefore, the 65% climate change map extents exceed the latest requirements for this Scheme as the recent changes in climate change allowances reduce the impacts of climate change in this regio

4.1.27 Furthermore, an Environment Agency Product 4 data request received on 9 July 2021 provided mapping with climate change allowances, taking into account 20% climate change. The mapping indicates the substation is not at fluvial risk during a 1 in 100 year plus 20% climate change event. The mapping also indicates the site is not at risk for up to the in 1000 year event (used as a proxy for the 65% climate change allowance fin lieu of detailed modelling). This mapping corroborates the discussion above. The site is considered to be within Flood Zone 1. Mapping is included in Annex C.

4.1.28 However, to take into account future flood risk and potential breaches of defences, it is proposed to set finished floor levels 850mm above ground level (AGL).

Sea Level Rise

4.1.29 The River Great Ouse tidal defences provide a high level of defence and it is not anticipated that significant benefit would be gained from raising the defences further to account for sea level rise (The Great Ouse Tidal River Strategy, 2009). The existing Burwell National Grid Substation is not within the 2017 ECDC SFRA modelled tidal and non-tidal breach extents.

4.1.30 There are a range of allowances for each river basin district and epoch for sea level rise. They are set out in Table 2 of the Environment Agency online Climate Change Assessment guidance and are based on percentiles. A percentile describes the proportion of possible scenarios that fall below an allowance level. **Table 17** below indicates the sea level rise estimate, for each epoch.

Table 17: Extract from Table 2 of Environment Agency Sea Level Rise Tables (Online)

Area of England	Allowance	2000 to 2035 (mm/yr)	2000 to 2035 (mm) – Cumulative Total	2036 to 2065 (mm/yr)	2036 to 2065 (mm) – Cumulative Total	2066 to 2095 (mm/yr)
Anglian	Higher central	5.8	203	8.7	261	11.6

Area of England	Allowance	2000 to 2035 (mm/yr)	2000 to 2035 (mm) – Cumulative Total	2036 to 2065 (mm/yr)	2036 to 2065 (mm) – Cumulative Total	2066 to 2095 (mm/yr)
Anglian	Upper end	7.0	245	11.3	339	15.8

4.1.31 The sea level rise allowances account for slow land movement. This is due to 'glacial isostatic adjustment' from the release of pressure at the end of the last ice age. The northern part of the UK is slowly rising and the southern part is slowly sinking. This is why net sea level rise is less for the north-west and north-east than the rest of the country.

4.1.32 Sea level rise poses a potential risk to the Burwell National Grid Substation Extension. It has been estimated, using the Environment Agency's online sea level rise Table 2 for the Anglian River Basin area, sea level could rise by up to approx. 800mm by the year 2080; assessed by accumulating the mm/yr increase in sea level depth in each epoch up to the year 2080 for this region (a worst-case date approach).

4.1.33 Mitigation is incorporated for this risk, refer to 4.1.36 below, to ensure the substation is designed and constructed to remain operational and safe in times of flood, and to ensure there is no increase in flood risk as a result of development, including allowance for sea level rise, complying with the NPPF and NPS EN-1.

4.1.34 The substation site will have no structures that would be occupied on a permanent basis; with staff generally attending only at times of inspection and maintenance. Any building compounds will be located within Flood Zone 1, taking into account the current climate change mapping extents.

4.1.35 Burwell substation is an established operational National Grid Substation and operated in accordance with the National Grid Substation Flood Defence Framework (NGFDF) (2019). The Scheme will be designed and constructed to remain operational and safe at all times and will also benefit from incorporation into this established framework and National Grid process.

4.1.36 Substations will not be manned unless for maintenance / carrying out works. During a flood event, affected infrastructure will not be accessed until flood waters recede.

4.1.37 The flood risk to structures and the risk to people is considered low when incorporating mitigation for sea level rise.

Finished Floor Levels

4.1.38 As the location of the Burwell National Grid Substation Extension is considered to be effectively in Flood Zone 1, but with potential sea level rise and breaches of defences being taken into account, finished floor levels are proposed to be set 850mm AGL. A recent site adjacent to Burwell Substation gained approval for a 600mm finished floor levels (Planning Ref: 20/00557/ESF); however, the Scheme is proposed to be in operation for a longer period of time, so a higher level is

proposed in this scheme to reflect a more conservative and precautionary approach.

Surface Water and Groundwater

4.1.39 Surface water risks are shown to have negligible impact to all potential substation locations and can be mitigated via the use of above ground SuDS features. Groundwater risk is shown to be high (>75%) and the geology is shown to be Chalk so may offer limited potential for infiltration SuDS, however, the site is not within a Source Protection Zone. This is subject to further ground investigation, groundwater monitoring and infiltration testing to be undertaken post consent as provided for in Annex F - Drainage Technical note.

Artificial Sources

4.1.40 The site is not at risk from any identified artificial sources (Reservoir / Canal etc).

Summary

4.1.41 With the NGFDF framework and the flood risk to the site from all other sources taken into account (including climate change), the overall flood risk to the Burwell National Grid Substation Extension is considered to be low.

4.2 Flood Risk Summary

4.2.1 Following a review of the land within the Order limits, and based on current information available, the conclusions of the FRA are presented in **Table 18** below:

Table 18: Flood Risk Summary

Flood Risk Source	Pre-Development Risk	Post Development Risk	Comments
Fluvial	Low	Low (residual)	The majority of the land within the Order limits is in Flood Zone 1, but certain areas lie in Flood Zone 2, 3a, 3b. No permanent above ground development will occur in Flood Zone 3b. Any infrastructure in flood zones will be mitigated against climate change impacts (including sea level rise).
Tidal	Very Low	Very Low	Not in a tidal area
Pluvial (Surface Water)	Low	Low	Surface water risk varies throughout the Order limits, indicating patches of the Order limits which are susceptible to surface water flooding. However, flooding is localised and generally shallow (low risk).
Groundwater	Medium	Medium	Groundwater risk also varies, with all Sites between <25% and >75%, therefore further ground investigation, groundwater monitoring and infiltration testing is proposed to confirm groundwater levels. Furthermore, both the Sunnica East Site B and Sunnica West Sites A and B Sites are shown to be within a Source Protection Zone III, with small areas of Source Protection Zone II. Therefore, infiltration techniques must ensure mitigation measures are put in effect to protect groundwater interaction in these areas.
Sewers	Low	Low	There are no sewers in the vicinity of the site compound areas.
Artificial Sources	Low (residual)	Low (residual)	Statutory Reservoirs (large raised reservoirs with volumes above ground of 25,000m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. On that basis they are deemed to pose a low (residual) risk. Other artificial sources such as canals and waterways are considered to be regularly maintained and therefore only deemed to pose a low (residual) risk to the Scheme

4.2.2 Both Options 1 and 2 for the Burwell Substation benefit from the same assessment for flood risk and potential sea level rise, as described above. Option 1 is the preferred location for the extension; however, should Option 2 be brought forward, it is envisaged the flood risk will remain the same as assessed above.

4.3 Demonstrating the Sequential and Exception Tests have been met

Sequential Test

4.3.1 The Sequential and Exception Tests have been undertaken to satisfy both NPS EN-1 and the NPPF requirements.

4.3.2 Paragraph 5.7.13 of NPS EN-1 states a preference should be given to locating projects in Flood Zone 1. If there is no reasonably available site in Flood Zone 1, then projects can be located in Flood Zone 2. If there is no reasonably available site in Flood Zones 1 or 2, then nationally significant energy infrastructure projects can be located in Flood Zone 3 subject to the Exception Test.

4.3.3 Similarly, within the NPPF, the overall aim of the Sequential Test is to steer new development to the lowest flood zone, i.e. Flood Zone 1. Where there are no reasonably available sites within Flood Zone 1, Flood Zones 2 and 3 may be considered, subject to passing the Exception Test, depending on the type of development proposed. The development type for the Scheme is 'Essential Infrastructure' which is defined in Table 3 of the NPPF, provided in section 3.2 of this FRA. Table 4 in Section 3.2 indicates that this type of development can be located in flood zones 3a and 3b if the Exception Test is passed. In accordance with national planning policy the Secretary of State will need to be satisfied that the Scheme passes the Sequential Test and the Exception Test, as small areas of the Scheme are within Flood Zone 3a.

4.3.4 Both the NPS EN-1 and the NPPF therefore, require the application of both the Sequential Test and the Exception Test.

4.3.5 An assessment to identify whether there are any other appropriate locations for the Scheme within a 15km area of search from Burwell National Grid Substation has been undertaken. This assessment has considered the flood risk of alternative sites identified within this area of search, as well as the performance of the alternative sites and the Scheme's location against other planning and environmental evaluation criteria and the operational requirements of the Scheme. **Chapter 4: Alternatives and Design Evolution** of the Environmental Statement **[EN010106/APP/6.1]** provides a summary of the assessment and **Appendix 4A** presents the **Alternative Sites Assessment [EN010106/APP/6.2]**. The assessment concludes that there are no more suitable locations within the area of search and that the Scheme's location is suitable for the scale of solar development proposed.

4.3.6 The majority of Burwell National Grid Substation lies in EA defended Flood Zone 3a, although the gov.uk long term flood risk map locates the substation in Flood Zone 2 (Low Risk). The ECDC (2017) SFRA climate change maps indicate large reductions in Flood Zone 3a and 2 areas and indicate the site is located within Flood Zone 1. However, it is potentially at risk from sea level rise. As discussed in the **Alternative Sites Assessment [EN010106/APP/6.2]**, Burwell National Grid

Substation is the proposed point of connection for the Scheme after a search was undertaken within the region of East Anglia, which is considered an optimal region of the UK within which to locate the Scheme. In consultation with UK Power Networks, Eastern Power Networks and National Grid, Burwell was identified as a location which has available capacity with reinforcement that could be completed within a reasonable timeframe and cost.

4.3.7 The design development for the layout of the Scheme has also followed a sequential approach in accordance with paragraph 5.7.9 of NPS EN-1 and the NPPF. Flood risk to the Order Limits has been a design consideration, with the design aiming to locate vulnerable Scheme components in the lowest flood risk zones. This approach has resulted in only very small areas of solar PV being located in Flood Zone 3a and no development within Flood Zone 3b. PV panels located in Flood Zone 3a are to be mitigated by raising the panels by 850mm.

4.3.8 From the topographical survey, the River Lark bank level is approximately 3.0m AOD in the north east corner of the site where solar PV panels are proposed (the only area that solar PV panels encroach in Flood Zone 3a). The solar PV panels in the flood risk areas are proposed to be raised by 850mm to provide additional protection against flood risk. The legs that sit within the floodplain will not cause a barrier to flood flows as they are expected to be less than 100mm in diameter, and do not materially remove floodplain volume (floodplain in zone 3a), i.e. there is no increased fluvial risk resulting from the panels within Flood Zone 3a. There is no development in Flood Zone 3b.

4.3.9 The estimated climate change fluvial extent, from the SFRA climate change maps overlaid onto the topographic survey, is approximately 3.6m AOD. Flood Zone 3A +65% cc has an estimated minimum level of approx. 3.3 to 3.4m AOD. A, 850mm height would be sufficient with more than approximately 250mm freeboard available above the climate change extents

4.3.10 As mentioned in 4.1.12, the climate change allowances have changed as of July 2021, with the current factors for design as 19% with “Upper End” sensitivity for 45%. The SFRA mapping includes 65% cc; our assessment that we are providing 250mm freeboard for 65%cc would indicate we are in excess of design and sensitivity requirements, providing a conservative approach.

4.3.11 The **Alternative Sites Assessment [EN010106/APP/6.2]** and the design development process therefore demonstrate the Sequential Test has been applied and is met.

Exception Test

4.3.12 The requirements of the Exception Test are set out in section 3 of this FRA. The NPPF expects the following to be demonstrated:

a. the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

b. the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

4.3.13 NPS EN-1 which was published in 2011 also includes the requirement that 'the project should be on developable, previously developed land or, if it is not on previously developed land, that there are no reasonable alternative sites on developable previously developed land subject to any exceptions set out in the technology-specific NPSs'

4.3.14 The majority of the Order limits lie within Flood Zone 1 and so do not require the Exception Test to be passed. The Burwell National Grid Substation Extension is in defended Flood Zone 3a as defined by the Environment Agency flood mapping published in 2009 however the 2017 SFRA climate change mapping indicates the site is not at risk of flooding and within Flood Zone 1. Small areas of solar PV for the Scheme do lie within Flood Zone 3a.

4.3.15 The Exception Test has, therefore been applied because small areas of the Scheme are located within Flood Zone 3a.

4.3.16 With regard to meeting the Exception Test requirements of the NPPF, and the first and third requirements of the Exception Test set out in NPS EN-1, the assessment of the flood risk from the Scheme presented in section 5.1 demonstrates that there is no increase in flooding elsewhere once the Scheme is operational and during its construction stage.

4.3.17 The information presented in sections 5.1, and sections 6 and 7 demonstrate that mitigation measures have been incorporated into the design to ensure that the Scheme will be at a low risk of flooding from all sources, as set out in 5.1.1, and will be safe for its lifetime.

4.3.18 The national need and benefits for the Scheme is set out in the Statement of Need **[EN010106/APP/7.1]** and the Planning Statement **[EN010106/APP/7.2]** which accompany the DCO Application. These documents explain why the large scale nature of the Scheme is urgently needed nationally and the wider sustainability benefits of renewable energy production. The Planning Statement **[EN010106/APP/7.2]** also explains the local benefits provided by the Scheme which include the delivery of significant biodiversity net gain and increased public local access.

4.3.19 Overall, the Scheme's wider sustainability benefits outweigh the low flood risk which is identified by this FRA to and from the Scheme. Measures set out in section 7 will ensure the Scheme is safe for its lifetime and that there will be no increases in flooding elsewhere.

4.3.20 With regard to meeting the second requirement of the Exception Test in NPS EN-1, the Scheme is not located on previously developed land. The **Alternative Sites Assessment [EN010106/APP/6.2]** considers whether there are suitable sites on previously developed land to meet the Scheme's requirements. This concludes that there are no previously developed sites of the size required for the Scheme within the area of search. In addition to site size requirements not being met, prioritisation of residential and other commercial uses on previously developed land mean solar development is secondary to this due to the nature of such development being less economically advantageous. There are therefore no reasonable alternative sites available on previously developed land.

4.3.21 In summary, it is considered that the Exception Test set out in NPS EN-1, and also within the NPPF, are met.

5 Drainage Strategy Assessment

5.1.1 Below is a summary of the Drainage Strategy for the Scheme, titled Drainage Technical Note which is provided at Annex F – Drainage of this FRA. The drainage strategy assesses PV panel areas, Compound and BESS areas, where permanent above ground development is located. It does not cover the remainder of the Order Limits (i.e. cable routes and ecology/archaeology areas as these areas will drain as existing.

5.2 Existing Drainage Arrangements

Existing Surface Water Drainage

5.2.1 The land within the Order limits is largely greenfield and is assumed to be 99% permeable, with very little built development or infrastructure in the Order Limits. Furthermore, it does not appear that there is any formal piped drainage network currently within the Order limits. The ground conditions found within the Order limits are typically reasonable for infiltration. This leads to the understanding that any runoff generated within the Order limits is discharged via infiltration, however, this will require further investigation through ground investigations at detailed design stage.

Existing Foul Water Drainage

5.2.2 There is no existing foul water drainage on site as the majority of the Sites are greenfield land.

5.3 Proposed Surface Water Drainage Strategy

5.3.1 Subject to a geotechnical investigation, in which groundwater monitoring and infiltration testing is conducted, it is proposed to remove any surface water runoff generated within the PV panel areas, Compound and BESS areas via infiltration techniques. Based on current understanding, this would mimic the manner that the land within the Order limits currently discharges runoff.

5.3.2 Individual solar PV panels will be held above the ground surface on narrow diameter mounts. This will avoid sealing the ground with impermeable surfaces. As a result, it is considered that the solar panel areas will remain consistent to their pre-development state. Runoff from the solar panels however will alter the existing routing of runoff.

5.3.3 Currently, it is understood that rainfall within the Order limits will mostly permeate into the ground where it falls with little or no runoff occurring throughout the Order limits. The introduction of solar PV panels will prevent some rainfall permeating to ground where it lands. This could cause concentrated areas of runoff build-up with could result in above ground ponding during heavy rainfall. To prevent ponding occurring around the panels, a series of up to 0.6m deep swales will be constructed to convey surface water to infiltrate in swales or runoff to infiltration ponds to be located throughout the Sites and Compound / BESS areas.

5.3.4 Percentage impermeable areas of compound areas and battery energy storage systems (BESS) and substations are not yet confirmed (it is assumed 50% impermeable area for compounds and substations, and 100% for BESS areas)),

however, increases to existing hardstanding are to be balanced by infiltration techniques, with exceedance flows captured by surrounding swales.

5.3.5 All swale features will avoid all archaeological sites and will maintain a minimum 10m buffer to watercourses and sensitive sites.

5.3.6 For further information, please refer to the Drainage Technical Note within Annex F – Drainage .

Fire Water Runoff

5.3.7 The BESS require fire water tanks to supress a fire, should one break out in the BESS containers.

5.3.8 An **Outline Battery Fire Risk Management Strategy [EN010106/APP/7.6]** has been prepared and is submitted with the DCO application. Fire water tanks are to be located at each BESS location, capable of retaining 242.5m^3 water per BESS location. The tanks are to be filled with standard water, with no chemical additives.

5.3.9 Should a fire break out in a container, the strategy proposes to contain fire within the individual container by using automated fire suppression, this water will be contained in a Sump within the battery container and transported off-site. Fire water will be used to soak nearby containers to prevent heat transfer and damage to other containers, See the **Outline Battery Fire Risk Management Strategy [EN010106/APP/7.6].**

5.3.10 Fire water runoff may, however, contain particles from a fire. In the unlikely event of fire water being discharged, the runoff must be contained and tested/treated before being allowed to discharge to the proposed SuDS (watercourse / infiltration).

5.3.11 It is proposed to contain the fire water runoff within a bunded lagoon structure where it can be held and tested before either being released into the SuDS system or taken off site by a tanker for treatment elsewhere. The lagoon will then be cleaned of all contaminants.

5.3.12 The lagoon will be controlled by a penstock valve that can be automatically closed during a fire, i.e. under normal circumstances rainfall will be allowed to drain through the lagoon into the SuDS system.

5.3.13 The lagoons will be 0.6m deep and 420m^2 in area. This is to allow attenuation of the 242.5m^3 fire water runoff plus an additional 10% capacity.

5.4 Proposed Foul Water Drainage Strategy

5.4.1 There are no public sewers in the vicinity of the proposed site compound / office facilities. It is proposed to use a septic tank arrangement to drain the compound areas. Septic tanks will be emptied as per the manufacturer recommendations.

6 Residual Risks and Mitigation

6.1 Residual Risks to the Scheme

6.1.1 A residual risk relating to fluvial risk to the areas of PV within Flood Zone 3a remains. The solar PV panels in the flood risk areas are proposed to be raised by 850mm to provide additional protection against flood risk. The legs that sit within the floodplain will not cause a barrier to flood flows as they are expected to be less than 100mm in diameter, and do not materially remove floodplain volume (floodplain in zone 3a), i.e. there is no increased fluvial risk resulting from the panels within Flood Zone 3a. There is no above ground permanent development in Flood Zone 3b.

6.1.2 The majority of the Burwell National Grid Substation Extension location is shown to be in Environment Agency Defended Flood Zone 3a, including areas selected for both options for the extension. However, the ECDC (2017) SFRA climate change maps indicate large reductions in Flood Zone 3a and 2 areas and show the extension within Flood Zone 1. The location for the extension (both Option 1 and 2) is however at potential risk from sea level rise and breaches of defences so finished floor levels for the substation extension are proposed to be set 850mm AGL.

6.2 Resilience and Resistance Measures

6.2.1 It is unknown at this stage whether modifications have been made in preventing water entering the existing substation under the National Grid Substation Flood Defence Framework, however, proposed extension works should comply with this framework. Measures should ensure protection from a 1:1,000 year flood event, considering climate change effects expected under a high emission scenario (UKCP09, corresponding to the IPCC SRES A1FI scenario) by 2080. If this is not possible, protection for a 1:200 year flood event, while still considering the effects of climate change at 2050 per a high emission scenario or a 1:1000 flood event at today's levels should be achieved.

6.2.2 Resistance and resilience measures that should be considered by Sunnica Limited are as follows, for the Burwell Substation Extension. The list is not exhaustive and not all measures need be employed to affect a more resilient structure;

a. Bunding the site with fixed or controllable structures including flood gates.

b. Raise foundations and plinths etc thus increasing the floor level above a predicted flood.

c. Raising the plant by addition of stilts

d. Adding flood defences to the perimeter. Attention shall be given to any ducting and ventilation which may need to be relocated accordingly.

e. Flood storage attenuation and land-management based measures.

f. Application of approved proprietary flood protection systems.

g. Application of demountable or temporary flood defence equipment where the risk is sufficiently low and temporary protection can be reliably applied.

6.2.3 It is envisaged that the substation extension will be monitored through its operational use for weather-related risks by National Grid, who are registered with the Environment Agency's flood alert system. During construction, registration of the Contractor to the Environment Agency's flood alert system is included within their CEMP.

6.3 Safe Access

6.3.1 Through the sequential process and design iterations there are no buildings located within the floodplain, the only structures within the floodplain are solar PV panels and solar stations associated with those panels. All compounds for site staff, on-site substations and battery storage units have been located out of flood zones and it is envisaged access to solar PV panels within Flood Zone 3a would not be undertaken during flooding conditions.

6.3.2 Substations will not be manned unless for maintenance / carrying out works. During a flood event, the affected infrastructure will not be accessed or manned until flood waters recede.

7 Conclusion and Recommendations

7.1.1 This Flood Risk Assessment has been prepared to support the DCO Application for Scheme.

7.1.2 Following a review of the Order limits and the Scheme, and based on current information available, the following conclusions are presented in **Table 19** below:

Table 19: Order Limits Flood Risk Summary

Flood Risk Source	Pre-Development Risk	Post Development Risk	Comments
Fluvial	Low	Low (Residual)	The majority of the Order limits are within Flood Zone 1, but certain areas lie in Flood Zone 2, 3a, 3b. No permanent above ground development will occur in Flood Zone 3b. Residual risk of PV panels within Flood Zone 3a has been taken into account with panels raised 0.85m above the ground level.
Tidal	Very Low	Very Low	Not in a tidal area
Pluvial (Surface Water)	Low	Low	Surface water risk varies throughout the Order limits indicating patches of the Order limits which are susceptible to surface water flooding. However, flooding is localised and generally shallow (low risk).
Groundwater	Medium	Medium	Groundwater risk also varies, with all Sites between <25% and >75%, therefore further ground investigation, groundwater monitoring and infiltration testing is proposed to confirm groundwater levels. Furthermore, both the Sunnica East Site B and Sunnica West Sites A and B Sites are shown to be within a Source Protection Zone III, with small areas of Source Protection Zone II. Therefore, infiltration techniques must ensure mitigation measures are put in effect to protect groundwater interaction in these areas.
Sewers	Low	Low	Sewer flood risk remains low
Artificial Sources	Low (residual)	Low (residual)	Statutory Reservoirs (large raised reservoirs with volumes above ground of 25,000m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. On that basis they are deemed to pose a low (residual) risk. Other artificial sources such as canals and waterways are considered to be regularly maintained and therefore only deemed to pose a low (residual) risk to the Scheme

7.1.3 The residual risk of sea level rise has been taken into account for the Burwell National Grid substation, with finished floor levels set 0.85m above ground level.

7.1.4 In accordance with NPS EN-1, and the NPPF, the Exception and Sequential Tests have been applied and evidence provided in this FRA and supporting documents within the DCO Application demonstrates the Sequential and Exception Tests have been met.

7.1.5 It is the intention to use infiltration SuDS techniques; swales and basins to mimic existing drainage conditions and accommodate the 1 in 100 year return period storm event plus a 40% increase allowance for climate change. At this stage, the exact impermeable area for the Scheme is not known; therefore, a conservative approach to drainage has been assessed, by assuming Compound and BESS areas are 1005 impermeable. However, it is envisaged that a negligible increase to the existing flood risk is likely and a review will be completed at detailed design stage.

7.1.6 Exceedance flows from the Order limits will not increase the existing flood risk on or off site as a result of the development proposals.

7.1.7 It is considered, following the assessment of flood risk and the given the resistance and resilience measures proposed to be employed that there are no reasonably anticipated flood risk grounds on which to refuse the application for a DCO.

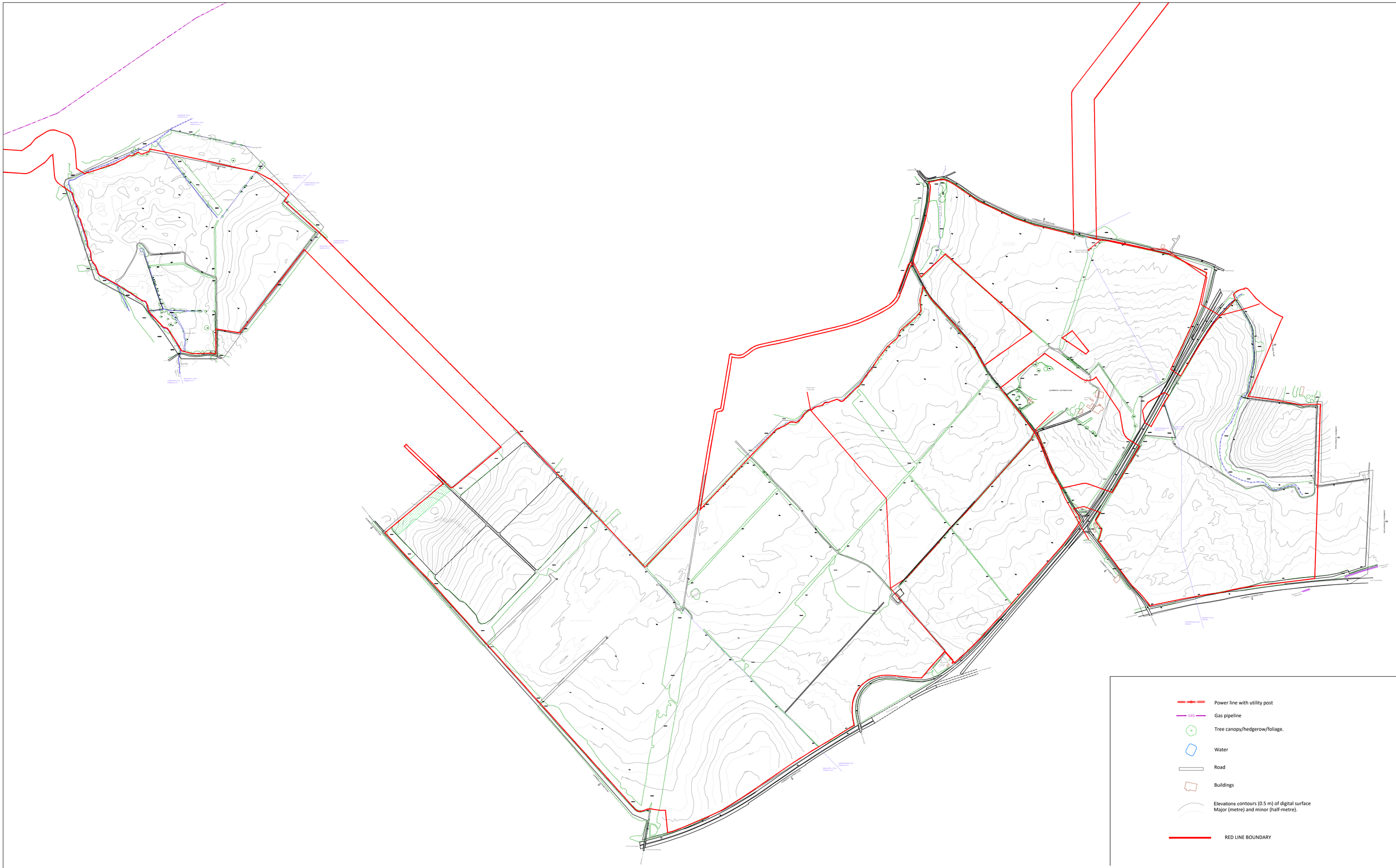
Annexes

Annex A – Existing Site Topographical Survey

Power line with utility post
Gas pipeline
Tree canopy/hedgerow/foliage.
Water
Road
Buildings
Elevations contours (0.5 m) of digital surface
Major (metre) and minor (half-metre).
RED LINE BOUNDARY

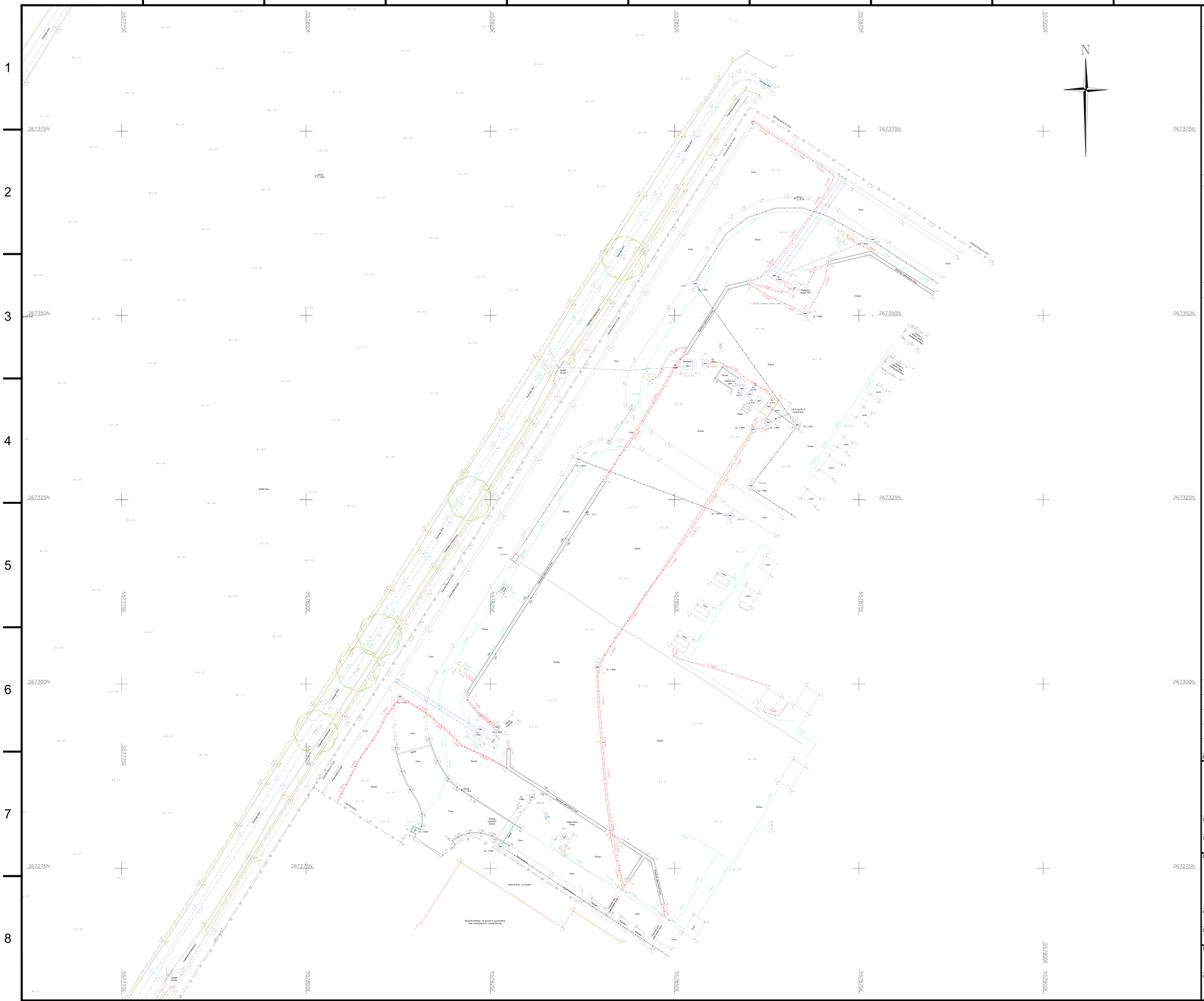
PS Renewables
Green Energy Investments

PROJECT:	SUNNICA PROJECT					
COMPANY:	PS RENEWABLES					
LAYOUT:	TOPOGRAPHIC LAYOUT - EAST					
DRAW BY:	Sergio Serna	PS RENEWABLES: 5 Stubbings Estate Maidenhead, Berkshire SL6 6QL	DATE:	-	NUM.:	5.4.1
DESIGN BY:	Nacho Perez		SCALE:	1:7.500		
CHECK BY:	David Ortiz		SIZE:	A1		



PS Renewables
Green Energy Investments

PROJECT:	SUNNICA PROJECT				
COMPANY:	PS RENEWABLES				
LAYOUT:	TOPOGRAPHIC LAYOUT - WEST				
DRAW BY:	Sergio Serna	PS RENEWABLES: 5 Stubbings Estate Maidenhead, Berkshire SL6 6QL	DATE:	-	NUM.: 5.4.2
DESIGN BY:	Nacho Perez		SCALE:	1:7.500	
CHECK BY:	David Ortiz		SIZE:	A1	



NOTES

Electromagnetic and Ground Penetrating Radar (GPR) techniques have been used to locate/map underground utilities and features on this drawing. Jacobs UK Ltd has made every endeavor to make sure that the information contained within this drawing is accurate.
Where quoted, depth information of underground services/features is stated. Depths are generally within +/- 10% accurate, but cannot be guaranteed. Any depths shown to drains are usually to invert unless otherwise stated.
If any record drawings have been used, these have been provided by the client or by the Statutory Utility Providers.
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A single line indicating a utility/feature may indicate the presence of multiple services within close proximity to each other. Where a single line type is shown we recommend HSG-47 safe digging practice within 0.5m to expose hidden services.
At Jacobs UK Ltd we use skilled staff and modern, calibrated equipment to perform our surveys. However, the completeness of any underground survey cannot be 100% guaranteed and the results are not infallible. It is strongly advised that trial excavations following HSG-47 practice should be undertaken to confirm survey results.

Survey Stations

Name	Easting	Northing	Level
STG1	557866.334	267365.886	1.674
STG2	557821.136	267285.613	1.746
STG3	558012.586	267218.228	1.638
STG4	557975.301	267160.346	1.643
STG5	557801.304	267368.905	1.432
STG6	557720.284	267249.200	1.603

LEGEND

ANNOTATIONS:

AV	Air Valve
BH	Borehole
BL	Bed Level
Bol	Bollard
OSBM	Bench Mark
BS	Bus Stop
BT	Telcom IC
Br	Stay Wire
Cbx	Control Box
Culv	Culvert
CL	Cover Level
CTV	Cable TV
DP	Down Pipe
Dr	Drain cover
Ebx	Electric Box
Elc	Electric Cover
EP	Electric Pole
PY	Electric Pylon
ER	Earthing Rod
FH	Fire Hydrant
FL	Flood Light
FS	Flag Staff
Gas	Gas Manhole
Scam	Speed Camera
Gt	Gate Post
G	Gully
GV	Gas Valve
IC	Inspection Cover
IL	Invert Level
Jbx	Junction Box
KO	Kerb Outlet
KI	Kerb Inlet
LB	Litter Bin
LC	Light Column
LP	Lamp Post
MH	Manhole
Mkr	Marker Post
MP	Mile Post
MS	Mile Stone
NB	Notice Board
Pi	Pipe
PM	Parking Meter
P	Post
PU	Pump
PZ	Piezometer
RE	Rodding Eye
RNP	Road Name Plate
RP	Reflector Post
RS	Road sign
SAP	Sapling
SB	Storage bin
SF	Soffit Level
Slt	Salt Box
ST	Stop Tap
SV	Sluice Valve
Tap	Water Tap
TCB	Telephone Call Box
TS	Traffic Signal
TL	Traffic Light
Thl	Threshold Level
TM	Traffic Master
TP	Telegraph Pole
CCTV	CCTV Camera
Gvp	Vent Pipe
W	Water Cover
WE	Well
WL	Water Level
WM	Water Meter
WO	Wash Out

FENCE TYPES:

CBF	Close Boarded Fence
IRF	Iron Railings Fence
PWF	Post & Wire Fence
PRF	Post & Rail Fence
BWF	Barbed Wire Fence
PCLF	Post & Chain Link Fence

WALL TYPES:

AB	Abutment Wall
BW	Brick Wall
SW	Stone wall
DSW	Dry Stone Wall
RTW	Retaining Wall
CW	Concrete Wall

SYMBOLS:

Building
Open Building
Gate
Bottom of Bank
Ditch
Fence
Foliage Line
Hedge (width varies)
Kerb
Overhead Line
Road Edge (no kerb)
Rock Outcrop
Top of Bank
Track Edge
Verge
Wall
Tree (spead varies)
Bush (spead varies)
(value) (Spot Level)
name value (Survey Station)

Rev	Description	Cre'd	Chk'd	App'd	Date
00	First Issue	SA	AB	MB	20.12.19

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
100436	N/A	BURWELL 400kV SUBSTATION

Scheme Name: BURWELL MSC1 & MSC3

Document Title:

BURWELL 2D HAZARD PLAN
SHEET 1 OF 4

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
SA	20.12.19	AB	20.12.19	MB	20.12.19

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
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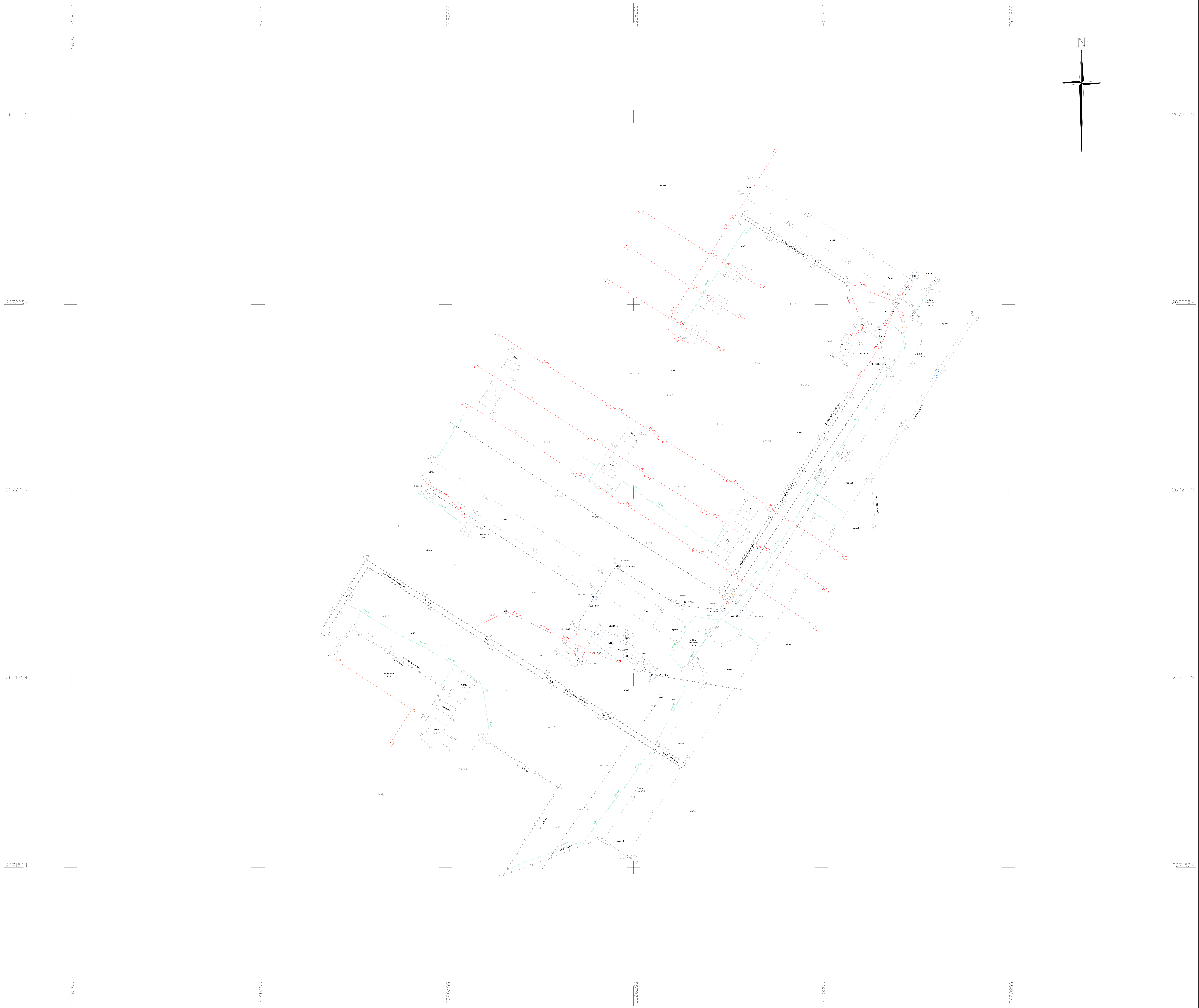
National Grid Drawing Number: PDD-100436-LAY-001

Originator Drawing Number: JA/B3100086/100436-LAY-001



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LEGEND

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BH Borehole
BL Bed Level
Bol Bollard
OSBM Bench Mark
BS Bus Stop
BT Telcom IC
Br Stay Wire
Cbx Control Box
Culv Culvert
CL Cover Level
CTV Cable TV
DP Down Pipe
Dr Drain cover
Ebx Electric Box
Elc Electric Cover
EP Electric Pole
PY Electric Pylon
ER Earthing Rod
FH Fire Hydrant
FL Flood Light
FS Flag Staff
Gas Gas Manhole
Scam Speed Camera
Gt Gate Post
G Gully
GV Gas Valve
IC Inspection Cover
IL Invert Level
Jbx Junction Box
KO Kerb Outlet
KI Kerb Inlet
LB Litter Bin
LC Light Column
LP Lamp Post
MH Manhole
Mkr Marker Post
MP Mile Post
MS Mile Stone
NB Notice Board
Pi Pipe
PM Parking Meter
P Post
PU Pump
PZ Piezometer

RE Rodding Eye
RNP Road Name Plate
RP Reflector Post
RS Road sign
SAP Sapling
SB Storage bin
SF Soffit Level
Slt Salt Box
ST Stop Tap
SV Sluice Valve

Tap Water Tap
TCB Telephone Call Box
TS Traffic Signal
TL Traffic Light
Thl Threshold Level
TM Traffic Master
TP Telegraph Pole
CCTV CCTV Camera
Gvp Vent Pipe
W Water Cover
WE Well
WL Water Level
WM Water Meter
WO Wash Out

FENCE TYPES:

CBF Close Boarded Fence
IRF Iron Railings Fence
PWF Post & Wire Fence
PRF Post & Rail Fence
BWF Barbed Wire Fence
PCLF Post & Chain Link Fence

WALL TYPES:

AB Abutment Wall
BW Brick Wall
SW Stone wall
DSW Dry Stone Wall
RTW Retaining Wall
CW Concrete Wall

SYMBOLS:

Building
Open Building
Gate
Bottom of Bank
Ditch
Fence
Foliage Line
Hedge (width varies)
Kerb
Overhead Line
Road Edge (no kerb)
Rock Outcrop
Top of Bank
Track Edge
Verge
Wall
Tree (spead varies)
Bush (spead varies)
(value) (Spot Level)
name value (Survey Station)

Fibre Optics
Telecom
Telemetry
Oil Pipe
Gas Pipe
Electric Cable
Electric Cable (TfR)
Overhead Lines
Earthing

Water Main
Foul Water
Surface Water
Surface Water (TfR)
Unknown Service
Abandoned Services

Rev	Description	Cre'd	Chk'd	App'd	Date
00	First Issue	SA	AB	MB	20.12.19

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
100436	N/A	BURWELL 400kV SUBSTATION

Scheme Name:
BURWELL MSC1 & MSC3

Document Title:
BURWELL 2D HAZARD PLAN
SHEET 2 OF 4

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
SA	20.12.19	AB	20.12.19	MB	20.12.19

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
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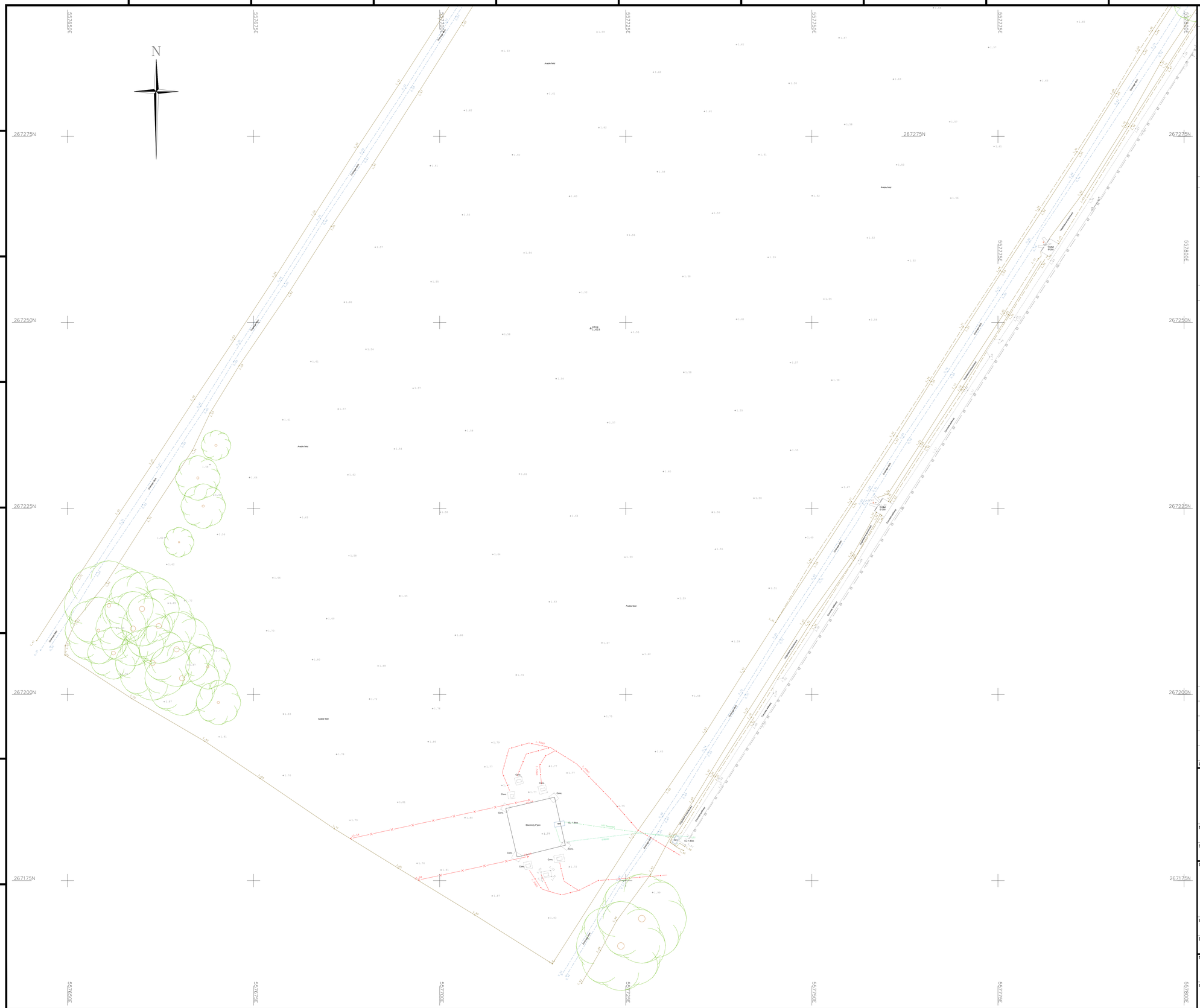
National Grid Drawing Number:
PDD-100436-LAY-001

Originator Drawing Number:
JA/B3100086/100436-LAY-001



NOTES

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Survey Stations

Name	Easting	Northing	Level
STG1	557866.334	267365.886	1.674
STG2	557821.136	267285.613	1.746
STG3	558012.586	267218.228	1.638
STG4	557975.301	267160.346	1.643
STG5	557801.304	267368.905	1.432
STG6	557720.284	267249.200	1.603

LEGEND

ANNOTATIONS:

AV	Air Valve
BH	Borehole
BL	Bed Level
Bol	Bollard
OSBM	Bench Mark
BS	Bus Stop
BT	Telcom IC
Br	Stay Wire
Cbx	Control Box
Culv	Culvert
CL	Cover Level
CTV	Cable TV
DP	Down Pipe
Dr	Drain cover
Ebx	Electric Box
Elc	Electric Cover
EP	Electric Pole
PY	Electric Pylon
ER	Earthing Rod
FH	Fire Hydrant
FL	Flood Light
FS	Flag Staff
Gas	Gas Manhole
Scam	Speed Camera
Gt	Gate Post
G	Gully
GV	Gas Valve
IC	Inspection Cover
IL	Invert Level
Jbx	Junction Box
KO	Kerb Outlet
KI	Kerb Inlet
LB	Litter Bin
LC	Light Column
LP	Lamp Post
MH	Manhole
Mkr	Marker Post
MP	Mile Post
MS	Mile Stone
NB	Notice Board
Pi	Pipe
PM	Parking Meter
P	Post
PU	Pump
PZ	Piezometer
RE	Rodding Eye
RNP	Road Name Plate
RP	Reflector Post
RS	Road sign
SAP	Sapling
SB	Storage bin
SF	Soffit Level
Slt	Salt Box
ST	Stop Tap
SV	Sluice Valve
Tap	Water Tap
TCB	Telephone Call Box
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(Use service linetype but change colour to 127)

Rev	Description	Cre'd	Chk'd	App'd	Date
00	First Issue	SA	AB	MB	20.12.19

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
100436	N/A	BURWELL 400kV SUBSTATION

Scheme Name:
BURWELL MSC1 & MSC3

Document Title:
BURWELL 2D HAZARD PLAN
SHEET 3 OF 4

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
SA	20.12.19	AB	20.12.19	MB	20.12.19

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
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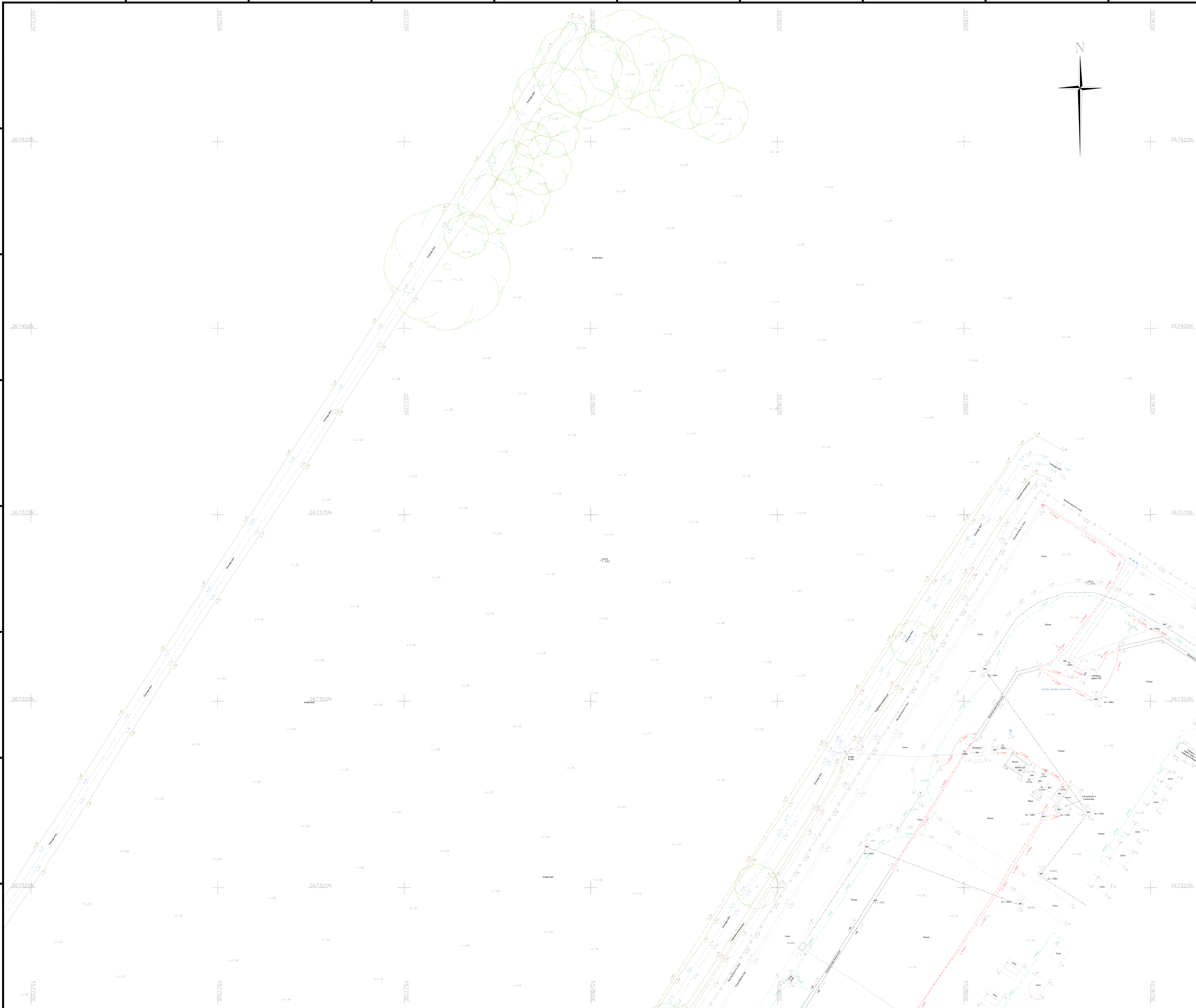
National Grid Drawing Number:
PDD-100436-LAY-001

Originator Drawing Number:
JA/B3100086/100436-LAY-001



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Telecom
Telemtry
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Electric Cable (TfR)
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Abandoned Services
(Use service linetype but change colour to 127)

Rev	Description	Cre'd	Chk'd	App'd	Date
00	First Issue	SA	AB	MB	20.12.19

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
100436	N/A	BURWELL 400kV SUBSTATION

Scheme Name: BURWELL MSC1 & MSC3

Document Title:

BURWELL 2D HAZARD PLAN
SHEET 4 OF 4

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
SA	20.12.19	AB	20.12.19	MB	20.12.19

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
S MATHOBELA	DRAWING	1:250	A1	4 OF 4	00

National Grid Drawing Number: PDD-100436-LAY-001

Originator Drawing Number: JA/B3100086/100436-LAY-001

Annex B – Development Parameter Plans

566000 567000 568000 569000 570000 571000

275000 274000 273000 272000 271000

E01 E02 E03 E04 E05 E08 E09 E10 E33

Office/Warehouse

ECO1 ECO2 ECO3

E12 E13 E14 E15 E16 E17 E18 E19 E20 E21 E22

Office/Warehouse

E24 E25 E26 E27 E28 E29 E30 E31 E32

0 500 1,000m

N

File Name:\\eu.aecomnet.com\UKUKCBG1\Jobs\PR.334327_Sunnica_Energy_Farm\400_Technical\434_Technical Disciplines\17. GIS\Layout\ES\Chapter 3 - Scheme Description\210917_SunnicaEnergyFarm_Figure3-1_SunnicaEastParameterPlan.mxd

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- The Order limits
- Public Highway within Scheme

Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Illustrative Locations of Solar Stations
- Proposed Road
- Potential Provision of Permissive Route

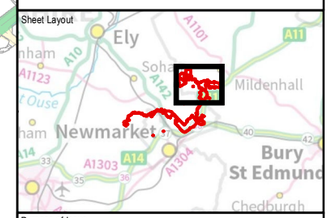
Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Proposed Woodland (new planting or infilling of existing vegetation)
- Proposed Hedgerow (new planting or infilling of existing vegetation)

Note: Developable fields previously referred to as E06, E07, E11 and E23 are no longer being developed with solar infrastructure and now form part of the mitigation strategy; however, the field numbering for the remaining developable fields has been retained for consistency.

Document Reference: EN010106/APP/6.3
APFP Regulation: 5(2)(a)

Sheet Layout



Purpose of Issue
FOR DCO SUBMISSION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
SUNNICA EAST
PARAMETER PLAN

Drawn	Checked	Approved	Date
LL	DW	NC	01/11/2021

AECOM Internal Project No.	Scale @ A3
60589004	1:18,000

AECOM
Unit 1 Wellbrook Court,
Girton,
Cambridge, CB3 0NA
United Kingdom
Telephone (01223) 488000
www.aecom.com

AECOM

Drawing Number	Rev
60589004_ES_SD_001	0

564000 565000 566000 567000 568000 569000

270000 269000 268000 267000 266000

ECO4
W01
W02
ECO5
W03
W04
W05
W06
W07
W08
W09
W10
W11
W12
W15
W17

0 500 1,000m

N

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- The Order limits
- Woodstore - 20m Buffer
- Public Highway within Scheme
- Proposed Fencing

Proposed Scheme Plan

- Developable Area
- Solar PV Array
- BESS and Substation
- Boundary Fence
- Illustrative Location of Solar Stations
- Proposed Road

Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Native Grassland/Wetland
- Heritage Offset with additional planting along The Avenue
- Proposed Woodland (new planting or infilling of existing vegetation)
- Retained Woodland
- Proposed Hedgerow (new planting or infilling of existing vegetation)

Note: Developable fields previously referred to as W13, W14 and W15 are no longer within the Order limits; however, the field numbering for the remaining developable fields has been retained for consistency.

Document Reference: EN010106/APP/6.3
APFP Regulation: 5(2)(a)

Sheet Layout

Purpose of Issue
FOR DCO SUBMISSION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
SUNNICA WEST A AND B PARAMETER PLAN

Drawn	Checked	Approved	Date
LL	DW	NC	12/10/2021

AECOM Internal Project No.	Scale @ A3
60589004	1:17,500

AECOM
Unit 1 Wellbrook Court,
Girton,
Cambridge, CB3 0NA
United Kingdom
Telephone (01223) 488000
www.aecom.com

AECOM

Drawing Number	Rev
60589004_ES_SD_002	0

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