Cottam Solar Project

Environmental Statement Chapter 10:

Hydrology, Flood Risk and Drainage

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January 2023

PINS Ref: EN010133

Document reference: APP/C6.2.10

APFP Regulation 5(2)(a)

Cottam
SOLAR PROJECT

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Issue Sheet

Report Prepared for: Cottam Solar Project Ltd.

Environmental Statement Chapter 10: Hydrology, Flood Risk and Drainage

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Date: January 2023

Revision: 01

10 Hydrology, Flood Risk and Drainage

10.1 Introduction

10.1.1 The Hydrology, Flood Risk and Drainage chapter of the ES considers the likely significant effects of the Scheme on the local hydrology during its construction, operation and decommissioning phases. For the purposes of this assessment, the term 'hydrology' includes risks associated with surface water and drainage and further includes an assessment of flood risk from all sources of flooding, namely:

- Tidal (flood risk from the sea)
- Fluvial
- Surface water
- Groundwater
- Artificial Sources (sewers, reservoirs and canals)

10.1.2 Paragraph 5.7.4 of NPS EN-1 states that; 'Applications for energy projects of 1 hectare or greater in Flood Zone 1 in England or Zone A in Wales and all proposals for energy projects located in Flood Zones 2 and 3 in England or Zones B and C in Wales should be accompanied by a flood risk assessment (FRA). An FRA will also be required where an energy project less than 1 hectare may be subject to sources of flooding other than rivers and the sea (for example surface water), or where the EA, Internal Drainage Board or other body have indicated that there may be drainage problems.'

10.1.3 The Draft NPS EN-1, published in September 2021 includes revised criteria for requiring a Flood Risk Assessment including:

- 'sites of 1 hectare or more
- land which has been identified by the EA or NRW as having critical drainage problems
- land identified (for example in a local authority strategic flood risk assessment) as being at increased flood risk in future
- land that may be subject to other sources of flooding (for example surface water)
- where the EA or NRW, Lead Local Flood Authority, Internal Drainage Board or other body have indicated that there may be drainage problems. This should 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.'

10.1.4 The Cottam Scheme is over 1 hectare in size and therefore requires a Flood Risk Assessment to support the planning application in line with National Policy Statement (NPS) for Energy (EN-1, DECC, 2011a) guidance.

10.1.5 Given the scale of this Scheme, and its separation into the multiple Sites of Cottam 1, Cottam 2, Cottam 3a and Cottam 3b (and in the case of Cottam 1, for assessment purposes, consideration of specific Sub-Sites of land within the Site), the overarching Flood Risk Assessment and Drainage Strategy (included as **Appendix 10.1**) is supported by individual Site and Cable Route Corridor assessments, that have been included as Annexes to **Appendix 10.1**.

10.1.6 Cottam 1 has been separated into three separate sub-sites (North, West and South) given it is comprised of areas of land which are hydrologically distinct.

10.1.7 This document is supported by the following appendix:

- Appendix 10.1: Flood Risk Assessment and Drainage Strategy **[EN010133/APP/C6.3.10.1]**.

Which in turn is supported by the following Annexes:

- Annex B - 10.1.1: Flood Risk Assessment and Drainage Strategy – Cable Route **[EN010133/APP/C6.3.10.2]**.
- Annex C - 10.1.2: Flood Risk Assessment and Drainage Strategy – Cottam 1 North **[EN010133/APP/C6.3.10.3]**.
- Annex D - 10.1.3: Flood Risk Assessment and Drainage Strategy – Cottam 1 West **[EN010133/APP/C6.3.10.4]**.
- Annex E - 10.1.4: Flood Risk Assessment and Drainage Strategy – Cottam 1 South **[EN010133/APP/C6.3.10.5]**.
- Annex F - 10.1.5: Flood Risk Assessment and Drainage Strategy – Cottam 2 **[EN010133/APP/C6.3.10.6]**.
- Annex G - 10.1.6: Flood Risk Assessment and Drainage Strategy – Cottam 3A **[EN010133/APP/C6.3.10.7]**.
- Annex H - 10.1.7: Flood Risk Assessment and Drainage Strategy – Cottam 3B **[EN010133/APP/C6.3.10.8]**.

A Water Framework Directive Assessment (WFD) has been undertaken **[EN010133/APP/C7.21]**. The aim of this assessment has been to determine the potential for any non-compliance of the Scheme with WFD objectives for affected water bodies, using readily available information and site observations.

10.2 Consultation

10.2.1 Consultation responses to the EIA Scoping and Statutory Consultation stages have been collated and responses to the comments are provided as within the Consultation Report **[EN010133/APP/C5.1]**.

Table 10.1: Consultation

Stage of Consultation	Consultee	Comments / Matters Raised	Response / Matters Addressed
Ongoing Engagement Emails / Remote Meetings	Environment Agency	From a flood risk perspective, Environment Agency (EA) representative expressed no concerns to the Scheme. Comments raised: • 8 m easement would be required to avoid permitting along EA Main Rivers	Comments informed approach of Flood Risk Assessment reports and embedded mitigation throughout the scheme.
Ongoing Engagement Emails	Witham 3 Internal Drainage Board (IDB)	IDB representative stated that solar farm developments within floodplain can be accepted with appropriate mitigation. Comments raised: • All electrical equipment is above design flood levels • Any development is resilient to flooding • Any surface water runoff associated with new developments will be required to be limited to greenfield rates • A clear unobstructed strip is required adjacent to all maintained watercourses • New byelaws will soon be adopted which require an easement distance of 9 m.	Comments informed approach of Flood Risk Assessment reports and embedded mitigation throughout the scheme.

Ongoing Engagement Emails	Trent Rivers Trust	No concerns expressed about Scheme	N/A
Ongoing Engagement Emails / Remote Meetings	Lincolnshire Lead Local Flood Authority (LLFA)	Comments: • Full Drainage Strategies would be required for large pieces of infrastructure, runoff rates should be limited to greenfield rates with appropriate SuDS measures provided • Highlighted that the issue of point erosion should be considered within Drainage Strategies • Resilience to surface water flooding should be considered within the design of solar sites	Comments informed approach of Flood Risk Assessment reports. Cottam 1 West (Annex D of the Flood Risk Assessment and Drainage Strategy) includes a Drainage Strategy for the proposed substation and battery storage infrastructure. All other points are included as embedded mitigation within the Scheme)
Ongoing Engagement Emails / Remote Meetings	Scott Stone Nottinghamshire Lead Local Flood Authority	LLFA representative considered the proposed design satisfactory. Comments: • No expectation for additional attenuation to be created for solar panels	Comments informed approach of Flood Risk Assessment and Drainage Strategy reports.

10.3 Policy Context

10.3.1 Legislation and policy specifically relevant to this topic area is outlined below.

National Legislation

The Overarching NPS for Energy (EN-1), adopted by the Department of Energy and Climate Change (DECC) in July 2011, to set objectives for the development of

nationally significant infrastructure in a particular sector and to provide the legal framework for planning decisions.

Overarching National Policy Statement for Energy (EN-1)

10.3.2 The Overarching National Policy Statement for Energy (NPS) (EN-1) sets out policy regarding the development of nationally significant energy infrastructure projects.

Specific policy relating to Flood Risk is set out in Section 5.7. Paragraph 5.7.9 of this section states 'in determining an application for development consent, the Examining Authority (formerly IPC) should be satisfied that where relevant:

- the application is supported by an appropriate FRA;
- the Sequential Test has been applied as part of site selection;
- a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk;
- the proposal is in line with any relevant national and local flood risk management strategy
- priority has been given to the use of sustainable drainage systems (SuDs) (as required in the next paragraph on National Standards); and
- in flood risk areas the project is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development. 3.1.3 Paragraph 5.7.12 states that the Secretary of State should not consent development in Flood Zone 2 in England unless it is satisfied that the Sequential Test requirements have been met and that it 'should not consent 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 the following:
- 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. 3.1.4 The overarching objectives of the NPS are addressed within this FRA, however, with regard to the Sequential and Exception Test, the NPS requires the following:
- 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.

- 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).
- All three elements of the test will have to be passed for development to be consented. For the Exception Test to be passed:
  - It must be demonstrated that the project provides wider sustainability benefits to the community that outweigh flood risk;
  - 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
  - An 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.
- 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.

10.3.3 The NPS EN-1 was published in July 2011, prior to the release of the NPPF, and its policies were subsequently developed based on PPS 25 'Development and Flood Risk'. As part of the preparation of the NPPF, the requirements to pass the Sequential and Exception Test listed in PPS 25 were reviewed and updated.

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

10.3.4 The NPS for Electricity Networks Infrastructure (EN-5) was published by the DECC in July 2011 and forms part of the suite of energy NPSs and is to be read in conjunction with the Overarching NPS for Energy (EN-1).

10.3.5 NPS EN-5 is relevant to the Proposed Development as the policy recognises electricity networks as "transmission systems (the long distance transfer of electricity through 400kV and 275kV lines), and distribution systems (lower voltage

lines from 132kV to 230V from transmission substations to the end-user) which can either be carried on towers/poles or undergrounded" and "associated infrastructure, e.g. substations (the essential link between generation, transmission, and the distribution systems that also allows circuits to be switched or voltage transformed to a useable level for the consumer) and converter stations to convert DC power to AC power and vice versa."

10.3.6 NPS EN-5 sets out further technology-specific considerations, in addition to those impacts covered in NPS EN-1, specifically with regards to Climate Change Adaptation and Resilience and its potential impacts on flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change.

Draft National Policy Statements

Draft Overarching National Policy Statement for Energy (EN-1)

10.3.7 In contrast to the adopted NPS EN-1 (2011), the Draft NPS EN-1, published in September 2021, makes specific reference to the generation of solar energy and recognises that there is an urgent need for new electricity generating capacity to meet UK objectives.

10.3.8 Paragraph 3.2.1 of the Draft NPS EN-1 sates that: "wind and solar are the lowest cost ways of generating electricity, helping reduce costs and providing a clean and secure source of electricity supply (as they are not reliant on fuel for generation). Our analysis shows that a secure, reliable, affordable, net zero consistent system in 2050 is likely to be composed predominantly of wind and solar." The NPS highlights that Government requires a sustained growth in the capacity of solar in the next decade and recognises that solar development needs to be coupled with technologies which optimise energy generation even when conditions for solar generation are not optimal.

10.3.9 Paragraph 3.3.24 of the Draft NPS EN-1 recognises that that energy storage is key in achieving net zero and providing flexibility to the energy system, so that high volumes of low carbon power can be integrated and to reduce the costs of the electricity system and increase reliability by storing surplus electricity in times of low demand to provide electricity when demand is higher.

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

10.3.10 The Draft NPS EN-5 was published in 2021 and recognises that new electricity networks required for electricity generation, storage and interconnection infrastructure are vital to achieving the nation's transition to net zero.

10.3.11 Draft NPS EN-5 does not include any substantial revisions with regards to Flood Risk and Drainage.

10.3.12 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 implements the WFD. The WFD seeks to enhance the status of

aquatic ecosystems, promotes sustainable water use and contributes to mitigating the effects of flood and drought. It is a requirement of the WFD that the UK is to classify major rivers and their tributaries in terms of their ecological status with reference to biological, chemical and hydro-morphological quality indicators.

10.3.13 The Groundwater (Water Framework Directive) (England and Wales) Regulations 2009 and Groundwater (Water Framework Directive) (England) Direction 2014 transpose the Groundwater Daughter Directive. The former addresses the protection of groundwater against pollution caused by certain dangerous substances and places an obligation to prevent pollution of groundwater by substances including hydrocarbons and control the introduction of named metals. The Daughter Directive requirements have been transposed into UK law by the Environmental Permitting (England and Wales) Regulations 2016. The "Daughter Directive" to the WFD establishes specific measures as provided for in the WFD to prevent and control groundwater pollution. It defines criteria for the assessment of good groundwater chemical status

10.3.14 The Flood Risk Regulations (2009) (England, Wales and Scotland) requires the development and update of a series of tools for managing all sources of flood risk, in particular:

- Preliminary flood risk assessments (PFRAs);
- Flood risk and flood hazard maps;
- Flood risk management plans;
- Co-ordination of flood risk management at a strategic level;
- Improved public participation in flood risk management; and
- Co-ordination of flood risk management with the WFD.

10.3.15 The Flood Risk Regulations 2009 was consolidated into the Flood and Water Management Act 2010. The Flood and Water Management Act 2010 (England and Wales) clarifies responsibilities for land drainage and flood risk management and transfers some key responsibilities to local authorities. The Act intends to provide better, more comprehensive management of flood risk for people, homes and businesses. In particular, it encourages the uptake of sustainable drainage systems by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt Sustainable Drainage Systems (SuDS) for new developments and redevelopments.

10.3.16 The Water Resources Act 1991 (and Land Drainage bylaws) (England and Wales) requires the prior written consent of the Environment Agency for any works or structures in, over, under or within 8 metres of any watercourse designated as a 'Main River'. Main Rivers are classified watercourses under the jurisdiction of the EA. The consenting regime for discharges to controlled waters is set out in the Environmental Permitting (England and Wales) Regulations 2016.

10.3.17 The Nitrate Pollution Prevention Regulations 2015 (England), aims to reduce nitrate concentrations from agriculture entering water systems through measures which include the following:

- A requirement to designate Nitrate Vulnerable Zones (NVZs);
- A requirement to plan nitrogen applications on agricultural land;
- The setting of limits on nitrogen fertiliser applications;
- The establishment of closed periods for spreading; and
- Controls on the application and storage of organic manure.

10.3.18 The EA is responsible for assessing farmers' compliance with measures in NVZs.

10.3.19 The Land Drainage Act 1991 (England and Wales) places responsibility for maintaining flows in watercourses on landowners.

National Planning Policy

10.3.20 The revised National Planning Policy Framework (NPPF) was last updated on 20th July 2021[1] (superseding the original NPPF published in 2012 which superseded the Planning Policy Statement 25 (PPS25)) along with previous updates in 2018 and 2019. It is supported by the associated National Planning Practice Guidance (NPPG), namely the 'Flood Risk and Climate Change[2]' which is a 'live' document and last updated on the 25th of August 2022. This report takes into account these guidance documents.

10.3.21 The NPPF seeks to ensure that climate change is considered for long term factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape. New development should therefore be planned to avoid increased vulnerability to the range of effects arising from climate change. Where new development is brought forward in areas which are vulnerable to the range of effects arising from climate change, care should be taken to ensure that flood risk can be managed through sustainable adaptation measures.

10.3.22 In relation to flood risk, inappropriate development in areas at high risk of flooding should be avoided by sequentially locating development away from areas at the highest risk. Where development is necessary within a flood zone it should be safe and should not increase flood risk elsewhere.

10.3.23 NPPF states that a Site-specific Flood Risk Assessment (FRA) is required for the following scenarios:

- Proposals of 1 hectare or greater in Flood Zone 1;
- All proposals for new development in Flood Zones 2 and 3;

[1] Technical Guidance to the National Planning Policy Framework (publishing.service.gov.uk)
[2] Flood risk and coastal change - GOV.UK (www.gov.uk)

- Proposals in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the EA); and
- Any Scheme or change of use to a more vulnerable use, on land in Flood Zone 1 which may be subject to other sources of flooding.

Local Planning Policy

10.3.24 The majority of the Scheme will be located within the administrative boundary of Lincolnshire County Council and West Lindsey District Council. The grid connection at the former Cottam Power Station and a part of the Cable Route Corridor are located within the jurisdiction of Bassetlaw District Council and Nottinghamshire County Council.

Lincolnshire County Council and West Lindsey District Council

10.3.25 The Central Lincolnshire Local Plan (adopted April 2017) includes the following policies relating to flood risk and drainage:

10.3.26 Policy LP14: Managing Water Resources and Flood Risk

Flood Risk

'All development proposals will be considered against the NPPF, including application of the sequential and, if necessary, the exception test.

Through appropriate consultation and option appraisal, development proposals should demonstrate:

a. that they are informed by and take account of the best available information from all sources of flood risk and by site specific flood risk assessments where appropriate;
b. that there is no unacceptable increased risk of flooding to the development site or to existing properties;
c. that the development will be safe during its lifetime, does not affect the integrity of existing flood defences and any necessary flood mitigation measures have been agreed with the relevant bodies;
d. that the adoption, ongoing maintenance and management of any mitigation measures have been considered and any necessary agreements are in place;
e. how proposals have taken a positive approach to reducing overall flood risk and have considered the potential to contribute towards solutions for the wider area; and
f. that they have incorporated Sustainable Drainage Systems (SuDS) in to the proposals unless they can be shown to be impractical'.

Protecting the Water Environment

'Development proposals that are likely to impact on surface or ground water should consider the requirements of the Water Framework Directive.

Development proposals should demonstrate: …

g. that water is available to support the development proposed;

h. that development contributes positively to the water environment and its ecology where possible and does not adversely affect surface and ground water quality in line with the requirements of the Water Framework Directive;

i. that development with the potential to pose a risk to groundwater resources is not located in sensitive locations to meet the requirements of the Water Framework Directive;

j. they meet the Building Regulation water efficiency standard of 110 litres per occupier per day;

k. how Sustainable Drainage Systems (SuDS) to deliver improvements to water quality, the water environment and where possible to improve amenity and biodiversity have been incorporated into the proposal unless they can be shown to be impractical;

l. l. that relevant site investigations, risk assessments and necessary mitigation measures for source protection zones around boreholes, wells, springs and water courses have been agreed with the relevant bodies (e.g. the Environment Agency and relevant water companies);

m. that adequate foul water treatment and disposal already exists or can be provided in time to serve the development;

n. that no surface water connections are made to the foul system;

o. that surface water connections to the combined or surface water system are only made in exceptional circumstances where it can be demonstrated that there are no feasible alternatives (this applies to new developments and redevelopments) and where there is no detriment to existing users;

p. that no combined sewer overflows are created in areas served by combined sewers, and that foul and surface water flows are separated;

q. that suitable access is safeguarded for the maintenance of water resources, flood defences and drainage infrastructure; and

r. that adequate provision is made to safeguard the future maintenance of water bodies to which surface water is discharged, preferably by an appropriate authority (e.g. Environment Agency, Internal Drainage Board, Water Company, the Canal and River Trust or local council)'.

Bassetlaw District Council

10.3.27 The Bassetlaw District Local Development Framework, Core Strategy document (adopted December 2011) includes the following policies relating to flood risk and drainage.

"Policy DM12: Flood Risk, Sewerage And Drainage

A. Flood Risk

Proposals for the development of new units in Flood Zones 2, 3a and 3b that are not defined by national planning guidance as being suitable for these zones will not be supported while development sites remain available in sequentially superior locations across the District. Reference should be made to the Council's Strategic Flood Risk Assessment when making assessments about likely suitability. Site specific Flood Risk Assessments will be required for all developments in flood risk areas, even where flood defences exist, as defined on the Proposals Map.

Where suitable redevelopment opportunities arise, the Council will require, in liaison with the Environment Agency, the opening up of culverts, notably in Worksop and Retford, in order to reduce the blocking of flood flow routes. Particular support will be given to the Flood Alleviation Scheme for Retford Beck.

B. Sewerage and Drainage

Proposals for new development (other than minor extensions) … will only be supported where it is demonstrated to the Council's satisfaction that the Scheme will not exacerbate existing land drainage and sewerage problems in these areas.

All new development (other than minor extensions) will be required to incorporate SuDS and provide details of adoption, ongoing maintenance and management. Proposals will be required to provide reasoned justification for not using SuDS techniques, where ground conditions and other key factors show them to be technically feasible.

Preference will be given to systems that contribute to the conservation and enhancement of biodiversity and green infrastructure in the District."

10.3.28 The Draft Bassetlaw Local Plan 2020 – 2037 (Publication Version) (Published August 2021) is currently undergoing examination and has not yet been adopted, however it contains the following policies relating to flood risk and drainage:

"Policy ST52: Flood Risk and Drainage

1. All proposals are required to consider and, where necessary, mitigate the impacts of the Scheme on flood risk, on-site and off-site, commensurate with the scale and impact of the development. Proposals, including change of use applications, must be accompanied by a Flood Risk Assessment (where appropriate), which demonstrates that the development, including the access and egress, will be safe for its lifetime, without increasing or exacerbating flood risk elsewhere and where possible will reduce flood risk overall.
2. Where relevant, proposals must demonstrate that they pass the Sequential Test and if necessary the Exceptions Test in Flood Zones 2 and 3 and ensure that where land is required to manage flood risk, it is safeguarded from development.

River Ryton Flood Management Impact Zone

3. All development within the River Ryton Flood Management Impact Zone, as identified on the Policies Map, will need to demonstrate through a Design and Access Statement that they will not prejudice the delivery of a future flood management scheme for the River Ryton catchment through prior agreement with the Environment Agency.

Surface Water Flood Risk

4. All development (where appropriate) should incorporate sustainable drainage systems (SuDS) in line with national standards. These should:

a) be informed by the Lead Local Flood Authority, sewerage company and relevant drainage board;

b) have appropriate minimum operational standards;

c) be managed in line with the Government's water strategy;

d) have maintenance arrangements in place to ensure an acceptable standard of operation and management for the development's lifetime;

e) prevent surface water discharge into the sewerage system;

f) maximise environmental gain through enhancing the green/blue infrastructure network, including urban greening measures, contributing to biodiversity net gain where possible, and securing amenity benefits along with flood storage volumes;

g) seek to reduce runoff rates in areas at risk from surface water flooding, and that any surface water is directed to sustainable outfalls".

"POLICY ST53: Protecting Water Quality and Management

1. In line with the objectives of the Water Framework Directive the quantity and quality of surface and groundwater bodies will be protected and where possible enhanced in accordance with the Humber River Basin Management Plan Development adjacent to, over or in, a main river or ordinary watercourse will be supported where proposals consider opportunities to improve the river environment and water quality by:

a) actively contributing to enhancing the status of the waterbody through positive actions or ongoing projects;

b) naturalising watercourse channels;

c) improving the biodiversity and ecological connectivity of watercourses;

d) safeguarding and enlarging river buffers with appropriate habitat in accordance with Policy ST39; and

e) mitigating diffuse agricultural and urban pollution.

2. Proposals within a Source Protection Zone will need to demonstrate that any risk to the Sherwood Sandstone Principle Aquifer and its groundwater

resources and groundwater quality will be protected throughout the construction, operational and decommissioning phase of development.

3. All proposals must ensure that appropriate infrastructure for water supply, sewerage and sewage treatment, is available or can be made available at the right time to meet the needs of the development. Proposals should:

a) utilise the following drainage hierarchy:

i. connection to a public sewer; then

ii. package sewage treatment plant (which can be offered to the Sewerage Undertaker for adoption); then

iii. septic tank, which will only be considered if it can be clearly demonstrated by the applicant that discharging into a public sewer is not feasible.

b) ensure that development that discharges water into a watercourse incorporates appropriate water pollution control measures;

c) ensure that drainage design take into account an appropriate climate change allowance as agreed with the relevant authority(s);

d) ensure that infiltration based SuDS incorporate appropriate water pollution control measures;

e) consider use of water recycling, rainwater and storm water harvesting, wherever feasible, to reduce demand on mains water supply."

Lincolnshire County Council

10.3.29 The Lincolnshire County Council 'Sustainable Drainage Design and Evaluation Guide' was produced to facilitate the best possible SuDS design. It is primarily intended for use by developers, designers and consultants who are seeking guidance on the Lead Local Flood Authority (LLFA) standards for the design of sustainable surface water drainage in Lincolnshire.

Nottinghamshire County Council

10.3.30 Nottinghamshire County Council does not provide any guidance or policies with regards to flood risk and drainage.

CIRIA SuDS Manual

10.3.31 The CIRIA SuDS Manual, C753 (CIRIA, 2015) provides best practice guidance on the planning, design, construction, operation and maintenance of Sustainable Drainage Systems (SuDS).

10.4 Assessment Methodology and Significance Criteria

10.4.1 A desktop analysis of the available data has been undertaken to inform this ES chapter. Further data has been collected as part of the Flood Risk Assessment and Drainage Strategy included as **Appendix 10.1** and the supporting Annexes (Annex 10.1.1 to 10.1.7). The assessments have identified and assessed the risks of all forms

of flooding to and from the proposed scheme in line with NPS, NPPF and PPG guidance and have:

- Identified and evaluated the significant effects and receptors at risk.
- Undertaken consultation with the Environment Agency, Lead Local Flood Authority, IDB and other stakeholders.
- Identified whether the proposed scheme is likely to be affected by current or future flooding from any source.
- Assessed whether it will cause increased flood risk elsewhere.
- Assessed whether the measures proposed to deal with these effects and risks are appropriate.
- Undertaken a review of the Sequential Test and, if required, the Exception Test as detailed in Paragraph 5.7.9, 5.7.12 to 5.7.17 of NPS EN-1.
- Provided an assessment to ensure that any potential increases in site runoff are mitigated utilising SuDS. This has been determined in consultation with the Environment Agency and Lincolnshire County Council and Nottinghamshire as Lead Local Flood Authorities.

10.4.2 A hydrological assessment has been undertaken to establish local drainage catchments and overland flow routes. Assessment in the form of a drainage strategy in accordance with the CIRIA guidance 'The SuDS Manual C753' has been undertaken by:

- Site visit and hydrological/drainage surveys;
- Baseline hydrological assessment, data acquisition and regulatory consultation;
- Hydrological analysis (considering climate change);
- Sustainable drainage system design; and
- Surface water quality risk assessment & pollution control review.

10.4.3 This ES chapter considers potential impacts to the site and the surrounding area over the lifetime of the development and proposes appropriate mitigation measures if required. The assessment of the significance of impact is informed by the valuation of the watercourse and the magnitude of impact. The magnitude of impact will be determined only for residual impacts following mitigation.

10.4.4 Flood risk and surface water drainage is summarised in the ES in accordance with guidance in the DMRB Volume 11, Section 3, Part 10 (HD 45/09).

10.4.5 This chapter summarises the findings and recommendations of the Drainage Strategy. Recommendations have been made for mitigation measures in order to minimise the potential effects of the Scheme on water quality and drainage. Any residual effects will be identified as well as the potential for relevant cumulative effects associated with any other developments nearby.

Approach and Method

10.4.6 As summarised in Tables 10.2, 10.3 and 10.4 magnitude is considered in relation to the potential impact on the receptor with magnitude defined in a range from Neutral to Major. The receptor sensitivity is defined as Low, Medium or High depending on the specific receptor character and its ability to tolerate change. The significance of the effect is defined in relation to both the magnitude of the impact and receptor significance. If the significance of the potential effect is 'Moderate Adverse' or higher, then mitigation measures may need to be considered.

Table 10.2: Sensitivity/Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	WFD Classification – Good or High Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar Site); European Designated salmonid fishery (or salmonid & cyprinid fishery); Important social or economic uses such as water supply, navigation or mineral extraction. Floodplain or defence protecting 1 or more residential properties or industrial premises from flooding.
Medium	WFD Classification: Moderate May be designated as a local wildlife Site. May support a small / limited population of protected species. Limited social or economic uses. Floodplain or defence protecting 10 or fewer industrial properties from flooding.
Low	WFD classification – Poor No nature conservation designations. Low aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses. Floodplain with limited constraints and a low probability of flooding of residential and industrial properties.

Table 10.3: Methodology for determining impact magnitude

Magnitude of Impact	Examples of Receptor
Major (adverse)	Loss of Protected Area. Pollution of potable sources of water abstraction. Deterioration of a water body leading to a failure to meet Good Ecological Status (GES) under the WFD and reduction in Class (or

	prevents the successful implementation of mitigation measures for heavily modified or artificial water bodies). Significant potential increase in peak flood level (1% annual probability).
Moderate (adverse)	Loss in production of fishery. Discharge of a polluting substance to a watercourse but insufficient to change its water quality status (WFD class) in the long term. No reduction in WFD class, but effect may prevent improvement (if not already at GES) or the successful implementation of mitigation measures for heavily modified or artificial water bodies. Moderate potential Increase in peak flood level (1% annual probability).
Minor (adverse)	Noticeable effect on features, or key attributes of features, on the Protected Areas Register. Measurable changes in attribute but of limited size and / or proportion, which does not lead to a reduction in WFD status or failure to improve. Minor potential increase in peak flood level (1% annual probability).
Negligible	No effect on features, or key attributes of features, on the Protected Areas Register. Discharges to watercourse but no significant loss in quality, fishery productivity or biodiversity. No effect on WFD classification or water body target. Negligible change in peak flood level (1% annual probability).
Beneficial	Improvement on features, or key attributes of features, on the Protected Areas Register. Improvement in fishery production or biodiversity. Improvement in WFD classification or water body target. Potential reduction in peak flood level (1% annual probability).

Table 10.4: Methodology for determining significance of effect

Sensitivity **Magnitude**	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible
Neutral	Neutral	Neutral	Neutral

10.4.7 In considering the significance of the effect account is taken of an effect's duration; reversibility and compatibility with relevant environmental policies and standards. Effects can be temporary or permanent. Temporary effects are largely associated with the construction and decommissioning phases and permanent effects are largely associated with the operational phase.

10.4.8 For the purposes of this ES Chapter, any effect identified as moderate or above is considered a **'significant effect'** and anything below is considered not significant.

Assumptions and Limitations

10.4.9 The methodology for assessment of potential water resource and flood risk effects as communicated during the PEIR stage has incorporated the following assumptions:

- That the Scheme will be low impact with access roads and footways surfaced with permeable surfacing and therefore assumed to be effectively permeable;
- Any runoff from waste materials would be collected, contained and prevented from direct entry to local water courses;
- That all clean surface water runoff would be discharged directly to the nearest surface water drainage feature;
- Analysis of flood extents is reliant on the accuracy of the published EA Flood Map for Planning and detailed EA flood data based on their latest hydraulic modelling. No new hydraulic modelling has been undertaken as part of this study; and
- Given the Scheme is anticipated to be unmanned, with infrequent attendance for maintenance, on-Site welfare facilities will be limited. Therefore no foul water discharge from the Scheme and no mains connected foul water drainage systems are likely to be necessary.

10.5 Baseline Conditions

10.5.1 The baseline conditions including relevant receptors for each of the sites has been detailed in the Flood Risk Assessment and Drainage Strategy included in **Appendix 10.1** and the supporting Annexes (Annex 10.1.1 to 10.1.7).

10.5.2 The risk of Tidal and fluvial flooding has been interpreted from the EA's online Flood Map for Planning, Site specific hydraulic modelling provided by the EA where available and the EA Long Term Flood Risk Map (Surface Water) where site specific modelling is not available. The risk of surface water flooding has been assessed from the EA Long Term Flood Risk Map (Surface Water).

10.5.3 The Site is situated within both the Anglian and Humber River Basin Management Plan (RBMP) areas. Within the Anglian RBMP the Site is further situated within Witham Management Catchment and within the Humber RBMP the Site is Lower Trent and Erewash Management Catchment. The local land drainage network feeds into local watercourses several of which are WFD surface waterbodies. The WFD

waterbodies are identified in the relevant Annexes and the WFD Assessment **[EN010133/APP/C7. APP/C7.21].**

10.5.4 As set out in Chapter 4 of the ES (Scheme Description) **[EN010133/APP/C6.2.4]**, within Schedule 1 of the draft DCO **[EN010133/APP/C3.1]** the "authorised development" is divided into works packages, and the works numbers for those packages range from Work No.1 to Work No.11. (note that the works package areas overlap). For this ES chapter and the supporting Flood Risk Assessment and Drainage Strategy the Scheme has been assessed as four Sites (Cottam 1, 2, 3a and 3b) plus the Cable Route Corridor. As noted at **Chapter 2** of the ES **[EN010133/APP/C6.2.2]**, part of the Gate Burton Energy Park cable route and West Burton Solar Project cable route will fall within the Cable Route Corridor (referred to in this ES as the 'Shared Cable Route Corridor') that also accommodates the Cottam cable, in the vicinity of Cottam Power Station. Both the Gate Burton Energy Park and West Burton Solar Project schemes are considered in the Cumulative Effects section 10.11 below.

10.5.5 Cottam 1 is subdivided into three distinct areas (North, West and South) and therefore, the assessment of each area has been undertaken separately. Furthermore Cottam 1 North and West are further divided into three Sub-Sites each, as described in the supporting **Appendix 10.1** and relevant Annexes (10.1.2, 10.1.3 & 10.1.4).

Cable Route

10.5.6 Given the scale of the Cable route it will necessarily come within close proximity to existing watercourses and in 31 instances will cross existing watercourses.

10.5.7 The EA's Flood Map for Planning indicates the vast majority of the cable route is within Flood Zone 1 (<0.1% AEP). The southern extent of the cable within the vicinity of the River Trent and the central extent in the vicinity of the River Till is situated within Flood Zones 2 and 3. Flood Zone 2 is defined as land assessed as having between a 1 in 1000 to 1 in 100 (0.1% to 1% Annual Exceedance Probability (AEP)) of river flooding. Flood Zone 3 defined as land assessed as having a 1 in 100 or greater (>1% AEP) of river flooding.

10.5.8 The River Trent is Tidally influenced where the proposed cable crossing is located.

10.5.9 The EA's Long Term Flood Risk Map (Surface Water indicates that the majority of the cable route is at Very Low (< 0.1% annual probability) risk of surface water flooding. Surface water flooding with a Medium (1% - 3.3% annual probability) and High (>3.3% annual probability) risk of occurrence is present in the western extent of the Site and along parts of the eastern Site boundary.

10.5.10 The extents of the surface water risk largely concur with the courses of the watercourses which run through the wider area.

Cottam 1 (North)

10.5.11 The EA's Flood Risk Map for Planning indicates that the eastern and western boundaries of Sub-Site B are within the extents of Flood Zone 3 (High Risk). A minor extent of the north-western corner of Sub-Site A is located in Flood Zone 3. Sub-Site C is encroached by Flood Zone 3 predominantly in the west and in the southern corner.

10.5.12 Flood Zone 3 is defined as land assessed as having a 1 in 100 or greater >1% Annual Exceedance Probability annual probability of river flooding.

10.5.13 Fluvial risk across the Sub-Sites within the Site is associated with a series of land drains and an Ordinary Watercourse to the west of Sub-Site C which discharges into the River Till (Main River – responsibility of the EA to maintain) approximately 1.7 km south-west of the Site.

10.5.14 In the absence of site specific modelled flood data, the 0.1% annual probability surface water flood scenario can be used as a proxy for the 1% Annual Exceedance Probability (AEP) plus Climate Change (CC) fluvial event. This is a practical and accepted approach in the absence of detailed hydraulic modelling and provides a reasonable and precautionary measure of the level of fluvial / surface water risk especially in open rural areas such as that the Scheme is located within.

10.5.15 A map depicting flood depths associated with the 0.1% Annual Probability is included as Annex 10.1.2 in **Appendix 10.1**. No flooding with a depth greater than 0.9 m is present across any of the Sub-Sites. Flooding with a depth between 0.6 – 0.9 m is present along the western boundary of Sub-Site B and the north-western corner of Sub-Site A.

10.5.16 The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the Site.

10.5.17 Sub-Site B has High Risk areas associated with some land drains that cross the Sub-Site in the east and a topographical low point in the west. Sub-Sites A and C have High Risk areas associated with the route of the River Till. There are multiple flow paths in the surrounding area that flow towards the Site

Cottam 1 (South)

10.5.18 The EA's Flood Risk Map for Planning indicates that the northern, western and a minor portion of the south-eastern extent of the Site are within Flood Zone 3.

10.5.19 Fluvial risk across the Site is associated with the River Till which flows southwards through the Site, the risk extends along some land drains in the north of the Site. The South Spinney/Beck Spinney is an Ordinary Watercourse (responsibility of the LLFA to maintain) and runs along the part of the south-eastern Site boundary.

10.5.20 The EA's Spatial Flood Defences dataset indicates that formal EA Flood Defences are present along the length of the River Till that runs through the Site. The defences are shown as 'embankments' on the dataset which upon inspection of Google Streetview appear to be raised grassy banks. The Standard of Protection (SoP) of the

defence is shown as up to the 1 in 10 year event. The upstream crest level of the defence is stated as 7.62 m AOD and the downstream crest level as 7.20 m AOD.

10.5.21 The EA have provided depth grid data for the Defended 1% AEP + 20% Climate Change (CC) scenario and 0.1% AEP + 20% CC scenario taken from the Upper Witham Lincoln 2015 Model.

10.5.22 During the 1% AEP + CC scenario (Annex F), flows are shown to overtop the right bank of the River Till and cover a minor portion of the Site in the south. The vast majority of the on-Site flooding is shown to be below 0.6 m however there are some minor areas shown to hold depths above 0.9 m in the south-western corner. It should be noted that the EA's model does not cover the entire Site and therefore in the south-west corner of the Site there is a 'clear' zone of no flood risk is shown. This model extent was discussed with the EA and confirmed. On comparison to LiDAR data, the elevation levels of the land in the flood free zone are not raised above the surrounding land, therefore there is no indication that flows would not reach this area. It should be assumed that flows would also extend over this area of the Site.

10.5.23 During the 0.1% AEP + CC scenario, the majority of the Site remains flood free however a greater proportion of the western extent of the Site on both sides of the River Till is shown to hold flooding with a depth greater than 0.9 m.

10.5.24 The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the western and eastern extents of the Site. The surface water extents shown on the EA Flood Map reflect the position of the River Till that run through the west of the Site and along the eastern periphery.

Cottam 1 (West)

10.5.25 The EA's Flood Risk Map for Planning indicates that Sub-Sites E and F are partially located within Flood Zones 2 (Medium Risk) and 3 (High Risk) associated with the River Till which flows in a south-easterly direction through Sub-Sites F& G.

10.5.26 The EA's Spatial Flood Defences dataset indicates that formal EA Flood Defences are present along the length of the River Till that runs through the Site. The defences are shown as 'embankments' on the dataset which upon inspection of Google Streetview appear to be raised grassy banks. The Standard of Protection (SoP) of the defence is shown as up to the 1 in 10 year event. The upstream crest level of the defence is stated as 10.45 m AOD and the downstream crest level as 8.41 m AOD.

10.5.27 The EA have provided depth grid data for the Defended 1% AEP + 20% CC scenario and 0.1% AEP + 20% CC scenario taken from the Upper Witham Lincoln 2015 Model.

10.5.28 During the 1% AEP + CC scenario, the vast majority of the Site is shown to remain flood free. A minor portion of flooding is shown to encroach the south-eastern corner of the Site however depths are shown to remain below 0.5 m.

10.5.29 During the 0.1% AEP + CC scenario, a minor extent of Sub-Site G is encroached by flooding however the depths are shown to remain below 0.4 m. Flooding is shown

on both sides of the River Till within the centre of Sub-Site F, with some areas indicated to have flooding reaching depths above 0.9 m. The majority of the northern Sub-Site E is shown to be flooded however the depths are shown to be below 0.7 across the entire Sub-Site. The eastern extent of the southern Sub-Site E is shown to be impacted, with maximum flood depths above 0.9 m in the eastern area of the Sub-Site that bounds the River Till.

10.5.30 The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the Site. Sub-Site G has High Risk areas associated with some land drains that cross the Sub-Site in the east and a topographical low point in the west. Sub-Sites E &F have High Risk areas associated with the route of the River Till. There are multiple flow paths in the surrounding area that flow towards the Site.

Cottam 2

10.5.31 The EA's Flood Risk Map for Planning indicates that the north and eastern boundary of the Site are encroached by Flood Zone 3 (High Risk). The remainder of the Site is at Low Risk in Flood Zone 1.

10.5.32 The EA were consulted to obtain site-specific flood data for the Site. In their response, the EA stated, 'we don't hold modelled data for Yewthorpe Beck since it is an ordinary watercourse'. Lincolnshire County Council as the Lead Local Flood Authority and Scunthorpe and Gainsborough Water Management Board as the Internal Drainage Board were subsequently consulted, however neither authority held any flood data relating to the watercourse.

10.5.33 In the absence of modelled flood data, the 0.1% annual probability surface water flood scenario can be used as a proxy for the 1% AEP + CC fluvial event. A map depicting flood depths associated with the 0.1% annual probability scenario is included as Annex E. The majority of the flooding along the eastern Site boundary is shown to be between 0.3 – 0.6 m. Two portions of flooding with depths between 0.6 – 0.9 m are shown in the north-eastern corner of the Site.

10.5.34 The EA's Long-Term Flood Risk Map (Figure 2) indicates that surface water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the boundaries of the Site, predominantly surrounding the north, east and west. The Site shows little surface water risk within the boundaries, aside from a small parcel within the centre of the site which is shown to be a Medium Risk (1% - 3.3%).

Cottam 3a

10.5.35 The EA's Flood Risk Map for Planning indicates that the Site is located wholly within Flood Zone 1 (Low Risk).

10.5.36 The EA's Long-Term Flood Risk Map indicates that the majority of the Site is at Very Low to Low (<0.1 - 1%) risk of Surface Water flooding. Isolated areas of the Site are at Medium to High Risk (1 - 3.3< % Annual Probability), notably on the north-eastern boundary of the Site for approximately 1 km. This forms a Surface Water flow path,

running along the boundary and away from the Site northwards. Other isolated areas of Medium to High Risk on the Site are associated with minor topographic depressions which infill during rainfall events.

Cottam 3b

10.5.37 The EA's Flood Risk Map for Planning indicates that the Site is located wholly within Flood Zone 1.

10.5.38 The EA 'Flood Risk from Surface Water' map (Figure 2) indicates that the Site is largely at Very Low risk (<0.1% annual probability) of surface water flooding. However, there are some small areas throughout the Site which are at Low to High risk (0.1 - ≥ 3.3% annual probability) of surface water flooding; these areas are generally confined to the north-east and south-western extents.

10.6 Identification and Evaluation of Likely Significant Effects

10.6.1 The potential likely significant effects of the Scheme during decommissioning are likely to be the same and no worse than (i.e. a worst case scenario basis) as those encountered during the construction phase. Therefore, those effects considered for construction below are similarly expected during the decommissioning phase.

Construction /Decommissioning

Effects on Flood Risk and Drainage

Mud and Debris Blockages

10.6.2 There is the potential for mud and debris arising from the construction / decommissioning works to enter the existing surface water / land drainage system, causing blockages and restricting flow. This could result in localised flooding on site, especially after heavy or prolonged rainfall. As the Site is at present predominantly agricultural the initial effect is considered to be limited. However, given the scale and phased nature of the scheme as construction progresses the likelihood of potentially significant construction effects could increase without mitigation.

10.6.3 The sensitivity of construction workers and equipment to mud and debris blockages is considered to be **Medium**. The potential for mud and debris to block drainage networks is considered to have an effect of **Low Adverse** magnitude on flooding to the Site itself and surrounding area which would result in flood risk to construction workers and equipment at the Site. The effect is therefore considered to be **Moderate Adverse,** which is considered to be **Significant** in EIA terms**.**

Temporary Increase in Impermeable Area

10.6.4 Temporary increase in impermeable area during construction / decommissioning has the potential to increase flooding both on and off site. Temporary hardstanding or compacted areas could result in rapid surface water runoff to local watercourses or cause an increase in overland flow. As the Site is Greenfield at present there is potential for overland flows to be created and for localised flooding to occur.

Increased, un-regulated discharges into local watercourses could also increase the risk of flooding downstream.

10.6.5 The effects would be temporary and short term. The sensitivity of construction workers and equipment is considered to be **Medium** with the temporary effects considered to have an effect of **Medium Adverse** magnitude to people working within - and property at - the Site as it could occur at a time of high flood risk (e.g. during a large storm event). The significance of effect is **Moderate Adverse,** which is considered to be **Significant** in EIA terms**.**

Compaction of Soils

10.6.6 Construction of access tracks and movement of construction / decommissioning traffic, in the absence of construction good practice, can lead to compaction of the soil. This can reduce soil permeability, potentially leading to increased run-off rates and increased erosion. The superficial geology underlying the Scheme is generally of low permeability and is in agricultural use, so the effects of compaction would not result in a substantial increase in runoff from existing conditions.

10.6.7 In order to avoid deterioration of drainage quality, it is necessary to ensure that construction / decommissioning methods do not seriously disrupt the established drainage network and that no areas are surcharged, either by water discharge or spoil.

10.6.8 Maintenance of existing drainage infrastructure is critical to avoid compaction of soils, therefore all existing land drainage network will be maintained. Existing access tracks have been used in the design where practicable, further reducing the potential for soil compaction.

10.6.9 The effects would be temporary and short term. The sensitivity of construction workers and equipment is considered to be **Medium** with the temporary effects considered to have an effect of **Medium Adverse** magnitude to people working within - and property at - the Site as it could occur at a time of high flood risk (e.g. during a large storm event). The significance of effect is **Moderate Adverse,** which is considered to be **Significant** in EIA terms**.**

Effects on Water Resources

Silt-laden Runoff

10.6.10 During the construction / decommissioning phases of the Scheme, there are a number of activities which have the potential to negatively affect the local water environment. Activities such as potential dewatering of excavations, concreting, earthworks, and use of heavy plant can lead to significant quantities of silty runoff that may also be contaminated with oil, fuel and/or other construction materials, all of which have potential to cause pollution of the water environment and negatively affect the ecology it supports. Pollutants could be mobilised to watercourses or infiltrate to ground.

10.6.11 The Scheme will involve construction of temporary access tracks to the Scheme. Access roads will be constructed with compacted self-binding aggregate fill materials. Shallow excavation of vegetation and soils would be necessary for placement of road surfaces. Access roads would form long linear features that, in the event of rainfall, could provide temporary drainage routes for surface water during the construction / decommissioning phase of the Scheme. With the potential for soil erosion and consequent liberation of sediment from shallow road excavations it would be necessary to ensure that pollution prevention measures within the Site are adequate to prevent migration of silt to surface watercourses and groundwater bodies.

10.6.12 The sensitivity of surface water and groundwater bodies to silt contamination is considered to be **Medium**. Without mitigation, potential effects are considered of a **Medium** magnitude. The significance of the effect is **Moderate Adverse** on a temporary short-term basis.

Spillages, Leakages and Pollutants

10.6.13 During construction / decommissioning, fuel, hydraulic fluids, solvents, grouts, paints and detergents and other potentially polluting substances will be stored and / or used on the Site. Leaks and spillages of these substances could pollute groundwater bodies through infiltration as well as the surface watercourses within the Site and those nearby if their use is not carefully controlled and spillages enter existing flow pathways. In order to ensure statutory compliance including with the Water Resources Act 1991, measures to control the storage, handling and disposal of such substances will need to be in place prior to and during construction / decommissioning. The construction laydown areas could be sited next to existing flow pathways.

10.6.14 The sensitivity of surface water and groundwater bodies to spillages, leakages and pollutants is considered to be **Medium**. Without mitigation measures spillages of chemicals/fuel stored and/or used on the Site could cause short term, temporary effects of a **Medium** magnitude on the local watercourses. The significance of effect is **Moderate Adverse** on a temporary short-term basis.

Inappropriate Wastewater Disposal from Welfare Facilities

10.6.15 In the absence of nearby public foul water sewers to which foul water from welfare facilities could be connected, suitably sized self-contained welfare should be provided by a specialist Contractor.

10.6.16 The sensitivity of surface water to inappropriate wastewater disposal from welfare facilities is considered to be **Medium**. Construction / Decommissioning foul water will not be discharged into a watercourse under any circumstances and therefore the magnitude of impact and significance of this effect is considered to be **Negligible.**

Operation

Effects on Flood Risk and Drainage

Increase in Permanent Impermeable Area

10.6.17 Given the nature of the Scheme, the increase in permanent impermeable area on the Site will be negligible, however equipment such as the proposed substations and energy storage areas will generate increased surface water runoff when compared to the current use of the Site. This could potentially increase localised pluvial flooding on the Site, as well as increase flood risk to people and property in the immediate surrounding area and downstream.

10.6.18 The sensitivity of people and property is considered **Medium.** Whilst the effects would be temporary and short term, this is considered to have an effect of **Medium Adverse** magnitude to people and property as it could occur at time of high flood risk (e.g. during a large storm event). The significance of effect is **Major Adverse,** which is considered to be **Significant** in EIA terms**.**

Increase in Discharge to Local Watercourse

10.6.19 An increase in the volume of water discharged to local watercourses has the potential to increase the flood risk to areas downstream of the Scheme.

10.6.20 The sensitivity of people and property is considered **Medium.** Whilst the effects would be temporary and short term, this is considered to have an effect of **Medium Adverse** magnitude to people and property (considered to be up to very high importance) occurring at time of high flood risk (e.g. during a large storm event) due to the potential risks and hazard (loss of life) and the potential economic damages. Therefore the significance of effect is **Major Adverse,** which is considered to be **Significant** in EIA terms**.**.

Blockage of Drainage Networks

10.6.21 There is the potential for mud and debris arising from the construction / decommissioning works to enter the existing surface water / land drainage system, causing blockages and restricting flow. This could result in localised flooding on site, especially after heavy or prolonged rainfall. As the Site is at present predominantly agricultural the initial effect is considered to be limited. Given the scale of the scheme as construction progresses the likelihood of significant construction effects increases.

10.6.22 The sensitivity of construction workers and equipment to mud and debris blockages is considered to be Medium. The potential for mud and debris to block drainage networks is considered to have an effect of **Low Adverse** magnitude on flooding to the Site itself and surrounding area which would result in flood risk to construction workers and equipment at the Site. The significance of effect is **Moderate Adverse,** which is considered to be **Significant** in EIA terms**.**

Summary

10.6.23 During construction / decommissioning there are a number of potential effects on surface water which require mitigation to reduce the residual effect to not significant levels, which are discussed below. During operation, the risk to the receptors will be mitigated through implementation of the embedded drainage discussed further below.

Effects on Water Resources

Diffuse Pollution Contained in Urban Runoff

10.6.24 The operation of the Scheme may negatively effect upon the local water environment. Urban runoff from the Site, along with the associated infrastructure, could contain diffuse urban pollutants such as hydrocarbons, heavy metals, and nutrients as well as debris and silt which could ultimately be discharged to the nearby watercourses via surface water runoff or infiltrate to ground. Without mitigation this could have a moderate adverse effect on water quality.

10.6.25 The sensitivity of surface water and groundwater bodies are therefore considered **Medium.** This is considered to have an effect of **Medium Adverse** magnitude on downstream watercourses. The significance of effect is **Moderate Adverse** for the local watercourses – including those within the Site - which is considered permanent if left unmitigated and considered **Significant** in EIA terms**.**

Diffuse Pollution Resulting from Fire

10.6.26 Given the nature of the Scheme there is a potential risk of fire which may negatively effect upon the local water environment. Runoff from the Site, along with the associated infrastructure, following a fire could contain diffuse urban pollutants such as hydrocarbons, heavy metals, as well as debris and silt which could ultimately be discharged to the nearby watercourses via surface water runoff or infiltrate to ground. Without mitigation this could have a moderate adverse effect on water quality.

10.6.27 The sensitivity of surface water and groundwater bodies are therefore considered **Medium**. This is considered to have an effect of **Medium Adverse** magnitude on downstream watercourses. The significance of effect is **Moderate Adverse** for the local watercourses – including those within the Site - which is considered permanent if left unmitigated and considered **Significant** in EIA terms.

Increase in Highway Routine Runoff

10.6.28 Traffic on existing roads to and from the Site will increase albeit negligibly as a result of the Scheme. Any increase in traffic flows could lead to the introduction of new sources (or changed discharges) of highway runoff into receiving watercourses. Surface water runoff from roads can contain pollutants such as hydrocarbons, heavy metals and inert particulates which can cause chronic pollution of the water environment if allowed to enter watercourses without the appropriate treatment.

10.6.29 Without mitigation this could have a **Low Adverse** effect on water quality, the sensitivity of surface water is therefore considered **Medium.** This is considered to have an effect of **Low Adverse** magnitude on downstream watercourses. The significance of effect is **Minor Adverse** for the local watercourses which is considered permanent if left unmitigated.

Increase in Highway Spillage Risk

10.6.30 Spillages of pollutants (e.g. oil) on highways can be transported to watercourses via runoff, where they could impact upon ecological life, or infiltrate to ground.

10.6.31 The receptors at risk are surface watercourses and groundwater bodies which are considered to be of **Medium** Sensitivity. Without mitigation the increase in highway spillage risk is considered to have an effect of a **Low Adverse** magnitude. The significance of effect is **Minor Adverse** which is considered permanent if left unmitigated.

Increased Demand on Water Supply

10.6.32 Due to the nature of the Scheme there is no demand for water. This is not directly considered to be a surface water quality effect, as it is unlikely that any required water would be sourced from local surface waters, and it is presumed that the Scheme would not proceed unless potable water was available from elsewhere.. Water consumption for any future Site users should be minimised through water efficiency measures.

10.6.33 The receptors at risk are surface water which are considered a **Low** sensitivity. The increased demand on water supply from the Scheme is considered to have an effect of **Negligible** magnitude (i.e. to locations where potable water supply is obtained from). The significance of effect is therefore **Negligible.**

Disposal of Surface and Foul Water from the Site

10.6.34 Access to the solar PV array during construction and operation will be taken from grassed/permeable tracks and existing farm tracks accessed from the wider highway network, limiting the requirement for new hardstanding.

10.6.35 The sensitivity on surface water is therefore considered **Medium**. This is considered to have an effect of **Medium Adverse** magnitude on downstream watercourses. The significance of effect is **Moderate Adverse** for the receiving watercourses which is considered permanent if left unmitigated and considered **Significant** in EIA terms.

10.6.36 Currently there is no known existing foul network on the Site or adjacent. Due to the nature of the Scheme waste water associated with welfare facilities at the substations will be contained in a septic tank to be emptied as and when required by tanker as there will be no foul drainage network associated with the Site.

Table 10.5: Flood Risk and Drainage summary of likely significant effects and receptors at risk if left unmitigated

Likely Significant Effect	Receptor(s)
Construction / Decommissioning Phase	
Mud and Debris Blockages	Flood risk to future people or property at the Site and surrounding areas. Construction workers and construction equipment
Temporary Increase in Impermeable Area	Flood risk to future people or property at the Site and surrounding areas. Construction workers and construction equipment
Compaction of Soils	Flood risk to future people or property at the Site and surrounding areas. Construction workers and construction equipment
Operational Phase	
Increase in Permanent Impermeable Area	Flood risk to future people or property at the Site and surrounding areas.
Increase in Discharge to Local Watercourses.	Flood risk to future people or property at the Site and surrounding areas.
Blockage of Drainage Networks	Flood risk to future people or property at the Site and surrounding areas.

Table 10.6: Water Resources summary of likely significant effects and receptors at risk if left unmitigated.

Likely Significant Effect	Receptor(s)
Construction / Decommissioning Phase	
Silt-laden Runoff	Local watercourses including those within and adjacent to the Site, groundwater bodies
Spillages, Leakages and Pollutants	Local watercourses including those within and adjacent to the Site, groundwater bodies
Inappropriate Wastewater Disposal from Welfare Facilities	Local watercourses including those within and adjacent to the Site
Operational Phase	
Diffuse Pollution Contained in Urban Runoff	Local watercourses including those within and adjacent to the Site, groundwater bodies

Diffuse Pollution Contained in Fire Water Runoff	Local watercourses including those within and adjacent to the Application Site, groundwater bodies
Increase in Highway Routine Runoff	Local watercourses including those within and adjacent to the Site
Increase in Highway Spillage Risk	Local watercourses including those within and adjacent to the Site, groundwater bodies
Increased Demand on Water Supply	Surrounding area
Disposal of Surface and Foul Water from the Site	Local watercourses including those within and adjacent to the Site

10.7 Embedded Mitigation

10.7.1 The following measures have been identified and adopted within the Scheme design and are considered to be embedded mitigation.

- 8m easements have been established around all watercourses, including Main Rivers and Ordinary Watercourses and 9 m from IDB assets.
- Beyond this, the separation of construction/decommissioning groundworks from drainage ditches has been maximised, particularly from the IDB maintained ditches onsite.
- Existing access tracks, where possible, will be retained, limiting the requirement to develop new access which can disturb soils and lead to compaction. Where new access tracks are required they have been designed to avoid crossing drainage ditches, where possible.
- The Outline Construction Environment Management Plan **[EN010133/APP/C7.1]** (CEMP) accompanying the application, describes water management measures to control surface water run-off and drain hardstanding and other structures during the construction, operation and decommissioning of the Scheme. This will form part of a Pollution Prevention Plan (PPP) to be implemented for the Scheme. In addition, a Water Management Plan (which will form part of a detailed CEMP) will include details of pre, during and post-construction water quality monitoring. This will be based on a combination of visual observations and reviews of the Environment Agency's automatic water quality monitoring network.
- The easements embedded into the design for watercourses, in conjunction with the CEMP, will avoid potential effects on the local receptors.
- It is also noted that, currently, the fields within the Core Study Area are typically used for arable farming, and are ploughed to within a closer distance of the ditches than the separations proposed for the Scheme. The "with Scheme"

scenario is therefore better in terms of drainage than the baseline scenario. The "with Scheme" scenario also does not include application of nitrates to the land, which is carried out periodically in the baseline scenario, and this will lead to further improvements in water quality in the "with Scheme" scenario compared to the baseline scenario.

- Access to the site during construction, operation and decommissioning will be taken from permeable and existing farm tracks accessed from the local highway network. This limits the potential for increased surface water runoff rates and sedimentation effects during construction / decommissioning.
- With regards to flood risk, the individual Sub-Sites which make up the Site have been assessed on the best available data for each Sub-Site. Based on the assessed flood risk the following embedded design has been implemented:
    - Critical infrastructure within the Scheme (the conversion units, substations and energy storage compounds) have been sequentially located within Zone 1, an area with a "Low probability of flooding" and therefore in land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%); and
    - Non-flood sensitive infrastructure forming the wider Scheme (PV arrays and cabling) have been sequentially located outside the 1 in 100 plus climate change annual probability extent (1% +CC) or where this is not possible restricted to areas which experience less than 1 m depth of flooding during the same event.
    - Flexibility for either tracker or fixed panels have been built into the EIA. Foundations are most likely to be galvanised steel poles driven into the ground. These will either be piles rammed into a pre-drilled hole, or a pillar attaching to a steel ground screw.
        - For both fixed and tracker panels all sensitive and electrical equipment on the solar panel will be elevated by the legs so that it is no less than 0.6 m above the surrounding peak flood level.
        - Tracker panel units will be mounted on raised frames (usually raised a minimum of 0.4m when on maximum rotation angle) and will therefore, be raised above surrounding ground levels and fitted with a tracking system. During times of flooding, solar panels may be stowed by the tracking system algorithm onto a horizontal plane, to the minimum post height of 2.3 m above ground level. This ensures that all sensitive and electrical equipment on the solar panel is raised to a minimum of 2.3 m above ground level in the horizontal position.
    - The design of the Scheme has ensured that the flood defences protecting the Scheme can be inspected and maintained by the operator of the Scheme to ensure their functionality throughout the lifetime of the Scheme.

10.8 Mitigation Measures

Mitigation by Design associated with Flood Risk and Drainage

Permanent Increase in Impermeable Area

10.8.1 Given the nature of the Scheme, the increase of permanent impermeable area on the Site will be negligible, however equipment such as the proposed substations and battery / energy storage areas will generate increased surface water runoff when compared to the current undeveloped nature of the Site. There can be no off-site detriment in terms of surface water runoff rates and volumes and therefore it is proposed to maintain the predevelopment surface water regime post development. This will be achieved through:

- Utilising permeable surfacing (Type 2 aggregate) for the Site access, ensuring that surface water is retained where it falls and is allowed to infiltrate to subsoils as per the existing situation.
- Installation of linear infiltration trenches around Critical infrastructure (the substations and energy storage compounds) or any other required hardstanding such as concrete bases. Infiltration trenches will ensure that any surface water generated by hardstanding is retained adjacent to the infrastructure, allowing it to infiltrate to subsoils as per the existing situation.
- The solar panels have the potential to concentrate rainfall under the leeward edge of the panels themselves. Research in the United States by Cook & McCuen[3], suggested this increase would not be significant however, there is a potential increase in silt ladened runoff. With the implementation of suitable planting (such as a wildflower or grass mix) the underlying ground cover is strengthened and is unlikely to generate surface water runoff rates beyond the baseline scenario.

10.8.2 Following implementation of the proposed mitigation the residual effect is considered to be **Negligible.**

Increase in Discharge to Local Watercourses

10.8.3 Maintaining the existing surface water run-off regime by utilising permeable surfacing for the Site access, linear infiltration trenches around any proposed infrastructure (substations and batteries) and wildflower planting at the leeward edge of solar panels will ensure that the Scheme is unlikely to generate surface water runoff rates beyond the baseline scenario.

10.8.4 The management train of any proposed SuDS will be designed appropriately so as not to exacerbate surface water risk from the Site. Suitability of the SuDS components will be determined in the detailed drainage design for the Scheme.

[3] "Hydrologic Response of Solar Farms." J. Hydrol. Eng., 18(5), 536–541. 2013

10.8.5 Following implementation of the proposed mitigation the residual effect is considered to be **Negligible.**

Mitigation by Design associated with Water Resources

Diffuse Pollution in Urban Runoff

10.8.6 The Scheme is likely to have a very-low pollution risk and so the management train should normally have one or two treatment stages. Generally, two treatment stages for run-off from access and one treatment stage for run-off from roofs are sufficient.

10.8.7 Where practical, at detailed design stage runoff from equipment and access tracks will be directed to permeable SuDS features with contributions being made from permeable surfacing, wildflower planting and linear infiltration trenches.

10.8.8 Inclusion of aforementioned features would provide sufficient treatment.

10.8.9 An overview of possible SuDS features and possible future maintenance are provided in the Drainage Strategy sections of the Flood Risk Assessment and Drainage Strategy included as Appendix 10.1 and the supporting Annexes.

10.8.10 Following the implementation of mitigation measures the residual effect is considered to be **Negligible**.

Diffuse Pollution Resulting from Fire

10.8.11 Given the nature of the energy storage within the scheme, there is a potential risk of fire which could result in the mobilisation of pollution within surface water run-off.

10.8.12 Where practical, at detailed design stage it is recommended that runoff from the energy storage area will be contained by local bunding and attenuated within gravel subgrade of lined permeable SuDS features prior to being passed forward to the local land drainage network. In the event of a fire a system of automatically self-actuating valves at the outfalls from the battery storage areas will be closed, isolating the battery storage areas drainage from the wider environment. The water contained by the valves will be tested and either treated and released or tankered off-site as necessary and in consultation with the relevant consultees at the time.

10.8.13 Local fire water provision has also been provided adjacent to the battery storage sites as requested by the fire department.

10.8.14 Inclusion of aforementioned features should provide sufficient mitigation should a fire event occur.

10.8.15 An overview of possible SuDS features and possible future maintenance are provided in the Drainage Strategy sections of the Flood Risk Assessment and Drainage Strategy included as Appendix 10.1 and the supporting Annexes.

10.8.16 Following the implementation of mitigation measures the residual effect is considered to be **Negligible**.

Increase in Highway Routine Runoff / Spillage Risk

10.8.17 No mitigation required beyond what is proposed in ES Chapter 14 Transport and Access **[EN010133/APP/C6.2.14]** is required. Mitigation may include adaptations porous surfacing or similar; this would be confirmed at detailed design.

10.8.18 The residual effect is considered **Negligible**.

Disposal of Surface Water and Foul Water from the Site

10.8.19 Maintaining the existing surface water run-off regime by utilising permeable surfacing for the Site access, linear infiltration trenches around any proposed infrastructure (substations and batteries) and wildflower planting at the leeward edge of solar panels will ensure that the Scheme is unlikely to generate surface water runoff rates beyond the baseline scenario.

10.8.20 The topography within the majority of the Site is relatively flat, meaning rainfall will tend to stay local to where it falls rather than running-off. In order to combat the effects of the concentration of water at the leeward edge of the solar panels, the area under the leeward edge should be seeded with a suitable grass / flower mix, to prevent rilling. With the implementation of suitable planting (such as a wildflower or grass mix) the ground cover is unlikely to generate surface water runoff rates beyond the baseline scenario.

10.8.21 Waste water associated with welfare facilities at the substations will be contained in a septic tank to be emptied as and when required by tanker as there will be no foul drainage network associated with the Site.

10.8.22 Following the implementation of mitigation measures the residual effect is considered to be **Negligible**.

10.8.23 Mitigation measures are summarised in Table 10.7 below.

Site Specific Mitigation associated with Flood Risk and Drainage

Mud and Debris Blockages

10.8.24 Where necessary a temporary drainage network will be installed prior to the commencement of construction and a robust maintenance plan, confirmed through a Construction Environmental Management Plan (CEMP), should be maintained throughout the duration of construction works on the Site. This is a precautionary and safeguarding approach to reduce the risk to the workers and help reduce the likelihood of the above significant effects. Similarly, during decommissioning a Decommissioning Environmental Management Plan (DEMP), should be maintained.

10.8.25 An Outline Construction Environment Management Plan **[EN010133/APP/C7.1]** and Outline Decommissioning Statement **[EN010133/APP/C7.2]** are submitted in support of the DCO application.

10.8.26 Following the implementation of mitigation measures the residual effect of mud and debris entering the surface water / land drainage system is considered **Negligible**.

Temporary Increase in Impermeable Area

10.8.27 Construction mitigation guidance should be adhered to, for example ensuring that the impermeable area on the Site is increased as little as possible and where necessary installing a temporary surface water drainage system during construction. This effect should lessen as the Scheme progresses and the overall impermeable area increases with surface water drainage networks installed to deal with this effect.

10.8.28 The residual effect, following the implementation of a temporary construction / Decommissioning drainage network, is considered to be **Negligible**.

Blockages of Drainage Networks

10.8.29 The drainage systems will be designed to good practice standards and the implementation of a robust maintenance plan will aid in ensuring that the risk of flooding as a result of blockages is reduced. A third-party management and maintenance team should be established to maintain the features throughout the lifetime of the Scheme.

10.8.30 Following the implementation of mitigation measures the residual effect is considered to be **Negligible**.

Additional Mitigation associated with Water Resources

Silt-laden Runoff

10.8.31 The following mitigation measures will be incorporated into the CEMP and DEMP for silt management and control:

- Works that are likely to generate silt-laden runoff (e.g. earthworks and excavations) will be done preferentially during the drier months of the year;
- During the construction / decommissioning phases, ideally easements of 10 m (where possible) should be preserved adjacent to all receptors to ensure that there is a sufficient buffer from the sensitive receptor to the construction stages of development;
- Site compounds and stockpiles will be located as far as possible (ideally at least 30 m) away from receptors;
- A drainage system will be developed to prevent silt-laden runoff from entering surface water drains, watercourses and ponds without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances;
- Earth stockpiles will be seeded as soon as possible, covered with geotextile mats or surrounding by a bund;
- Mud will be controlled at entry and exits to the Site using wheel washes and / or road sweepers;

- Tools and plant will be washed out and cleaned in designated areas within Site compound where runoff can be isolated for treatment before discharge to watercourse under appropriate consent;
- Debris and other material will be prevented from entering receptors; and
- Construction / decommissioning SuDS (such as temporary attenuation) to be used during construction / decommissioning if necessary.

Following the implementation of mitigation measures the residual effect is considered to be **Negligible**.

Spillages and Leaks of Pollutants

10.8.32 Measures to control the storage, handling and disposal of chemicals, fuels/oils and other substances will need to be put in place prior to and during construction / decommissioning. The following key mitigation measures relating to the control of spillages and leaks have been included in the CEMP.

- Fuel will be stored and used in accordance with the Control of Substances Hazardous to Health Regulations 2002, and the Control of Pollution (Oil Storage) (England) Regulations 2001;
- Fuel and other potentially polluting chemicals are to be stored in a secure impermeable and bunded area;
- Refuelling of plant to take place off the Site if possible, or only in a designated area at the Site compound ideally at least 20 m from receptors;
- Any plant / machinery / vehicles will be regularly inspected and maintained to ensure they are in good working order and clean for use in a sensitive environment. This maintenance is to take place off the Site if possible or only at designated areas in the Site compound;
- All fixed plant used on the Site to be self-bunded;
- Mobile plant to be in good working order, kept clean and fitted with drip trays where appropriate;
- An Emergency Response Plan will be prepared and included in the CEMP. Spill kits and oil absorbent material to be carried by mobile plant and located at vulnerable locations on the Site. Construction workers will receive spill response training;
- The Site is to be kept secure to prevent vandalism that could lead to a pollution incident;
- Construction / decommissioning waste / debris are to be prevented from entering any water body;
- Surface water drains on roads, other watercourse crossings or the core scheme compound area will be identified and where there is a risk that silt

laden runoff could enter them they will be protected (e.g. covers or sand bags); and

- Concrete wash water will be adequately contained and removed from the Site.

10.8.33 Following the implementation of the mitigation measures the residual effect is considered to be **Negligible**.

10.8.34 Mitigation measures are summarised in Table 10.7 below.

Table 10.7: Mitigation

Ref	Measure to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects	How measure would be secured	
		By Design	By DCO Requirement
	Maintaining the existing surface water run-off regime by utilising permeable surfacing for the Site access, linear infiltration trenches around any proposed infrastructure (substations and batteries) and wildflower planting at the leeward edge of solar panels	X	
	Where necessary install temporary drainage network prior to the commencement of construction / decommissioning and robust maintenance plan should be maintained throughout the duration of construction works on the Site.		X
	Any proposed drainage features such as permeable surfacing, infiltration trenches and wildflower planting should be designed to good practice standards and a robust maintenance plan should be implemented.	X	X
	Include silt management and control measures in the CEMP.		X
	Ensure measures to control the storage, handling and disposal of pollutants are put in place prior to and during construction included in the CEMP and during decommissioning in the DEMP.		X

10.9 In-Combination Effects

10.9.1 There are considered to be no cumulative effects from inter-topic relationships following respective mitigation that would cumulatively impact the Site.

10.10 Cumulative Effects

10.10.1 The potential for inter-project cumulative effects has been considered for the developments identified in **Appendix 2.3** of the ES 'Long List of Cumulative Assessment Sites' **[EN010133/APP/C6.3.2.3]**.

10.10.2 Of those developments listed, notable substantial projects in close proximity to the Scheme are:

- West Burton Solar Project (currently working to the same timescales as the Scheme);
- Gate Burton Energy Park (EIA scoping opinion issued December 2021 and PEIR published Summer 2022);
- Tillbridge Solar (EIA Scoping opinion request submitted to PINS October 2022).

Cumulative Effects during Construction

10.10.3 There is potential for overlap between construction of adjacent schemes and construction of this Scheme. Thus, there is the potential for short term, temporary construction related pollutants generated from both the Scheme and adjacent developments to impact on watercourses in the study area. However, provided that standard and good practice mitigation is implemented on the construction sites through their respective CEMPs and as per the conditions of the relevant planning permission, environmental permits and licences, as is being proposed for this Scheme, the cumulative risk can be effectively managed and there would not be a significant increase in the risks to any waterbodies. As such, there would not be any significant cumulative effects anticipated during construction on the basis of the above assessment.

Cumulative Effect during Operation

10.10.4 All developments listed above have been reviewed through the relevant planning portals and have been produced with relevant drainage strategies with reference to the relevant policies and guidance documents outlined in Section 10.3. In some instances the developments may not be at the application stage, however it must be assumed that they will be supported by appropriate flood risk assessments and drainage strategies in line with relevant guidance and best practice. The Scheme assessed in this chapter will similarly be designed to ensure no long-term deterioration in water quality or increase in flooding. Attenuation and treatment will be provided where necessary for runoff from the Scheme prior to discharge to waterbodies or ground. As such, provided that all the mitigation measures are implemented for all schemes, then the cumulative impacts from the Scheme and any cumulative schemes are not anticipated to produce any significant effects.

10.11 Residual Effects

10.11.1 With the embedded design measures described above and those within the CEMP, all identified potential effects have been assessed as being of **negligible significance**, and therefore not significant in terms of the EIA Regulations.

10.11.2 No further mitigation is proposed.