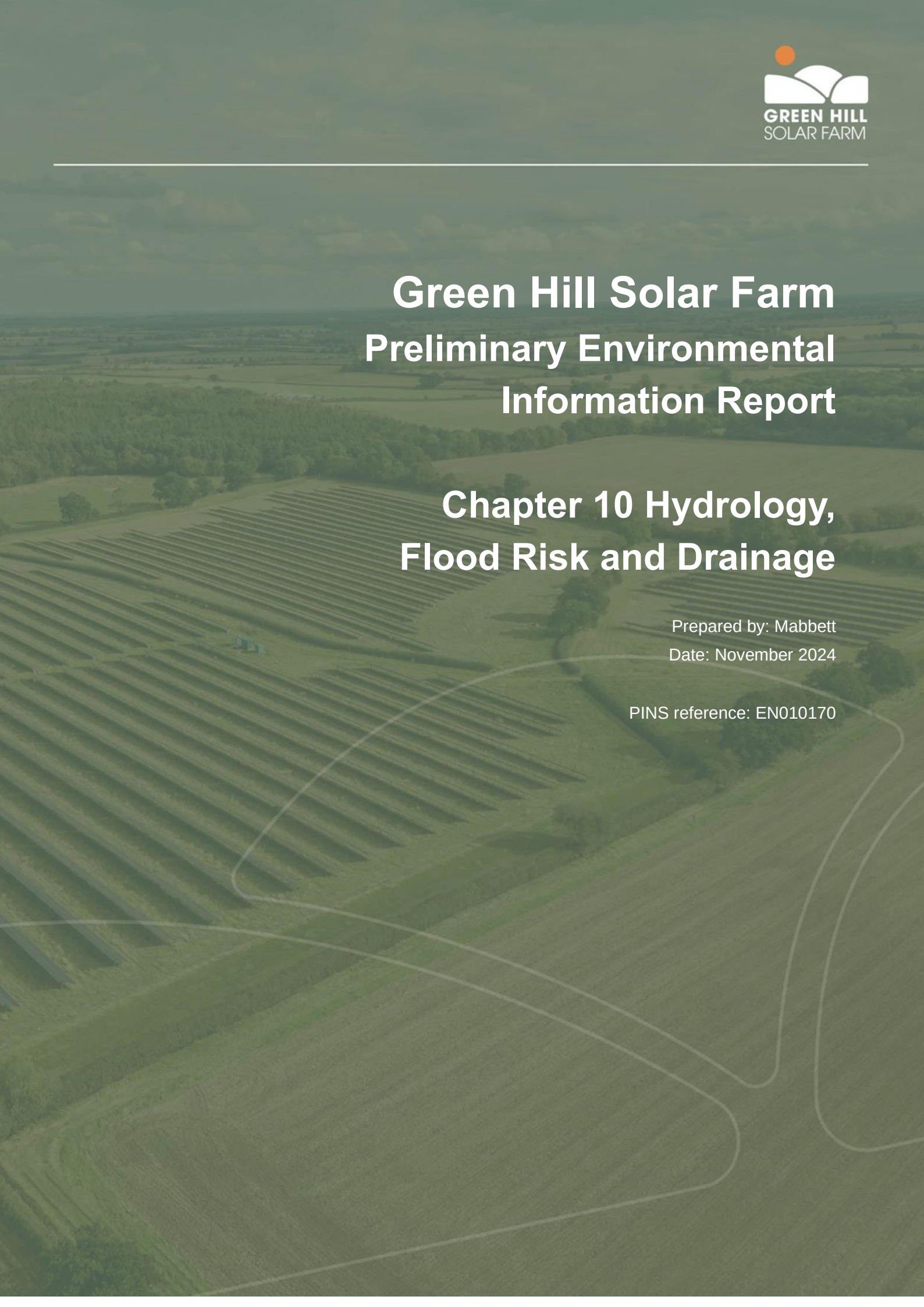

# Green Hill Solar Farm

## Preliminary Environmental Information Report

## Chapter 10 Hydrology, Flood Risk and Drainage

Prepared by: Mabbett

Date: November 2024

PINS reference: EN010170

# Contents

# 10 Hydrology, Flood Risk and Drainage

## 10.1 Introduction

10.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) undertaken to date concerning the potential impacts of the Scheme on Hydrology, Flood Risk and Drainage during the construction, operational 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; and
- Artificial sources (sewers, reservoirs, and canals).

10.1.2 Paragraphs 5.8.13 to 5.8.15 of National Policy Statement (NPS) for Energy 'The Overarching NPS for Energy' (EN-1) provide the criteria whereby a site-specific Flood Risk Assessment is required.

Ref.1 The Scheme is over 1ha in size and therefore requires a Flood Risk Assessment to support the DCO application in line with the criteria in EN-1 and footnote 59 of the National Planning Policy Framework (NPPF) (Ref.1). Surface water management is also a key consideration for the Scheme with regards to both surface water and water quality control to appropriately manage any on or off-site impacts to flood risk and/or water quality.

10.1.3 Further details about the Scheme are set out in **Chapter 4: Scheme Description** of this PEIR.

### Appendices and Figures

10.1.4 This chapter is supported by the following appendices in **PEIR Volume 2**:

- **Appendix 10.1**: Flood Risk Assessment and Drainage Strategy.

10.1.5 This chapter is supported by the following figures:

- **Figure 10.1**: Green Hill A and Green Hill A.2 – Flood Risk and Drainage;
- **Figure 10.2**: Green Hill B – Flood Risk and Drainage;
- **Figure 10.3**: Green Hill C – Flood Risk and Drainage;
- **Figure 10.4**: Green Hill D – Flood Risk and Drainage;
- **Figure 10.5**: Green Hill E – Flood Risk and Drainage;
- **Figure 10.6**: Green Hill F – Flood Risk and Drainage;
- **Figure 10.7**: Green Hill G – Flood Risk and Drainage;
- **Figure 10.8:** Green Hill BESS – Flood Risk and Drainage; and
- **Figure 10.9 and 10.9.1 to 10.9.14:** Green Hill Cable Route Search Area

10.1.6 A separate set of figures has been created to show the Cable Route Search Area (CRSA); however, it can also be seen within each Site-specific figure. The Cable Corridor is yet to be confirmed, and the draft Flood Risk Assessment and Drainage Strategy report (Annex A) assesses the CRSA as is. Therefore, it will need to be refined at a later date.

10.1.7 This chapter is supported by the following tables:

- Table 10.1: Summary of Consultation and Responses;
- Table 10.2: Sensitivity of the Identified Environmental Receptor;
- Table 10.3: Methodology for Determining Impact Magnitude;
- Table 10.4: Methodology for Determining Significant Effects;
- Table 10.5: Likely Significant Effects and Receptors at Risk if Left Unmitigated; and
- Table 10.6: Water Resources Summary of Likely Significant Effects and Receptors at risk if left.

## 10.2 Consultation

10.2.1 An EIA Scoping Report was submitted to the Planning Inspectorate (PINS) in August 2024, with a formal request for Scoping Opinion. PINS subsequently issued the Scoping Opinion on the proposed scope in September 2024. Consultation undertaken throughout the pre-application and scoping phase for the Scheme has informed the approach to the Hydrology, Flood risk and Drainage assessment and the information provided within this chapter.

10.2.2 A summary of consultation and response to the Scoping Report are outlined below in **Table 10.1**.

**Table 10.1: Summary of Consultation and Responses**

| Consultee | Consultation to date | Outcome and any further steps anticipated |
|---|---|---|
| Environment Agency<br><br>Ongoing Engagement | A discussion was held with the Environment Agency on 01/07/2024 on the Scheme, including the approach for this assessment.<br><br>The form of the reporting of the hydrology, flood risk and drainage matters were discussed and is in line with the methodology considered in this document.<br><br>The disapplication of environmental permitting for river crossings was also discussed, this would enable a standard methodology to be agreed so that individual permit applications for river crossings will not be required.<br><br>Further EA comments have been included in Appendix 2 of the Scoping Opinion Report. The main flood risk points from the report to consider will be discussed below.<br><br>A 75-year timeframe should be applied rather than the 60 year lifetime proposed. An upper end allowance for the 2080s epoch should be used as a sensitivity test. Additionally, the Scheme (particularly the cable routing) may require Flood Risk Activity Permits.<br><br>The EA do not have hydraulic modelling for the Ordinary Watercourses, and the Main River modelling that they do have | The following points from the Environment Agency (EA) have been fully addressed in our Flood Risk Assessment and Drainage Strategy:<br><br>We have aligned the reporting methodology for hydrology, flood risk, and drainage with the approach discussed with the EA.<br><br>We have applied the EA's recommendation for a 75-year timeframe and used the upper end allowance for the 2080s epoch as a sensitivity test.<br><br>The potential flood risk from unmodelled Ordinary Watercourses has been assessed with additional analysis, given the limitations in the EA's hydraulic modelling.<br><br>The BESS site has been subject to detailed hydraulic modelling and is designed to be located outside the 1% AEP +CC flood extents, ensuring resilience to future flood |

| Consultee | Consultation to date | Outcome and any further steps anticipated |
|---|---|---|
| | (River Nene and Grendon Brook) is based on 2d modelling conducted in 2004 using JFLOW. It is worth noting, areas that appear to be in no Flood Zones around the Ordinary Watercourses, may be at risk due to the Flood Map for Planning mapping catchments >3km$^2$. The EA recommend further analysis to ensure flood risk is properly considered.<br><br>The report also highlights the proposed BESS should be raised and sequentially located. It is recommended that the BESS location has further consultation, and if it is placed within Flood Zone 2 and 3, it should be designed to sit above 1% AEP +CC for the 2080s scenario. Any loss of floodplain should be mitigated by level for level and volume for volume compensation. Furthermore, BESS fires are a risk to groundwater, therefore a pollution control method is recommended and should be scoped into the EIA. | events. Floodplain loss has been mitigated with level-for-level and volume-for-volume compensation.<br><br>Pollution control measures for BESS fires have been specifically assessed.<br><br>These points have been fully considered in the Flood Risk Assessment and Drainage Strategy. |
| North Northamptonshire Council - Lead Local Flood Authority (LLFA)<br><br>Ongoing Engagement | Information regarding the Scheme has been supplied to the LLFA and a consultation request was issued by the Applicant on 28/05/24 to discuss the Scheme.<br><br>The LLFA responded providing responses to queries and indicated further information would be provided along with requesting a meeting.<br><br>Further LLFA comments have been included in Appendix 2 of the Scoping Opinion Report. The North Northamptonshire Council Comments have been discussed below.<br><br>Flood risk mitigation should follow the order of avoid, minimise or reduce impact and remedy or compensate.<br><br>The Environmental Statement should consider the cumulative effect of other large scale solar schemes in operation within the council district. | A subsequent meeting is to be scheduled.<br><br>Surface water risk will be assessed and presented within the Flood Risk and Drainage Strategy included as an Appendix to the ES Chapter. |
| West Northamptonshire Council - Lead Local Flood Authority (LLFA)<br><br>Ongoing Engagement | A discussion was held with the LLFA on 19/06/2024 about the Scheme's impact on ordinary watercourses and local surface water flooding. The LLFA have requested assurance that the proposed development will not cause an offsite detriment and, whilst acknowledging the necessity of low impact development, | Surface water risk will be assessed and presented within the Flood Risk and Drainage Strategy included as an Appendix to the ES Chapter. |

| Consultee | Consultation to date | Outcome and any further steps anticipated |
|---|---|---|
| | wanted a consideration of local flow paths.<br><br>West Northamptonshire Council had no comments for flood risk within the Scoping Opinion Report. | |
| Milton Keynes City Council - Lead Local Flood Authority (LLFA)<br><br>Ongoing Engagement | Information regarding the Scheme has been supplied to the LLFA and a consultation request has been issued by the Applicant on 18/06/2024 to discuss the Scheme.<br><br>A response is awaited.<br><br>Milton Keynes City Council had no comments for flood risk within the Scoping Opinion Report.<br><br>A response was received for the consultation on 17/09/2024, which has been acknowledged as being after the Scoping Opinion Report and has been addressed separately. The comments in relation to flood risk have been discussed below.<br><br>Lavendon is a Critical Drainage Catchment and the LLFA state that the Scheme should investigate existing risk to the surrounding areas. Additionally, although solar farms are considered to have a low risk to surface water, it is only the case when mitigation is considered. SuDS should be considered and a supporting land management plan to ensure the land remains in good condition is required.<br><br>The incorporation of permeable surfacing is sound, however, the overall impermeable area to calculate the required volume of storage should include any areas of permeable surfacing. The use of this will not entirely replicate the greenfield situation. | N/A |

## 10.3 Legislation, Planning Policy, and Guidance

10.3.1 This section provides an overview of the legislation, planning policy and guidance against which the Scheme will be considered for Hydrology, Flood Risk and Drainage.

### Legislation

**European Legislation**

*The Water Environment Framework Directive (WFD)(England & Wales) Regulations 2017*

10.3.2 The Water Framework Directive (WFD) (Ref.2), stablishes a framework for Community action in the field of water policy. The WFD relevantly seeks to enhance the status of aquatic ecosystems,

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

*The Groundwater Directive (2006/118/EC as amended)*

10.3.3 The Groundwater Directive (2006/118/EC as amended) (Ref.3) is a 'Daughter Directive' to the WFD and addresses the protection of groundwater against deterioration and pollution caused by certain dangerous substances and places an obligation on member states to prevent pollution of groundwater by substances including hydrocarbons and to control the introduction of named metals, including copper. It establishes specific measures as provided for in the WFD to prevent and control groundwater pollution. It also defines criteria for the assessment of good groundwater chemical status.

*The Flood Risk Regulations 2009 implement the EU Directive on the assessment and management of flood risks [2007/60/EC] (the 'Flood Directive')*

10.3.4 The Flood Risk Regulations 2009 implement the EU Directive on the assessment and management of flood risks [2007/60/EC] (the 'Flood Directive') (Ref.4), The Flood Directive requires member states to develop and update 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
- Coordination of flood risk management with the WFD.

*The Nitrates Directive (91/676/EEC) (the 'Nitrates Directive')*

10.3.5 The Nitrates Directive (91/676/EEC) (the 'Nitrates Directive') (Ref.5), aims to reduce nitrate concentrations from agriculture entering water systems.

**UK Legislation**

*The Land Drainage Act 1991*

10.3.6 The Land Drainage Act 1991 (Ref.6), places responsibility for maintaining flows in watercourses on landowners. Classified watercourses maintained by the Environment Agency (EA) are termed 'Main Rivers'. The EA has powers to control works in, over, under, on the banks of, within 7m to 10m of the top of the bank of the river, and of all floodplain areas through the issuing of Land Drainage Consents.

10.3.7 The EA is responsible for assessing farmers' compliance with measures in Nitrate Vulnerable Zones (NVZs).

*The Environmental Permitting (England and Wales) Regulations 2016*

10.3.8 Regulation 12 of the Environmental Permitting (England and Wales) Regulations 2016 (Ref.7), prohibits a person from causing or knowingly permitting a water discharge activity or groundwater activity except under and to the extent authorised by an environmental permit. Relevantly, a 'water discharge activity' is defined in the Act as the discharge or entry to inland freshwaters, coastal waters or relevant territorial waters of any poisonous, noxious or polluting matter, waste matter, or trade effluent or sewage effluent (regulation 2 and paragraph 3 of Schedule 21). The regime for environmental permits is also set out in the Environmental Permitting (England and Wales) Regulations 2016.

*The Flood and Water Management Act (2010)*

10.3.9 The Flood and Water Management Act 2010 (Ref.8), 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 (SuDS) by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SuDS for new developments and redevelopments.

*The Nitrates Directive (91/676/EEC)(the "Nitrates Directive") and the Nitrate Pollution Prevention Regulations 2015*

10.3.10 The Nitrates Directive (91/676/EEC) (the 'Nitrates Directive') (Ref.5), aims to reduce nitrate concentrations from agriculture entering water systems

10.3.11 The Nitrates Directive is implemented by the Nitrate Pollution Prevention Regulations 2015 (Ref.9), which include:

- 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.

*Building Regulations (2010) Part H of Schedule 1 ('Building Regulations Part H')*

10.3.8 Buildings Regulations Part H (Ref.10), provide guidance in terms of foul drainage, wastewater treatment systems and cesspools, rainwater drainage, building over sewers, separate systems for surface water and foul waste disposal.

10.3.9 In relation to flood risk, Buildings Regulations Part H sets out a hierarchy of where surface water should discharge. This hierarchy should be followed where practicable and is listed below.

10.3.10 Infrastructure protocol states that a designer should consider the following in order of preference before finalising a surface water design statement for the development:

- Discharge to SuDS devices, e.g. an adequate soakaway or some other adequate infiltration system;
- Discharge to a watercourse or where this is not reasonably practicable, and
- Discharge to a public sewer network.

## Planning Policy

### National Planning Policy

*National Policy Statement (NPS) for Energy*

*The Overarching NPS for Energy (EN-1)*

10.3.11 The Overarching NPS for Energy (EN-1) (Ref.11), designated by the Department for Energy Security and Net Zero (DESNZ) in January 2024, sets out objectives for the development of nationally significant infrastructure in a particular sector and provides the legal framework for planning decisions.

*10.3.12* Specific policy relating to Flood Risk is set out in Section 5.8 of NPS EN-1.

10.3.13 NPS EN-1, paragraph 5.8.13, requires Site-specific flood risk assessments for all energy projects located in Flood Zones 2 and 3 in England. For projects located in Flood Zone 1, an assessment is required for all proposals that involve:

- *sites of 1 hectare of more;*
- *land which has been identified by the EA 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.*

*10.3.14* Relevant factors for the Secretary of State to consider when determining an application for development consent are listed at paragraph 5.8.36 of that section. Paragraph 5.8.36 states: '*in determining an application for development consent, the Secretary of State should be satisfied that where relevant:*

- *The application is supported by an appropriate FRA;*
- *The Sequential Test has been applied and satisfied as part of the 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;*
- *Sustainable drainage systems (SuDS) (as required in the next paragraph on National Standards) have been used unless there is clear evidence that their use would be inappropriate*
- *In flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere (subject to the exceptions set out in paragraph 5.8.18)*
- *The project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development*
- *Land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance*'.

10.3.15 Paragraphs 5.8.9 to 5.8.12 and 5.8.21 to 5.8.23 of NPS EN-1 relevantly provide that:

- Paragraph 5.8.9 – "If, following application of the Sequential Test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied, as required by Annex 3 of the Planning Practice Guidance. The test provides a method of allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.*"*
- Paragraph 5.8.10 – "The Exception Test is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site. It would only be appropriate to move onto the Exception Test when the Sequential Test has identified reasonably available, lower risk sites appropriate for the proposed development where, accounting for wider sustainable development objectives, application of relevant policies would provide a clear reason for refusing development in any alternative locations identified. Examples could include alternative site(s) that are 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) which would not usually be considered appropriate.*"*

- Paragraph 5.8.11 – “Both elements of the Exception Test will have to be satisfied for development to be consented. To pass the Exception Test it should be demonstrated that:
    - The project would provide wider sustainability benefits to the community that outweigh flood risk; and
    - The project will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible will reduce flood risk overall.”
- Paragraph 5.8.12 – “Development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate change throughout the lifetime of the development. There should be no net loss of floodplain storage, and any deflection or constriction of flood flow routes should be safely managed within the site. Mitigation measures should make as much use as possible of natural flood management techniques.”
- Paragraph 5.8.21 – “The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites with medium risk areas and then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas.”
- Paragraph 5.8.22 – “The technology specific NPSs set out some exceptions to the application of the Sequential Test. However, when seeking development consent on a site allocated in a development plan through the application of the Sequential Test, informed by a strategic flood risk assessment, applicants need not apply the Sequential Test, provided the proposed development is consistent with the use for which the site was allocated and there is no new flood risk information that would have affected the outcome of the test.”
- Paragraph 5.8.23 – “Consideration of alternative sites should take account of the policy on alternatives set out in Section 4.2 above. All projects should apply the Sequential Test to locating development within the site.”

*National Policy Statement for Renewable Energy Infrastructure (EN-3)*

10.3.16 Paragraph 2.4.11 states that “Solar photovoltaic (PV) sites may also be proposed in low lying exposed sites. For these proposals, applicants should consider, in particular, how plant will be resilient to:

- increased risk of flooding; and
- impact of higher temperatures.”

10.3.17 Paragraph 2.10.16 indicates that “Associated infrastructure may also be proposed and may be treated, on a case by case basis, as associated development, such as energy storage, electrolysers associated with the production of low carbon hydrogen, or security arrangements (which may encompass flood defences, fencing, lighting and surveillance).”

10.3.18 Paragraph 2.10.60 states that “As set out above applicants will consider several factors when considering the design and layout of sites, including proximity to available grid capacity to accommodate the scale of generation, orientation, topography, previous land–use, and ability to mitigate environmental impacts and flood risk.”

10.3.19 Paragraphs 2.10.84 – 2.10.88 relevantly provide that:

10.3.20 Paragraph 2.10.84 – “Where a Flood Risk Assessment has been carried out this must be submitted alongside the applicant's ES. This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not, in general, be significant.”

10.3.21 Paragraph 2.10.85 – "Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control any run-off where recommended."

10.3.22 Paragraph 2.10.86 – "Given the temporary nature of solar PV farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses."

10.3.23 Paragraph 2.10.87 – "Culverting existing watercourses/drainage ditches should be avoided."

10.3.24 Paragraph 2.10.88 – "Where culverting for access is unavoidable, applicants should demonstrate that no reasonable alternatives exist and where necessary it will only be in place temporarily for the construction period."

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

10.3.25 The NPS for Electricity Networks Infrastructure (EN-5) (Ref.12), was designated by DESNZ in January 2024. It forms part of the suite of energy NPSs and is to be read in conjunction with NPS EN-1 and EN-3.

10.3.26 Paragraph 2.3.2 of NPS EN-5 confirms, with regards to Climate Change Adaptation and Resilience, that applicants should set out the *"extent that the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to: flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change"*.

*National Planning Policy Framework (NPPF)*

10.3.27 The revised National Planning Policy Framework (NPPF) was last updated in December 2023. It should be read in conjunction with the National Planning Practice Guidance (NPPG) (Ref.13).

10.3.28 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.

10.3.29 In relation to flood risk, inappropriate development in areas at high risk of flooding should be avoided by directing development away from areas at the highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere and considering the effects of climate change.

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

- All proposals involving sites of 1 hectare or greater in Flood Zone 1;
- All development in Flood Zones 2 and 3;
- All proposals involving land within Flood Zone 1 which has been identified by the EA as having critical drainage problems;
- All proposals involving land within Flood Zone 1 identified in a strategic flood assessment as being at increased flood risk in future; and
- All proposals involving land within Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

**Local Planning Policy**

10.3.31 Green Hill A, A.2 and B are located within the West Northamptonshire Council administrative boundary. Green Hill C, D, E, F and the BESS Site are located within the North Northamptonshire Council administrative boundary. Green Hill G Is located within Milton Keynes City Council

administrative boundary. The Cable Route Search Area falls within all three of the above administrative boundaries.

*The West Northamptonshire Joint Core Strategy Local Plan*

10.3.32 The West Northamptonshire Joint Core Strategy Local Plan (Part 1) (Ref.14), (produced as a partnership of Northampton Borough Council, Daventry District Council and South Northamptonshire and Northamptonshire County Councils), adopted in December 2014, contains the following policies in relation to flood risk and drainage:

*Policy BN7 – Flood Risk*

*10.3.33* '*Development proposals will comply with flood risk assessment and management requirements set out in the national planning policy framework and planning practice guidance and the West* Northamptonshire *strategic flood risk assessments to address current and future flood risks with appropriate climate change allowance.*

*10.3.34 A sequential approach will be applied to all proposals for development in order to direct development to areas at the lowest probability of flooding unless it has met the requirements of the sequential test and the exception test as set out within Table 6.*

*10.3.35 All new development, including regeneration proposals, will need to demonstrate that there is no increased risk of flooding to existing properties, and proposed development is (or can be) safe and shall seek to improve existing flood risk management.*

*10.3.36 All proposals for development of 1 hectare or above in Flood Zone 1 and for development in 2, 3a or 3b must be accompanied by a flood risk assessment that sets out the mitigation measures for the site and agreed with the relevant authority.*

*10.3.37 A flood risk assessment must also accompany proposals where it may be subject to other sources, and form, of flooding or where other bodies have indicated that there may be drainage problems.*

*10.3.38 In order to meet the exception test development must:*

- *Demonstrate that the development provides wider sustainability benefits to the community that outweigh the flood risk;*
- *Be located on [previously] developed land; and*
- *Be accompanied by a site specific flood risk assessment that demonstrates that the development will be safe for its lifetime without increasing flood risk elsewhere and where possible, reduce flood risk overall*

*10.3.39 Where flood risk management requires the use of sustainable drainage systems to manage surface water run-off, these should:*

*a) Separate surface water from foul and combined sewer;*

*b) Be accompanied by a long-term management and maintenance plan; and*

*c) Protect and enhance water quality.*

*10.3.40 The design standard for the upper Nene catchment (through Northampton and within the Nene catchment upstream of Northampton) is the 0.5% probability (1 in 200 chance of occurring in any year) event plus climate change. Surface water should be provided up to this standard'.*

10.3.41 Northamptonshire County Council has identified within their 'Local Standards And Guidance For Surface Water Drainage In Northamptonshire' (Ref.15), document that all development should be accompanied by a Sustainable Drainage Strategy. The guidance document states;

- The '*Local Standards and Guidance for Surface Water Drainage in Northamptonshire', August 2016, states that: 'Where reasonably practicable, for greenfield development, the*

*runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year 6 hour rainfall event should never exceed the greenfield runoff volume for the same event….Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body… the runoff volume must be discharged at a rate that does not adversely affect flood risk…. Evidence would need to be provided to support a higher volume of discharge and would have to be agreed by the relevant sewerage undertaker, Environment Agency, Internal Drainage Board or Canal and River Trust (where appropriate).*'

- '*…Flow across the site must be diverted away from buildings and main access-egress routes… Any infiltration storage features should be capable of half emptying within 24 hours of the rainfall event…. The risk of high groundwater levels must be accounted for in the design of infiltration drainage*…'

10.3.42 The submitted documents shall identify sources of water entering the site pre-development, how flows will be routed through the site, where flows leave the site pre-development and where they will leave post development. This should include details of flows from all catchments and sub-catchments discharging into, through and from the site. Any changes to the locations of these sources and points of discharge must be agreed with adjacent landowners or responsible authorities and written agreement from these parties must be provided at the time of application.

10.3.43 At least one surface feature should be deployed within the drainage system for water quality purposes, or more features for runoff which may contain higher levels of pollutants in accordance with the CIRIA SuDS Manual C753. Only if surface features are demonstrated as not viable, the approved proprietary engineered pollution control features such as vortex separators, serviceable / replaceable filter screens, or pollution interceptors may be used. Soakaways and other infiltration SuDS must not be constructed in contaminated ground.'

*The North Northamptonshire Joint Core Strategy*

10.3.44 The North Northamptonshire Joint Core Strategy 2011-2031 (Ref.16), adopted in July 2016, contains the following policies in relation to flood risk and drainage:

*Policy 5- Water Environment, Resources and Flood Risk Management*

*10.3.45* '*Development should contribute towards reducing the risk of flooding and to the protection and improvement of the* quality *of the water environment. This will be achieved through the following criteria:*

*i. Development should, wherever possible, be avoided in high and medium flood risk areas through the application of a sequential approach considering all forms of flooding for the identification of sites and also the layout of development within site boundaries;*

*ii. Development should meet a minimum 1% (1 in 100) annual probability standard of flood protection with allowances for climate change unless local studies indicate a higher annual probability, both in relation to development and the measures required to reduce the impact of any additional run off generated by that development to demonstrate that there is no increased risk of flooding to existing, surrounding properties;*

*iii. Development should be designed from the outset to incorporate SuDS wherever practicable, to reduce flood risk, improve water quality and promote environmental benefits;*

*iv. Where appropriate, development should, subject to viability and feasibility, contribute to flood risk management in North Northamptonshire;*

*v. Following any identified mitigation, development that would lead to deterioration or may compromise the ability of a water body or underlying groundwater to meet good status standards in the Anglian River Basin Management Plan (required by the WFD) is unlikely to be permitted;*

vi. *Development will only be permitted where it can be demonstrated that adequate and appropriate water supply and wastewater infrastructure is available (or will be prior to occupation)*.'

*The Local Plan for Milton Keynes, Plan:MK*

10.3.46 The new Local Plan for Milton Keynes, Plan:MK (Ref.17), was adopted by Milton Keynes Council at its meeting on the 20 March 2019. Plan:MK now forms part of the Council's Development Plan and replaces both the Core Strategy (2013) and saved policies of the Local Plan (2005). Plan:MK includes the following policies related to flood risk and drainage:

*Policy FR1 Managing Flood Risk*

*A.* '*All new development must incorporate a surface water drainage system with acceptable flood control and demonstrate that water supply, foul sewerage and sewage treatment capacity is available or can be made available in time to serve the development. Suitable access is safeguarded for the maintenance of water supply and drainage infrastructure.*

*B. Plan:MK will seek to steer all new development towards areas with the lowest probability of flooding. The sequential approach to development, as set out in national guidance, will therefore be applied across the Borough, taking into account all sources of flooding as contained within the Council's Strategic Flood Risk Assessment (SFRA).*

*C. Development within areas of flood risk from any source of flooding, will only be acceptable if it is clearly demonstrated that it is appropriate at that location, and that there are no suitable available alternative sites at a lower flood risk.*

*D. Development proposed in an area at risk of flooding will be required:*

*1. To be supported by a site-specific Flood Risk Assessment (FRA) (subject to the triggers set out below);*

*2. To take into account all forms of flooding including, but not limited to: fluvial, groundwater, surface water and reservoir flooding;*

*3. To ensure that opportunities to reduce the causes and impacts of flooding to the site and the surrounding area are taken as far as possible, in order to improve the existing situation, taking into account climate change. At a minimum, proposals will need to demonstrate no increase in flood risk to the site or surrounding area;*

*4. To clearly demonstrate that the benefits of the development to the community, outweigh the risk of flooding when applying the sequential test and exception test (where required);*

*5. When applying the sequential test, to clearly demonstrate that the impacts of climate change are taken into account;*

*6. To demonstrate the application of a sequential approach to the site design and layout to ensure highest vulnerability land uses are located within areas of the site at lowest risk of flooding;*

*7. To build resilience into a site's design;*

*8. To ensure that a site's design and any flood mitigation measures implemented are designed with an allowance for climate change and the potential impact it may have over the lifetime of the proposed development(31);*

*9. To provide a safe access and egress route for future users of the development; and*

*10. To attenuate surface water run-off in line with Policy FR2.*

11. *To consult the Fire and Rescue Service as to the feasibility of undertaking rescue and recovery operations during and in the aftermath of flooding events.*

E. *A site-specific FRA will be required for:*

1. *All sites of 1ha or more in Flood Zone 1;*
2. *All sites within Flood Zone 2 or 3;*
3. *All sites highlighted as being at high risk from surface water flooding, or which are located within a Critical Drainage Catchment (CDC), as identified in the Milton Keynes Surface Water Management Plan. In this case the FRA will be required to demonstrate that the development will not increase the flood risk to the CDC and where possible will provide an improvement to the existing situation.*

F. *The FRA should include an assessment of flood risk to and from the proposed development, and demonstrate how the development will be safe, will not increase flood risk elsewhere and where possible will reduce flood risk overall in accordance with the NPPF and PPG*.'

*Policy FR2 Sustainable Drainage Systems (SUDS) and Integrated Flood Risk Management*

A. '*Plan:MK advocates the continuation of a strategic, integrated approach to managing flood risk which seeks the management of surface water to be planned at the largest appropriate scale for the new development and incorporated into the site at the earliest opportunity in the design process.*

B. *New development is required to incorporate SuDS; in line with national policy and guidance and, which meet the requirements set out in national standards and the Council's relevant local guidance. It is expected that:*

1. *Flood risk management and SuDS will be provided at a strategic scale and in an integrated manner, wherever possible;*
2. *Space will be specifically set aside for SuDS and fluvial flood risk reduction features and used to inform the overall layout of development sites;*
3. *Above ground attenuation will be provided in preference to below ground attenuation;*
4. *SuDS will be designed as multi-purpose green infrastructure and open space, to maximise additional environmental, biodiversity, social and amenity value, wherever possible. The use of land to provide flood storage capacity should not conflict with required amenity and recreation provision - floodplains and floodplain habitats should be safeguarded;*
5. *SuDS will be designed with an allowance for climate change and the potential impact it may have over the lifetime of the proposed development;*
6. *Proposals for development within Critical Drainage Catchments, as identified in the Milton Keynes Surface Water Management Plan, should investigate the potential for the site to reduce or mitigate existing risk in the surrounding area;*
7. *All surface water drainage proposals for new development must include full details of the means of achieving future management, maintenance and adoption of the systems, prior to approval of any planning permission, to ensure that it will function effectively over the lifespan of the development. This will include details of funding and should be formulated through discussion with the relevant responsible bodies, including Milton Keynes Council, The Parks Trust, Anglian Water and the Internal Drainage Board;*

8. *Development will ensure no adverse impact on the functions and setting of a watercourse and its associated corridor;*

9. *Development should avoid building over or culverting watercourses, encourage the removal of existing culverts and seek opportunities to create wetlands and wet grasslands and woodlands and restore natural river flows and floodplains*.'

*Policy FR3 Protecting and Enhancing Watercourses*

A. '*All new development must be set back at a distance of at least 8 metres from any main rivers, at least 9 metres from all other ordinary watercourses, or at an appropriate width as agreed by the Environment Agency, Lead Local Flood Authority or Internal Drainage Board, in order to provide an adequate undeveloped buffer zone. Development that restricts future de-culverting of waterways should be avoided.*

B. *The Council will resist proposals that would adversely affect the natural functioning of main rivers, ordinary watercourses and wet or dry balancing lakes, this includes through the culverting of open channels, unless for access purposes*.'

### Guidance

*Non-Statutory Technical Standards for Sustainable Drainage (2015)*

10.3.47 The National Standards for SuDS published by the Department of Environment, Food and Rural Affairs (DEFRA) (Ref.18), set out the technical standards, which are non-statutory, to be utilised in conjunction with the NPPF and associated paragraphs (55-63) of the Flood Risk and Coastal Change section of the NPPG.

10.3.48 The CIRIA SuDS Manual C753 published by CIRIA, cover planning, design, construction and maintenance of Sustainable Drainage Systems (SuDS) to assist with implementing within both new and existing developments.

## 10.4 Assessment Methodology

10.4.1 The methodologies described in the following section have been developed in line with the relevant planning policy and appropriate industry guidance for assessing potential effects from the Scheme on Hydrology, Flood Risk and Drainage.

### Study Area

10.4.2 As described in **Chapter 3: The Development Site** the Study Area comprises nine Sites (A-G and BESS) and the Cable Route Search Area.

10.4.3 At present, the final Cable Corridor is yet to be determined; a Cable Route Search Area has been identified within which the cable route will be located (see **Volume 2, Figures 3.2.1-3.2.3**). Only a narrow width within this search area will be required for the final Cable Corridor and its construction. The locations of these elements will be refined prior to submission of the DCO application.

10.4.4 For the purposes of this preliminary assessment, however, the Study Area comprises each of the Sites and the Cable Route Search Area.

### Impact Assessment Methodology

10.4.5 The following list of documents will support the Hydrology, Flood Risk and Drainage ES chapter:

- **Flood Risk Assessment and Drainage Strategy**, which includes consideration of the Site's hydrology, assesses the potential risks of flooding to each Site and its surroundings. It outlines measures to manage surface water, prevent increased flood risk, and ensure proper drainage through sustainable systems, including Sustainable Drainage Systems (SuDS). By incorporating SuDS and understanding the site's hydrological conditions, the strategy helps manage water runoff, protect water quality, and minimise the environmental

impact on local infrastructure. A preliminary Flood Risk Assessment and Drainage Strategy is provided as Volume 3, Appendix 10.1.

- **WFD Screening and Scoping Assessment**, which includes consideration of the Site's and CRSA hydrology and water quality, assesses the potential impacts of a development on water bodies under the Water Framework Directive. It identifies risks to water quality and ecology, ensuring the project complies with WFD objectives. The assessment outlines mitigation measures to protect and enhance water bodies, while managing the environmental impact on local water resources and ecosystems.

10.4.6 An initial desktop analysis of the available data has been undertaken to inform this PEIR chapter and the Flood Risk Assessment and Drainage Strategy (Appendix 10.1). The assessment has identified and assessed the risks of all forms of flooding to and from the Study Area and presents:

- The potential receptors at risk of hydrology, flood risk and drainage effects arising from the Study Area;
- The likely significant hydrology, flood risk and drainage effects on relevant receptors as a result of the Scheme;
- Consultation with the EA, LLFA and other stakeholders;
- Whether the Scheme is likely to be affected by current or future flooding from any source;
- Whether the Scheme will cause increased flood risk elsewhere;
- Whether the measures proposed to deal with these effects and risks are appropriate; and
- Completion of the Sequential Test and, if required, the Exception Test.

10.4.7 The design of SuDS will be examined for mitigating any increases in site runoff in the Study Area. Requirements for this will be determined with consultation with the EA, North Northamptonshire Council, West Northamptonshire Council and Milton Keynes City Council as LLFAs.

10.4.8 A hydrological assessment will be undertaken to establish local drainage catchments and overland flow routes. The Hydrology, Flood Risk and Drainage ES chapter will include a review and summary of relevant legislation and national, regional, and local planning policy relevant to the water environment. A drainage assessment in accordance with the CIRIA guidance 'The SuDS Manual C753' will be undertaken and comprise:

- A site visit and hydrological/drainage surveys;
- A baseline hydrological assessment, data acquisition and regulatory consultation;
- Hydrological analysis (considering climate change);
- Consideration of SuDS design;
- Surface water quality risk assessment and pollution control review;
- Assessment of the implementation of SuDS; and
- Consideration of maintenance requirements and responsibilities.

10.4.9 This chapter considers potential impacts to the Study Area and the surrounding area over the lifetime of the Study Area and sets out the appropriate mitigation measures required. The assessment of the significance of impact is determined by considering the sensitivity of the receptor and magnitude of impact / effect. Mitigation measures are then applied, and any residual likely significant effects are identified.

10.4.10 As highlighted in the Scoping Opinion in relation to the assessment of flood risk and the impacts of climate change the Scheme is anticipated to have a 60-year life, therefore a 75- year timeframe

should be applied, consistent with the Government's Planning Practice Guidance. Further details can be found within the Green Hill Covering Report.

10.4.11 Further consultation is required with the EA and the LLFAs to assess the risk from all sources of flooding to and from the Study Area to ensure flood risk is not exacerbated.

10.4.12 The ES chapter will summarise the findings and recommendations of the Drainage Strategy. Mitigation measures in order to minimise the potential effects of the Study Area on flood risk, water quality and drainage will be identified. Any residual effects will be identified as well as the potential for relevant cumulative effects associated with any other developments nearby.

10.4.13 A Screening and Scoping WFD Assessment will be undertaken. The aim of this assessment would be to determine the potential for any non-compliance of the Study Area with WFD objectives for affected water bodies, using readily available information and site observations. This will include an examination of the potential construction, operational and decommissioning phase effects of the Study Area on relevant WFD biological, hydromorphological and physio-chemical parameters. Depending on the outcomes of the Screening and Scoping WFD Assessment, more detailed investigations and assessments may be required, which will be determined in consultation with the EA. If further assessment is required, this would be provided alongside the ES. The Scoping WFD Assessment will be done separately from the PEIR report and once produced will be further assessed with the ES Chapter.

**Approach and Method**

10.4.14 Unless otherwise stated, the terms used to define sensitivity and magnitude in this assessment are based on the methodology outlined in the Design Manual for Roads and Bridges (DMRB) (DMRB 2009). The sensitivity criteria applied in this chapter are summarised in Table 3 below. Although the DMRB methodology includes a 'very high' sensitivity category, for this assessment of hydrology, hydrogeology, and flood risk effects, the categories ranging from 'high' to 'negligible' are considered sufficient to cover the potential receptors. Where a receptor could reasonably fit into more than one sensitivity category, professional judgement has been used to determine the most appropriate classification.

10.4.15 As summarised in **Tables 10.2, 10.3 and 10.4**, the receptor sensitivity is defined as "Negligible," "Low," "Medium" or "High" depending on the specific reactor character and its ability to tolerate change. Magnitude is considered in relation to the potential impact on the receptor. Magnitude is defined in a range from 'Neutral' to 'High','. 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, the effect is considered significant and mitigation measures will be identified to reduce the significance of effect.

**Sensitivity of Receptors**

**Table 10.2: Sensitivity of the Identified Environmental Receptor**

| Sensitivity | Definition |
|---|---|
| High | WFD Classification – Good or High<br>Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site);<br>European Designated salmonid fishery (or salmonid & cyprinid fishery);<br>Important social or economic uses such as water supply, navigation or mineral extraction.<br>Floodplain or defence protecting 1 or more residential properties or industrial premises from flooding. |
| Medium | WFD Classification: Moderate |

| Sensitivity | Definition |
|---|---|
| | May be designated as a local wildlife site.<br>May support a small / limited population of protected species. Limited social or economic uses.<br>Floodplain or defence protecting 10 or fewer industrial properties from flooding. |
| Low | WFD classification – Poor<br>No nature conservation designations.<br>Low aquatic fauna and flora biodiversity and no protected species.<br>Minimal economic or social uses.<br>Floodplain with limited constraints and a low probability of flooding of residential and industrial properties. |
| Negligible | WFD classification – Poor<br>No nature conservation designations.<br>Low aquatic fauna and flora biodiversity and no protected species.<br>Minimal economic or social uses.<br>Floodplain with very limited constraints and a very low probability of flooding of residential and industrial properties. |

**Magnitude of Impacts**

**Table 10.3: Methodology for determining impact magnitude**

| Sensitivity | Definition |
|---|---|
| High | Loss of Protected Area.<br>Pollution of potable sources of water abstraction.<br>Deterioration of a water body leading to a failure to meet Good Ecological Status (GES) under the WFD and reduction in Class (or prevents the successful implementation of mitigation measures for heavily modified or artificial water bodies).<br>Significant potential increase in peak flood level (1% annual probability). |
| Medium | Loss in production of fishery.<br>Discharge of a polluting substance to a watercourse but insufficient to change its water quality status (WFD class) in the long term.<br>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.<br>Moderate potential Increase in peak flood level (1% annual probability). |
| Low | Noticeable effect on features, or key attributes of features, on the Protected Areas Register.<br>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. |

| Sensitivity | Definition |
|---|---|
| | 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.<br>Discharges to watercourse but no significant loss in quality, fishery productivity or biodiversity.<br>No effect on WFD classification or water body target. Negligible change in peak flood level (1% annual probability). |

**Assessment of Significance**

**Table 10.4: Methodology for determining significant effects**

| | Sensitivity / Magnitude | High | Medium | Low | Negligible |
|---|---|---|---|---|---|
| Adverse Magnitude | High | Major | Major/Moderate | Moderate | Moderate/Minor |
| | Medium | Major/Moderate | Moderate | Moderate/Minor | Minor |
| | Low | Moderate | Moderate/Minor | Minor | Negligible |
| | Negligible | Moderate/Minor | Minor | Negligible | Negligible |

10.4.16 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 long term effects are largely associated with the operational phase.

10.4.17 For the purposes of this assessment, any effect that is of major or moderate significance is considered to be significant in EIA terms. Any effect that has a significance of minor or negligible is not significant.

10.4.18 Where adverse significant effects are identified, additional mitigation measures will be considered and identified to reduce the significance of the effect. An assessment of residual likely significant effects following the application of appropriate mitigation measures will then be undertaken.

## 10.5 Assessment Assumptions and Limitations

10.5.1 This preliminary assessment is based on baseline and site design information available at the time of writing this chapter. A full assessment is being undertaken as part of the EIA, the assessment will be developed and refined following statutory consultation, and as additional information becomes available, the final assessment presented within the ES.

10.5.2 Where the Scheme designs and details are either not yet known or incomplete at this stage, either assumptions have been made based on professional judgment, or, in the event that it is not possible to make any assumptions, a full assessment has not been made. This assessment is an iterative process and will be both expanded and made more specific as survey data is collected, analysed and reported on, and designs are further developed. This process will be carried out in conjunction with relevant consultees and third parties as necessary to achieve the most robust outcome.

10.5.3 The methodology for Hydrology, Flood Risk and Drainage assessment and chapter has considered the following assumptions:

- 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 construction and maintenance waste materials will be collected, contained and prevented from direct entry to local water courses;
- All clean roof drainage from the BESS 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 EA flood data. No new hydraulic modelling has been undertaken as part of this study;
- • While the Scheme is anticipated to be typically unmanned during the operational phase, with infrequent attendance for routine maintenance, there will be periods of increased activity associated with the replacement of solar panels and batteries at the end of their operational life. These activities will require specific management plans and may necessitate temporary welfare facilities during these times; however, permanent on-scheme welfare facilities will remain limited or non-existent.
- • Routine maintenance checks and the periodic replacement programme would likely be the primary times when staff are present. As there will be no ongoing foul water discharge from the Scheme, and no permanent mains-connected foul water drainage systems are deemed necessary, impacts on foul sewer capacity are scoped out of further assessment.

## 10.6 Baseline Conditions

10.6.1 This section describes the baseline environmental characteristics for the Scheme and surrounding areas with specific reference to Hydrology, Flood Risk and Drainage.

10.6.2 The risk of fluvial flooding has been interpreted from the EA's online Flood Map for Planning (Ref.19), The risk of surface water flooding has been assessed from the EA Long Term Flood Risk Map (Surface Water) (Ref.20), and where necessary site specific hydraulic modelling.

10.6.3 In our reports, climate change has been assessed following EA guidance and NPS EN-1 requirements to ensure the Scheme's resilience under the credible maximum scenario for NSIPs.

10.6.4 The Scheme is situated within Anglian River Basin Management Plan (RBMP) area. Within the Anglian RBMP, the Scheme is situated within the Nene Management Catchment.

10.6.5 Green Hill A to F and the BESS are located in the Nene Management Catchment, where the upper allowance for peak river flow in the 2080s is 36%. Green Hill G is located in the Upper and Bedford Ouse Management Catchment, where the upper allowance is 58%. The Cable Route Search Area spans both catchments, and both allowances have been considered in the assessment.

10.6.6 Where EA data is available, peak river flow allowances have been applied. For un-modelled watercourses, the EA Surface Water Flood Map has been used as a proxy, with allowances applied using Manning's open channel flow equation.

10.6.7 Site-specific hydraulic modelling, such as at the Green Hill BESS site, includes peak rainfall allowances. Drainage strategies for the Green Hill BESS site and Green Hill C account for climate change, with surface water runoff rates and attenuation volumes calculated using the EA peak rainfall intensity allowances, which are 40% for both catchments. This approach ensures the Scheme is robust against potential climate change impacts.

10.6.8 It is understood that the vast majority of the Scheme is currently utilised as arable fields which will be subject to standard arable farming practises.

### Existing Baseline

10.6.9 The existing baseline conditions are derived from the draft Flood Risk Assessment and Drainage Strategy.

### Green Hill A

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.10 A network of land drainage ditches is located within Green Hill A (see **Volume 2, Figure 10.1** - Green Hill A). Flows within the ditches are expected to flow generally in a south-westerly direction based on local topography. All the land drains are ordinary watercourses and are therefore the responsibility of the LLFA to maintain (whereas main rivers fall under the responsibility of the EA).

10.6.11 Fluvial flooding could occur if the land drains overtopped their banks during or following an extreme rainfall event.

10.6.12 The entirety of the Green Hill A is situated in Flood Zone 1 and therefore has less than a 1 in 1,000 annual probability of river or sea flooding.

10.6.13 The EA Historical Flood Map indicates that Green Hill A has not historically flooded and neither has the area in near vicinity.

10.6.14 Green Hill A is therefore considered to be at low risk of fluvial flooding, the proposed solar panels will be raised above surrounding ground levels with associated power infrastructure appropriately located out of the flood zone and protected.

*Surface Water Flood Risk*

10.6.15 The EA Flood Risk from Surface Water Map indicates that Green Hill A ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.16 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches which flow throughout Green Hill A.

10.6.17 Based on the above and considering the embedded mitigation as part of the design of the solar panels the overall risk of surface water flooding at Green Hill A is considered to be low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately located out of the flood zone and protected thereby reducing the potential to be impacted in the event of surface water flooding.

### Green Hill A.2

10.6.18 There are two identifiable land drainage ditches located within Green Hill A.2. Flows within the ditches are expected to flow generally in a south-westerly direction based on local topography. The land drains are ordinary watercourses and are therefore the responsibility of the LLFA to maintain.

10.6.19 Fluvial flooding could occur if the land drains overtopped their banks during or following an extreme rainfall event.

10.6.20 The entirety of the Green Hill A.2 is situated in Flood Zone 1 and therefore has less than a 1 in 1,000 annual probability of river or sea flooding.

10.6.21 The EA Historical Flood Map indicates that Green Hill A.2 has not historically flooded and neither has the area nearby. The nearest recorded historic flood extent is 6km east of the site.

10.6.22 Green Hill A.2 is therefore considered to be at low risk of fluvial flooding, the proposed solar panels will be raised above surrounding ground levels with associated power infrastructure appropriately located out of the flood zone and protected.

*Surface Water Flood Risk*

10.6.23 The EA Flood Risk from Surface Water Map indicates that Green Hill A.2 ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.24 As described in the fluvial section above, the surface water flooding extents largely correspond with the land drainage ditches which flow east to west through Green Hill A.2.

10.6.25 Based on the above and considering the embedded mitigation as part of the design of the solar panels the overall risk of surface water flooding at Green Hill A.2 is considered to be low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately located out of the flood zone and protected thereby reducing the potential to be impacted in the event of surface water flooding.

**Green Hill B**

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.26 There are two land drainage ditches located within 200m of Green Hill B (see **Volume 2, Figure 10.2** - Green Hill B). Flows within the ditches are expected to flow in a south-westerly direction based on local topography. All the land drains are ordinary watercourses and are therefore the responsibility of the LLFA to maintain.

10.6.27 Fluvial flooding could occur if the land drains overtopped their banks during or following an extreme rainfall event.

10.6.28 The entirety of Green Hill B is situated in Flood Zone 1 and therefore has less than a 1 in 1,000 annual probability of river or sea flooding.

10.6.29 The EA Historical Flood Map indicates that Green Hill B has not historically flooded and neither has the area nearby.

10.6.30 Green Hill B is therefore considered to be at low risk of fluvial flooding, the proposed solar panels will be raised above surrounding ground levels with associated power infrastructure appropriately located out of the flood zone and protected.

*Surface Water Flood Risk*

10.6.31 The EA Flood Risk from Surface Water Map indicates that Green Hill B ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.32 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches.

10.6.33 Based on the above and considering the embedded mitigation as part of the design of the solar panels the overall risk of surface water flooding at Green Hill B is considered to be low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately

located out of the flood zone and protected thereby reducing the potential to be impacted in the event of surface water flooding.

### Green Hill C

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.34 There is one land drainage ditch which runs through the centre of Green Hill C (**Volume 2, Figure 10.3** - Green Hill C). Flows within the ditches are expected to flow in a south-westerly direction based on local topography.

10.6.35 Fluvial flooding could occur if the land drains overtopped their banks during or following an extreme rainfall event.

10.6.36 The entirety of Green Hill C is situated in Flood Zone 1 and therefore has less than a 1 in 1,000 annual probability of river or sea flooding.

10.6.37 The EA Historical Flood Map indicates that the Green Hill has not historically flooded and neither has the area nearby.

10.6.38 Green Hill C is therefore considered to be at low risk of fluvial flooding, the proposed solar panels will be raised above surrounding ground levels with associated power infrastructure appropriately located out of the flood zone and protected.

*Surface Water Flood Risk*

10.6.39 The EA Flood Risk from Surface Water Map indicates that Green Hill C ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.40 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches.

10.6.41 Based on the above and considering the embedded mitigation as part of the design of the solar panels the overall risk of surface water flooding at Green Hill C is considered to be low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately located out of the flood zone and protected thereby reducing the potential to be impacted in the event of surface water flooding.

### Green Hill D

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.42 There is an unnamed ordinary watercourse located along the western boundary of Green Hill D, flowing in a south-westerly direction (see **Volume 2, Figure 10.4** - Green Hill D). Fluvial flooding could occur if the ordinary watercourse overtopped its banks during or following an extreme rainfall event.

10.6.43 The majority of Green Hill D is situated in Flood Zone 1 and therefore has less than a 1 in 1,000 annual probability of river or sea flooding. However, a limited area to the south-western boundary is identified as being in Flood Zone 3, associated with the unnamed ordinary watercourse.

10.6.44 The EA Historical Flood Map indicates that Green Hill D has not historically flooded and neither has the area nearby.

10.6.45 Green Hill D is therefore considered to be at low risk of fluvial flooding, the proposed solar panels will be raised above surrounding ground levels with associated power infrastructure appropriately located out of the flood zone and protected.

*Surface Water Flood Risk*

10.6.46 The EA Flood Risk from Surface Water Map indicates that Green Hill D ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.47 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches and ordinary watercourses.

10.6.48 Based on the above and considering the embedded mitigation as part of the design of the solar panels the overall risk of surface water flooding at Green Hill D is considered to be low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately located out of the flood zone and protected thereby reducing the potential to be impacted in the event of surface water flooding.

**Green Hill E**

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.49 A network of land drainage ditches is located within Green Hill E (see **Volume 2, Figure 10.5** – Green Hill E). Flows within the ditches are expected to flow in a south-westerly direction based on local topography.

10.6.50 The majority of Green Hill E is situated in Flood Zone 1. However, an area to the western boundary, southern boundary and the south-eastern boundary are within the extents of Flood Zone 3. The EA Historical Flood Map indicates that Green Hill E has not historically flooded and neither has the neighbouring land.

10.6.51 Green Hill E is therefore considered to be at low risk of fluvial flooding, the proposed solar panels will be raised above surrounding ground levels with associated power infrastructure appropriately located out of the flood zone.

*Surface Water Flood Risk*

10.6.52 The EA Flood Risk from Surface Water Map indicates that Green Hill E ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.53 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches and ordinary watercourses.

10.6.54 Based on the above and considering the embedded mitigation as part of the design of the solar panels the overall risk of surface water flooding at Green Hill E is considered to be low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately located out of the flood zone and protected thereby reducing the potential to be impacted in the event of surface water flooding.

### Green Hill F

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.55 A network of land drainage ditches is located within Green Hill F (see **Volume 2, Figure 10.6** – Green Hill F). Three tributaries of an unnamed main river are shown as ditches and will flow in a northerly direction based on local topography.

10.6.56 The majority of Green Hill F lies within Flood Zone 1, indicating a low risk of flooding. However, the northern and north-western boundaries, along with sections of the Unnamed Main River Tributaries within the site, are located within Flood Zone 3. Historically, flooding has affected the northern part of Green Hill F, most notably during the River Nene flood event in March 1947.

10.6.57 The Environment Agency (EA) has provided flood extents from the Grendon 2013 model, which closely match the EA's Flood Zone extents. These are based on generalised national modelling. In the absence of detailed local flood data, surface water maps have been used as a proxy to assess potential fluvial flood risks. Additionally, Manning's open channel flow formula, informed by EA LiDAR data, was used to estimate flood extents during a 1% AEP +36% climate change event. These calculations suggest that the actual flood extent is likely smaller than that shown on surface water maps, providing a conservative estimate.

10.6.58 Crucially, the flood risk on-site is largely confined to the immediate vicinity of Grendon Brook. With the implementation of embedded mitigation measures (Section 3.2 of Appendix 10.1: Flood Risk Assessment and Drainage Strategy), including the elevation of solar panels above ground level and an 8m easement around watercourses, the overall flood risk to the site is considered low.

*Surface Water Flood Risk*

10.6.59 The EA Flood Risk from Surface Water Map indicates that Green Hill F ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.60 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches and ordinary watercourses.

10.6.61 Based on the above and considering the embedded mitigation as part of the design of the solar panels the overall risk of surface water flooding at Green Hill F is considered to be low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately located out of the flood zone and protected thereby reducing the potential to be impacted in the event of surface water flooding.

### Green Hill G

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.62 There is a network of land drains which join and flow southwards through the centre of the Green Hill G. The land drains become a more rational watercourse flowing through Lavendon to the south and ultimately discharges to the River Great Ouse approximately 2km south of Green Hill G (see **Volume 2, Figure 10.7** - Green Hill G). Flows within the ditches are expected to flow in a south-westerly direction based on local topography.

10.6.63 Fluvial flooding could occur if the land drains overtopped their banks during or following an extreme rainfall event.

10.6.64 The majority of Green Hill G is situated in Flood Zone 1 and therefore has less than a 1 in 1,000 annual probability of river or sea flooding. However, a limited area to the southern boundary is identified as being in Flood Zone 3, associated with the land drain and unnamed ordinary watercourse. The EA Historical Flood Map indicates that Green Hill G has not historically flooded and neither has the area nearby.

10.6.65 Green Hill G is therefore considered to be at low risk of fluvial flooding, the proposed solar panels will be raised above surrounding ground levels with associated power infrastructure appropriately located out of the flood zone and protected.

*Surface Water Flood Risk*

10.6.66 The EA Flood Risk from Surface Water Map indicates that Green Hill G ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.67 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches.

10.6.68 Based on the above and considering the embedded mitigation as part of the design of the solar panels the overall risk of surface water flooding at Green Hill G is considered to be low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately located out of the flood zone and protected thereby reducing the potential to be impacted in the event of surface water flooding.

**BESS Site**

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.69 The nearest watercourse is Whiston Brook, an EA main river that forms the northern boundary of the BESS3 field within the BESS Site (see **Volume 2, Figure 10.8** – BESS Site).

10.6.70 A further EA main river named Grendon Brook flows in a northerly direction and forms the eastern boundary of BESS1 field within the BESS Site. Whiston Brook and Grendon Brook flow in a general north-eastern direction before they all converge to the River Nene approximately 620m north of the BESS3.

10.6.71 Fluvial flooding could occur if the land drains overtopped their banks during or following an extreme rainfall event.

10.6.72 The EA Historical Flood Map indicates that fields BESS1 and BESS3 have historically flooded in March 1947 due to the River Nene. It is known that recent flooding causing the evacuation of Billing Aquadrome occurred in the area in February 2024, it is understood c was not impacted. Further flooding in September 2024 was widely reported, it is understood the BESS Site was not impacted.

10.6.73 All fields within the BESS Site are within Flood Zone 3 (high risk) of flooding.

10.6.74 The EA provided modelling data for the Grendon Brook (2013) which found that flood extents up to and including the defended 1 in 100 year scenario impact the eastern extents of BESS1. The flood extents are largely shown to remain in the immediate extents of Grendon Brook. No flood depth modelling data was made available by the EA. Therefore, hydraulic modelling was undertaken by Mabbett Ltd.

10.6.75 Mabbett Ltd conducted modelling for a range of return periods to assess fluvial flood risk at the BESS site, with a particular focus on the 1% AEP +36% Climate Change (CC) scenario. In this

scenario, flood depths in the north of BESS1 are predicted to reach up to 0.67m. Due to the depths modelled at BESS3, it has been decided that no BESS infrastructure will be developed in that area.

10.6.76 The main substation infrastructure is proposed for construction in the south of BESS2, which remains flood-free during the 1% AEP +36% CC modelled scenario. The associated BESS infrastructure is proposed for the remaining areas of BESS2, as well as the north and south of BESS1. While the south of BESS1 is outside the fluvial flood risk area, the suitability of the north-east of BESS1 for battery systems is still being evaluated due to the modelled flood depths, and appropriate mitigation measures are being considered.

10.6.77 Given the locations of the proposed BESS developments, excluding the north of BESS1, the site is considered to be at Low risk of fluvial flooding. However, since the north of BESS1 is modelled to experience depths of up to 0.67m, the risk in that area is considered to be Moderate.

*Surface Water Flood Risk*

10.6.78 The EA Flood Risk from Surface Water Map indicates that the BESS Site ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).

10.6.79 As described in the fluvial section above, the surface water flooding extents largely match the courses of the watercourses and land drainage ditches.

10.6.80 The overall risk of surface water flooding at the BESS Site is considered to be low.

**Cable Search Area**

**Flood Risk and Drainage Designations**

*Fluvial Flood Risk*

10.6.81 The EA's Flood Map for Planning indicates that the vast majority of the cable route is within Flood Zone 1 (1% Annual Exceedance Probability (AEP)) for river flooding (see **Volume 2, Figures 10.9 and 10.9.1 to 10.9.13** – Cable Search Area). The section of the cable route between Green Hill E, Green Hill F and the Green Hill BESS site is in the vicinity of the River Nene and its tributaries, which is situated within Flood Zones 2 and 3. Flood Zone 2 is defined as land assessed as having between a 1 in 1,000 to 1 in 100 (0.1% to 1% AEP) chance of river flooding. Flood Zone 3 is defined as land assessed as having a 1 in 100 or greater (>1% AEP) chance of river flooding.

10.6.82 Based on the nature of the proposed development (sub surface cable) it can be concluded that the Cable Route is at Very Low risk of fluvial flooding, therefore no specific mitigation is considered necessary.

*Surface Water Flood Risk*

10.6.83 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 Cable Route and along parts of the eastern Cable Route boundary.

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

10.6.85 Based on the above and considering the nature of the proposed development (sub surface cable) the overall risk of surface water flooding is considered to be Very Low.

### Future Baseline

10.6.86 This section considers changes to the baseline conditions, described above, that might occur in the absence of the Scheme. The future baseline scenarios are set out in **Chapter 2: EIA Process and Methodology**.

10.6.87 In the absence of the Scheme, the majority of baseline conditions for Hydrology, Flood Risk, and Drainage are unlikely to change significantly. However, the potential increase in flood risk due to climate change, particularly in relation to increased rainfall, is assessed throughout the Flood Risk Assessment and Drainage Strategy. This includes potential impacts on both surface water and fluvial flood risks, which are expected to evolve over time.

## 10.7 Likely Significant Effects

10.7.1 The following are the likely Significant Effects and the potential receptors if left unmitigated.

**Table 10.5: 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.<br>Construction workers and construction equipment |
| Temporary Increase in Impermeable Area | Flood risk to future people or property at the Site and surrounding areas.<br>Construction workers and construction equipment |
| Compaction of Soils | Flood risk to future people or property at the Site and surrounding areas.<br>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 |

| Likely Significant Effect | Receptor(s) |
|---|---|
| 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 |

## 10.8 Mitigation Measures

### Embedded Mitigation Measures

10.8.1 The way that potential environmental impacts have been or will be prevented, avoided or mitigated to reduce impacts to a minimum through design and/or management of the Scheme is outlined in this section and will be taken into account as part of the assessment of the potential effects. Proposed environmental enhancements are also described where relevant.

10.8.2 The following embedded mitigation measures for all phases of the Scheme have been incorporated into the Scheme design, with detailed proposals and locations to be submitted with the DCO application.

10.8.3 The following embedded mitigation measures for all phases of the Scheme have been incorporated into the Scheme design, with detailed proposals and locations to be submitted with the DCO application.

- Eight metre buffers have been established around watercourses, including Main Rivers and Ordinary Watercourses.
- All service cabling should be designed and installed to be flood resilient / water compatible. This should be achieved in accordance with appropriate design standards and best practise guidance.
- Beyond this, the separation of construction/decommissioning groundworks will be kept as far from the from watercourses / drainage ditches.
- Existing access tracks, where practicable, 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 will be designed to avoid crossing drainage ditches, where practicable.
- The Outline Construction Environment Management Plan (OCEMP) accompanying the DCO application, will describe 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.
- 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 Scheme during construction, operation and decommissioning will be taken from new permeable or 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.
- In addition, a Water Management Plan (which will form part of a detailed CEMP) will include details of pre-construction, during the construction phase 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.
- With regards to flood risk, the individual Sites which make up the Scheme have been assessed on the best available data for each 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) will be sequentially located where possible to 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) will be sequentially located outside the 1 in 100 plus climate change annual probability extent (1% +CC) or where this is not practicable restricted to areas which experience less than 1 m depth of flooding during the same event.
    - Flexibility for either tracker or fixed panels has been built into the EIA. Foundations are most likely to be galvanised steel poles driven into the ground. These will either be piles rammed directly into the ground or rammed into a pre-drilled hole, or a pillar attaching to a steel ground screw depending on ground conditions.
        - For both fixed and tracker panels, all sensitive and electrical equipment on the solar panel will be elevated by the legs (including the solar panel face itself) 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 (raised a minimum of 0.4 m 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 2.5 m above ground level. This ensures that all sensitive and electrical equipment on the solar panel is raised to a minimum of 2.5 m above ground level in the horizontal position.

**Mitigation by Design associated with Flood Risk and Drainage**

**Permanent Increase in Impermeable Area**

10.8.4 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 (Ref.21), 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.

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

**Increase in Discharge to Local Watercourses**

10.8.6 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.

10.8.7 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.

10.8.8 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**

10.8.9 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.

10.8.10 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.

10.8.11 Inclusion of aforementioned features would provide sufficient treatment.

10.8.12 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.

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

**Diffuse Pollution Resulting from Fire**

10.8.14 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. Section 3.8 ‘Surface Water Treatment’ within Annex E (Solar C) and Annex J (BESS) provides further assessment for pollution control in the event of a fire.

10.8.15 Where practicable, 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.

10.8.16 Local fire water provision will be provided within the Green Hill BESS site. As detailed in the Scoping Opinion the National Fire Chiefs Council Grid Scale Battery Energy Storage System planning Guidance states that, 'it is recommended that hydrant supplies for boundary cooling purposes should be located close to BESS containers (but considering safe access in the event of a fire) and should be capable of delivering no less than 1,900 litres per minute for at least 2 hours. Fire and rescue services may wish to increase this requirement dependant on location and their ability to bring supplementary supplies to site in a timely fashion'.

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

10.8.18 An initial 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.

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

**Increase in Highway Routine Runoff / Spillage Risk**

10.8.20 The Scheme is likely to have a very-low pollution risk and so the management train for highway runoff should normally two treatment stages.

10.8.21 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.

10.8.22 Inclusion of aforementioned features would provide sufficient treatment.

10.8.23 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.

10.8.24 Highway Routine Runoff / Spillage Risk will be considered within the Transport and Access Chapters. Mitigation may include adaptations to the porous surfacing or similar; this would be confirmed at detailed design.

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

**Disposal of Surface Water and Foul Water from the Site**

10.8.26 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.

10.8.27 The topography is varied within the Scheme and therefore where areas are relatively flat rainfall will tend to stay local to where it falls rather than running-off, whereas steeper areas surface water will follow the local topography and ultimately pass to land drains and or watercourses. 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.

10.8.28 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.

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

### Site Specific Mitigation associated with Flood Risk and Drainage

#### Mud and Debris Blockages

10.8.30 Where deemed 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 Statement should be maintained.

10.8.31 A CEMP and Outline Decommissioning Statement will be submitted in support of the DCO application.

10.8.32 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

10.8.33 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.

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

#### Blockages of Drainage Networks

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

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

### Additional Mitigation associated with Water Resources

#### Silt-laden Runoff

10.8.37 The following mitigation measures will be incorporated into the CEMP and decommissioning statement 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 buffers of 10m (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.

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

**Spillages and Leaks of Pollutants**

10.8.39 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 will be 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;
- Refueling 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 Sites are 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 sandbags); and
- Concrete wash water will be adequately contained and removed from the Site.

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

## 10.9 Residual Effects

10.9.1 With the embedded and additional mitigation by 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.

10.9.2 No further mitigation is proposed.

## 10.10 Cumulative Effects

10.10.1 The ES will give consideration to potential cumulative effects of the Scheme and other relevant projects within the vicinity of the Scheme on a single receptor/resource.

10.10.2 A list of cumulative projects can be found in **Volume 3, Appendix 2.2** of the PEIR, the list will be reviewed and refined in preparation of the DCO application submission through further consultation and will be presented and assessed in the ES. Cumulative effects will be listed within the ES.

### 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 Effects during Operation

10.10.4 All relevant developments will be required to be supported by 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.

### In-combination effects

10.10.5 There is potential for in-combination effects with Ecology, Ground Conditions, and Climate Change. These in-combination effects have been assessed in the relevant chapters, with particular focus on climate change impacts, which have been specifically addressed in this chapter and the supporting Appendix. Following the respective mitigation measures outlined, any cumulative impacts on the Scheme are considered to be effectively managed.

## 10.11 Summary

10.11.1 This chapter of the PEIR has identified the existing environment in relation to Hydrology, Flood Risk and Drainage and the assessment work that has been undertaken to date including the completion of a draft Flood Risk Assessment and Drainage Strategy (**Volume 3, Appendix 10.1**).

10.11.2 Preliminary mitigation measures are described in section 10.7 and 10.8 are being explored and have been described with potential residual effects outlined. However, it is to be noted that it is not possible to identify all significant likely environmental effects of the Scheme.

## References

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