Green Hill Solar Farm

EN010170

Environmental Statement

Chapter 10: Hydrology, Flood Risk and Drainage

Revision A

Prepared by: Arthian Ltd

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APFP Regulation 5(2)(a)

Schedule of Changes

Revision	Section Reference	Description of Changes	Reason for Revision
A	[cover]	Updated to Revision A	As required for submission at Deadline 1.
	[throughout]	Updates to document references	As required for submission at Deadline 1.
	10.6.3–10.6.13, 10.8.26–10.8.27, 10.9.2–10.9.3	Minor text clarifications: • Confirmed that floodplain-storage conclusions will be reviewed following final EA modelling comments and secured through Requirement 11. • Clarified that the BESS drainage and fire-water containment system will be impermeable, using a sealed design to prevent infiltration to ground. • Added statement confirming that temporary and permanent watercourse crossings will be designed in accordance with the FRA Annex A and, ensuring no increase in flood risk. • Incorporated factual updates and minor formatting corrections arising from ongoing drafting.	Updates made in response to Relevant Representations made by the Environment Agency (EA-003, EA-011, EA-019, EA-020) to confirm design commitments and alignment with ongoing modelling

Contents

Issue Sheet

Report Prepared for: Green Hill Solar Farm

~~DCO Submission~~
Deadline 1

Chapter 10: Hydrology, Flood Risk and Drainage

Revision A

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10 Hydrology, Flood Risk and Drainage

10.1 Introduction

10.1.1 This chapter presents the findings of the Environmental Impact Assessment (EIA) concerning the likely significant effects on hydrology, flood risk and drainage of the Scheme during the construction, operation and maintenance, and decommissioning phases.

10.1.2 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, mainly:

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

10.1.3 The following aspects have been considered within the hydrology, flood risk and drainage assessment process:

- A description of the methods used within the assessment, followed by an assessment of the relevant baseline conditions at the Sites and the hydrological setting. This is followed by an assessment of the likely significant effects of the Scheme;
- Mitigation measures are presented and discussed to minimise the impacts of the Scheme during the construction, operation and decommissioning phases to an acceptable level for the purposes of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations);
- Given the scale of this Scheme, and its separation into the Sites of Green Hill A, Green Hill A.2, Green Hill C, Green Hill D, Green Hill E, Green Hill BESS, Green Hill F, Green Hill G and the Cable Route Corridor, the overarching Flood Risk Assessment and Drainage Strategy (Appendix 10.1 **[~~EN010170/APP~~EX1/GH6.3.10.1_A]**) is supported by individual site and cable route corridor assessments, that have been included as Appendix 10.2 – 10.11; and
- The baseline condition of the Sites have also been derived from the supporting Flood Risk Assessment and Drainage Strategy Appendices produced by Arthian (Appendix 10.1).

10.1.4 For project description details, please refer to Chapter 4: Scheme Description **[~~EN010170/APP~~EX1/GH6.2.4_A]** of this Environmental Statement (ES).

10.1.5 This chapter has been prepared by Arthian Ltd (previously Mabbett) (see Statement of Competence **[~~EN010170/~~APP~~/GH6.3.1.1~~-065]**).

Appendices and Figures

10.1.6 This chapter is supported by the following appendices:

- Appendix 10.1 - Flood Risk Assessment and Drainage Strategy **[~~EN010170/APP/6~~EX1/GH6.3.10.1~~}~~ A]**
- Appendix 10.2 – Annex A: Flood Risk Assessment and Drainage Strategy – Cable Route Corridor **[~~EN010170/~~APP~~/6.3.10.2~~-098 and APP-099]**
- Appendix 10.3 - Annex B: Flood Risk Assessment and Drainage Strategy – Green Hill A **[~~EN010170/~~APP~~/6.3.10.3~~-100]**
- Appendix 10.4 – Annex C: Flood Risk Assessment and Drainage Strategy – Green Hill A.2 **[~~EN010170/~~APP~~/6.3.10.4~~-101]**
- Appendix 10.5 – Annex D: Flood Risk Assessment and Drainage Strategy – Green Hill B **[~~EN010170/~~APP~~/6.3.10.5~~-102]**
- Appendix 10.6 – Annex E: Flood Risk Assessment and Drainage Strategy – Green Hill C **[~~EN010170/APP/6~~EX1/GH6.3.10.6 A]**
- Appendix 10.7 – Annex F: Flood Risk Assessment and Drainage Strategy – Green Hill D **[~~EN010170/~~APP~~/6.3.10.7~~-104]**
- Appendix 10.8 – Annex G: Flood Risk Assessment and Drainage Strategy – Green Hill E **[~~EN010170/~~APP~~/6.3.10.8~~-105]**
- Appendix 10.9 – Annex H: Flood Risk Assessment and Drainage Strategy – Green Hill F **[~~EN010170/~~APP~~/6.3.10.9~~-106]**
- Appendix 10.10 – Annex I: Flood Risk Assessment and Drainage Strategy – Green Hill G **[~~EN010170/~~APP~~/6.3.10.10~~-107]**
- Appendix 10.11 – Annex J: Flood Risk Assessment and Drainage Strategy – Green Hill BESS **[~~EN010170/APP/6~~EX1/GH6.3.10.11 A]**.

10.1.7 A Water Framework Directive (WFD) Assessment has been undertaken **[~~EN010170/APP~~EX1/GH7.22 A]**. The aim of this assessment has been to determine the potential for any non-compliance of the Scheme with WFD objectives for affected water bodies, using readily available information and Site observations. A Water Resources Assessment has also been undertaken **[~~EN010170/~~APP~~/GH7.19~~-563]** to assess consumptive and non-consumptive demands.

10.1.8 This chapter is supported by the following tables:

- ~~**Table 10.1: Relevant Scoping Opinion Comments**~~
- ~~**Table 10.2: Statutory Consultation Comments**~~
- ~~**Table 10.3: Sensitivity of the Identified Environmental Receptor**~~
- ~~**Table 10.4: Methodology for determining impact magnitude**~~
- ~~**Table 10.5: Methodology for determining significant effects**~~
- ~~**Table 10.6: Summary of Residual Effects for Hydrology, Flood Risk and Drainage**~~

10.2 Consultation

Scoping Opinion

10.2.1 An EIA Scoping Report was submitted to the Planning Inspectorate (PINS) in July 2024 (Ref 10.1), with a formal request for a Scoping Opinion. PINS subsequently issued the Scoping Opinion on 30 August 2024.

Table 10.1: Relevant Scoping Opinion Comments

Consultee and Date	Comment	How has the comment been addressed	Location of response in chapter
The Planning Inspectorate 30 August 2024 ID 3.4.1	The Inspectorate agrees that the matter of 'foul sewer capacity during operation' may be scoped out of the assessment according to the information provided that there would be no foul water discharge from the Proposed Development and therefore no requirement for a mains-connected foul water drainage system.	Noted, and confirmed that there are no proposals for foul water discharge from the Scheme.	Not Applicable, scoped out.
The Planning Inspectorate 30 August 2024 ID 3.4.2	The Inspectorate notes that in relation to the matter of flood modelling, the applicant should refer to the EA's Scoping Opinion and the Level 1 Strategic Flood Risk Assessment (SFRA) for the East Riding of Yorkshire Council. The Inspectorate notes a 75-year lifetime should be applied to remain consistent with National Planning Practice Guidance (NPPG).	Noted and agreed, a 75-year lifetime has been applied. Given the distance from the Scheme to Yorkshire, the East Riding of Yorkshire Council SFRA has not been considered.	See Section 10.6

Consultee and Date	Comment	How has the comment been addressed	Location of response in chapter
The Planning Inspectorate 30 August 2024 ID 3.4.3	In relation to the matter of the baseline assessment of the Flood Zones, the Inspectorate requests that the baseline for all components of the Proposed Development should be described in the ES.	Noted and agreed, this has now been included.	See Section 10.6 of this ES Chapter.
The Planning Inspectorate 30 August 2024 ID 3.4.4	In relation to the matter of the BESS, the wording in the scoping report refers to the proposed solar panels rather than the BESS, this should be clarified in the ES Chapter. The ES Chapter should also explain how flood risk has been taken into account when determining the location of the BESS, and appropriate mitigation measures proposed and secured as necessary.	Noted and agreed, these points have now been clarified and addressed.	See Section 10.9 of this ES Chapter and Appendix 10.11.
The Planning Inspectorate 30 August 2024 ID 3.4.5	In relation to the matter of the assessment, the Inspectorate requests that the list of 'Potential and Likely Significant Effects' does not include flood risk. This should be included in the ES and assessed accordingly.	Noted and agreed, this has been referred to and assessed.	See Section 10.7 of this ES Chapter.
The Planning Inspectorate	In relation to the methodology, the Planning Inspectorate states this is unclear and reference is made to impacts rather than effects, this should	Noted and agreed, the methodology has been written to be more coherent and consistent.	See Section 10.4 of this ES Chapter.

Consultee and Date	Comment	How has the comment been addressed	Location of response in chapter
30 August 2024 ID 3.4.6	be clearly set out in the ES with no inconsistencies.		
The Planning Inspectorate 30 August 2024 ID 3.4.7	In relation to the matter of Water Resources in the assessment, the Inspectorate notes that it is not stated whether a water supply or abstractions would be required during any phase of the Proposed Development. The Inspectorate also notes that reference is made only to potable water abstractions, although the EA identify that there are a number of existing licences for other abstractions within or in proximity to the Site. The ES should provide details of water supply and demand requirements during construction and operation (including in the context of BESS fire risk). An assessment should be provided where there is potential for LSE to occur on water resources or demonstration of the absence of LSE with agreement from the relevant consultation bodies. Anglian Water should be consulted at the earliest opportunity. The Applicant is referred to their consultation response	Noted, comments have been addressed throughout the ES Chapter.	Impacts associated with HDD are assessed in Section 10.8 (Assessment of Impacts and Effects) and embedded mitigation measures are outlined in Section 10.9. Additional mitigation related to surface water runoff and potential pollution from HDD use is included in Section 10.10. HDD methodology and breakout contingency planning will be secured via the Outline ~~CEMP [EN010170/APP~~Construction Environmental Management Plan **[EX1/GH7.1_A]**.

Consultee and Date	Comment	How has the comment been addressed	Location of response in chapter
	contained in Appendix 2 of this Opinion in this regard.		
The Planning Inspectorate 30 August 2024 ID 3.4.8	In relation to the matter of HDD impacts in the assessment, the Inspectorate notes there is potential for HDD to be used where watercourses are crossed by the cable corridor. The ES should assess impacts from any use of HDD on water resources receptors which are likely to result in significant effects. Should drilling fluid be used in construction, a breakout plan should be submitted with and secured within the DCO application.	Noted.	HDD impacts addressed in Water Resources Sections throughout ES Chapter.

Statutory Consultation

10.2.2 Further consultation in response to formal pre-application engagement was undertaken through the Preliminary Environmental Information Report (PEIR). **Table 10.2** outlines the statutory consultation responses relating to hydrology, flood risk and drainage and how these have been addressed through the ES.

10.2.3 Responses to the Statutory Consultation are outlined in the Consultation Report **[~~EN010170/APP~~EX1/GH5.1_A].**

Table 10.2: Statutory Consultation Comments

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
West Northamptonshire Council 10 January 2025 West Northamptonshire Council has reviewed the PEIR and the supporting Flood Risk Assessment and Drainage Strategy report, the latter of which was deemed suitable for this stage of planning.	We note that areas A, A2 and B fall within the Upper Nene Catchment area. Following the significant flooding to Northampton town centre in Easter 1998 improvements were made to the defences along the River Nene. In order to secure the level of protection afforded by the new defence, all new development in the Upper Nene catchment must be designed for a flood with a 0.5% probability (1 in 200 chance) occurring in any year, including an appropriate allowance for climate change. This includes design of mitigation for main river flooding and any surface water attenuation. This applies across the whole of the Upper Nene catchment including all branches and arms of the Nene, upstream of Billing Aquadrome, and all tributaries such as Wootton Brook, Dallington Brook and Bugbrooke Brook. At the next stage of planning, please can the applicant ensure that the drainage system and any flood management is	This has been noted and is included in the ES Chapter policy section. The supporting Flood Risk Assessment and Drainage Strategy in Appendix 10.3, 10.4 and 10.5 are also in line with the design event required for the Upper Nene catchment.	This is presented in Section 10.3 and the respective supporting Appendices 10.3, 10.4, 10.5.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	aligned with this policy and addresses all return periods up to the 1 in 200yr event plus 40% climate change allowance.		
	The applicant is reminded to make space for SuDS across the site to deliver a comprehensive and effective drainage strategy. In order to support the Drainage Hierarchy, please can the applicant ensure at the next stage of planning that appropriate soil permeability tests and groundwater monitoring is provided to support the possibility of drainage via infiltration.	Sufficient space for SuDS have been provided across the Application Site. It is considered that the Application Site will remain largely permeable following development (with the proposed solar panels being raised). The supporting Appendix 10.6 and Appendix 10.11 assessments adopt a combination of passive infiltration over undeveloped greenfield land and lined attenuation systems with controlled discharge where formal drainage is required. As infiltration is not relied upon in the current strategy, BRE 365 testing is not considered necessary or proportionate to support the DCO application. Should infiltration become feasible during detailed design, soakaway testing would be undertaken at that stage in line with BRE 365 and relevant guidance.	See supporting Appendix 10.6 and Appendix 10.11 for Site-specific proposals.
	The applicant is reminded that there are areas of high surface	No action required - measures to address areas of surface water risk	See supporting Appendices 10.1 - 10.11.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	water flood risk across the proposed sites. Therefore, critical infrastructure should not be constructed in high (more than 3.3% chance each year) and medium (between 1% and 3.3% chance each year) surface water extents without appropriate mitigation.	have been addressed within Section 5.0 of the supporting Appendices. Critical infrastructure is not placed in areas at medium or high risk of surface water flooding, and do not obstruct flows.	
	According to the Flood Risk Assessment, watercourses are located within or adjacent to the sites. A minimum 9m buffer should be maintained between the edge of the watercourse for maintenance access unless demonstrated inappropriate. Under the provisions of the Land Drainage Act 1991, land drainage consent is required for any works affecting the flow in an ~~ordinary watercourse.~~Ordinary Watercourse.	The local plan policy requiring a 9 metre buffer from any Ordinary Watercourses in Sites located in West Northamptonshire, North Northamptonshire and Milton Keynes Council areas will be adhered to. The DCO will disapply the need for any land drainage consents in areas where works are proposed and instead include protective provisions. Specific to the Scheme, the buffer will need to be applied to all Ordinary Watercourses within the Order Limits of the Scheme.	See Section 10.3 and 10.7. See supporting Appendices.
	Document 1 states: “The land drains are ~~ordinary watercourses~~Ordinary Watercourses and are therefore the responsibility of the LLFA to maintain”. This statement is not	Noted, this is be clarified within the ES chapter and the supporting Flood Risk Assessment and Drainage Strategy, to state that the responsibility of Ordinary	See ES Chapter Section 10.6 below and supporting Appendices.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	correct. The maintenance of ~~ordinary watercourses~~Ordinary Watercourses, under The Water Resources Act 1991 and The Land Drainage Act 1991, is the responsibility of the riparian owner. The duty of maintenance of the ~~ordinary watercourses~~Ordinary Watercourses will fall to the landowner.	Watercourses is under the riparian owner.	
North Northamptonshire Council December 2024 North Northamptonshire Council have reviewed the PEIR and have the following comments that will be addressed in this ES Chapter.	The PEIR is missing a topography plan, this needs to be provided for all areas.	Each supporting Appendix contains LIDAR and/or specific topographic survey information for each Green Hill Site. The surveys inform the understanding of local topography, including surface water flow direction and catchment delineation, and have been used to support drainage design where required.	See supporting Appendices 10.2 - 10.11.
	The LLFA would ordinarily expect receipt of a detailed drainage plan (appropriately cross-referenced to supporting calculations) for the development which clearly indicates the location of all proposed drainage elements. It is noted the drainage strategy	This will be addressed in full at the next stage of planning, at the detailed design stage when fixed layouts are available, particularly with reference to the Green Hill C and Green Hill BESS Sites.	N/A

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	submitted by the Applicant under drawing does not correctly reference the pipes and manhole details. There should also be a qualitative examination of what would happen if any part of the system fails. It should be demonstrated that flood water will have flow routes through the Site without endangering property and where possible maintaining emergency access/egress routes.		
	No supporting calculations have been provided for the pre-development brownfield/ greenfield discharge rates/attenuation volumes. Following submission of this the LLFA may have further comments to make.	Given that the Scheme is primarily comprised of panelled areas, the Application Site is proposed to be freely draining and therefore supporting calculations are not considered to be required. For the proposed BESS areas, calculations have been undertaken and are provided in Appendix 10.6 and Appendix 10.11.	Refer to Appendix 10.6 and Appendix 10.11.
	The LLFA expect to see full WinDES modelling or similar with the details on proposed discharge rates, simulating storms through the whole drainage system, with results of	This will be addressed in full at the detailed design stage when fixed layouts are available.	Not Applicable

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	critical storms, demonstrating that there is no surcharge 20 in the system for the 1 in 1 year, no above ground flooding for the 1 in 30 year, and that any above-ground flooding for 1 in 100 year storm is limited to areas designated and safe to flood, away from sensitive infrastructure or buildings. These storms should also include an allowance for climate change. Following submission of this the LLFA may have further comments to make.		
	It is noted that the Applicant has made a reference in the Flood Risk Assessment (FRA) to the infiltration of surface water run-off from the Site to be considered as one of the feasible options. The LLFA would request that the Applicant supplies details of BRE 365 compliant infiltration testing to confirm that such a method of surface water disposal is viable. If the infiltration test results will be lower, the Applicant will need to provide details demonstrating	The supporting Appendix 10.6 and Appendix 10.11 assessments adopt a combination of passive infiltration over undeveloped greenfield land and lined attenuation systems with controlled discharge where formal drainage is required. As infiltration is not relied upon in the current strategy, BRE 365 testing is not considered necessary or proportionate to support the DCO application. Should infiltration become feasible during detailed design, soakaway testing would be	See Appendix 10.1.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	that soakaway's can be emptied from full to half volume within 24 hours, in order to allow for the subsequent storm inflow. Please note, should infiltration methods not prove viable, the LLFA would require demonstration of the proposed discharge from the Site.	undertaken at that stage in line with BRE 365 and relevant guidance.	
	If discharge is to an ~~ordinary watercourse~~Ordinary Watercourse, evidence will need to be provided to ensure that the system can accept the proposed flows to an acceptable downstream point without increasing risk to others. If the watercourse is not within the boundary of the Site, evidence will be required that the Applicant has a right to cross 3rd party land. The drainage calculations will need to include an analysis of the effects on the drainage system if the outfall is likely to be surcharged during flooding events.	Discharge to ground via passive infiltration is proposed across the majority of panelled areas, consistent with the existing undeveloped greenfield condition. These areas are not proposed to include formal hardstanding and therefore formal drainage systems have not been required. Instead, surface water is expected to infiltrate naturally to ground, supported by the use of permeable access routes and wildflower planting at the leeward edge of solar panels to manage localised runoff. For infrastructure areas requiring formal drainage (such as the BESS compounds), Drainage Strategies have been developed and are included in Appendix 10.6 and	See Appendix 10.6 and 10.11

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
		10.11. These confirm that infiltration is not viable due to ground conditions, and therefore controlled discharge to ~~ordinary watercourses~~Ordinary Watercourses is proposed. If this option is pursued at detailed design stage, supporting drainage calculations and confirmation of discharge rights will be provided in line with LLFA expectations.	
	Details are required of the organisation or body responsible for vesting and maintenance of individual aspects of the drainage system. A maintenance schedule setting out which assets need to be maintained, at what intervals and what method is to be used including details of expected design life of all assets with a schedule of when replacement assets may be required, should be submitted. A maintenance schedule should be accompanied by a site plan to include access points, maintenance access easements and outfalls. Maintenance	Maintenance schedules are included where formal drainage features are required (the BESS areas). This is included within Appendix 10.11.	Refer to Appendix 10.11.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	operational areas to be identified and shown on the plans, to ensure there is room to gain access to the asset, maintain it with appropriate plant and then handle any arising's generated from the Site.		
Milton Keynes City Council	Milton Keynes City Council has stated the need for the hydrology, flood risk and drainage chapter to consider that measures should be in place to manage surface water runoff due to flood events in Lavendon. Also notes the Local Plan Policy of a 9 m buffer to Ordinary Watercourses.	No action required - measures to address areas of surface water risk have been addressed within Section 5.0 of the supporting Appendices. Separate hydraulic modelling is being completed for the Lavendon catchment to explore the impact on the area. Comment relating to watercourse buffer addressed above.	See supporting Appendices.
Earls Barton Parish Council	Comment that the BESS is currently located within the floodplain (flooded twice in the last four months) and potential access limitations for emergency services to access the site if flooded.	The Parish Council has raised concern that the BESS is located within the floodplain and may have flooded twice in the last four months, with associated implications for emergency access. This comment is understood to refer specifically to Green Hill BESS. Based on our topographic	See Appendix 10.11 for updates to the Flood Risk Assessment.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
		review and site-specific hydraulic modelling, the BESS platform is located outside of the modelled flood extents for the 1 in 100 year plus climate change event, and was not affected by the recent flooding events. This is consistent with our findings and supported by local photographic records. Emergency access and egress will be maintained during flood events via the site access and surrounding road network, which lie outside modelled flood risk areas. Further detail is provided in the updated Flood Risk Assessment.	
Bedfordshire Council	Paragraph 3.4.5 could be more specific in noting the location of the BESS, the BESS facility, is located in the functional flood zone of the SPA, Ramsar, SSSI site. This is identified as a significant effect on a designated wetland of international importance.	Appendix 10.11 provides detailed commentary of treatment methods to ensure that the SPA/Ramsar/SSSI are not adversely impacted.	See Section 10.9 and Appendix 10.11.
Bozeat Parish Council	Downstream risks should be considered and not scoped out	No action required - the purpose of the drainage strategy in the supporting Appendices 10.6 and 10.11 is to ensure that any increase	Considered throughout this ES Chapter and Appendix 10.6 and 10.11.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
		in surface water runoff does not contribute to flood risk elsewhere, including downstream of the Sites, this is considered to be achieved. This consideration has therefore been adequately addressed.	
Irchester Parish Council	Concerns about flooding during installation and fire risks from battery storage units, along with resulting pollution	In locations such as Green Hill BESS and Green Hill C where battery energy storage is proposed, an impermeable liner will prevent pollutants or firewater from entering the ground. Automatically closing valves will be installed at drainage outfalls which will isolate the drainage system if triggered by fire detection systems. This will allow firewater to be safely contained for later disposal or treatment. Dedicated firewater tanks will also be provided.	See Section 10.10 of this ES Chapter, the non-technical summary and the Outline Battery Storage Safety Management Plan **[~~EN010170/APP~~EX1/GH7.7_A]** for further detail.
Mears Ashby Parish Council	Flooding at Wellingborough Road – the proposed mitigation of raising the height of the panels is deemed insufficient by the council to address this concern	No action required - this is referring to Wellingborough Road and therefore does not impact the Sites.	Not Applicable
Lavendon Parish Council	The current PEIR does not consider the possible impact of	Hydraulic model updates have been applied to the Middle Nene, Grendon Brook and Field Drain	Considered in Section 10.6 and within Appendix 10.11.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	the solar farm on the surrounding area's flood risk. Lavendon Village has experienced major flooding events in 2020 and 2024, partially due to water flow from the proposed solar farm site.-	models to give insight into the flood risk across the Sites and inform the potential for flood mitigation to be incorporated into the Scheme. Hydraulic modelling is also currently being undertaken in the Lavendon area (separate to the DCO submission), this will provide a clear understanding of the impacts of the development on the village.	
	Milton Keynes Borough Council is developing a Flood Alleviation Scheme, which will involve attenuation ponds in this area. The final proposals should take this scheme into account.	Conversations undertaken during the consultation events suggest that this Flood Alleviation Scheme is no longer going ahead, therefore this has not been considered further within our flood risk assessments.	N/A
Environment Agency 24 January 2025 PINS Ref: ~~EN01017~~ EN010170	The Sequential Test is referred to here and within Section 6.2. However, rationale for the layout of the overall site has not been presented. An overall site Sequential Test and application of a sequential approach within each development plot will ensure that development is not proposed within inappropriate areas of flood risk.	The Sequential and Exception Tests will be appropriately applied within the supporting Appendix 10.1, and sufficient input has been provided into Appendix B of the Planning Statement **[~~EN010170/~~APP~~/GH7.15~~-559].**	See supporting Appendix 10.1 and Appendix B of the Planning Statement.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	A hierarchy of proposed flood mitigation measures are set out, which are acceptable in principle. The FRA does not set out where these will be implemented across the site. It is difficult to assess the risk of flooding to the site, and the potential impact of the development on the flood zones due to lack of information regarding the layouts of each plot within the development.	As first priority, development has been directed to Flood Zone 1. The ES Chapter and supporting FRA and DS Appendices now clearly mark areas which are within Flood Zones 2 and 3. Any mitigation measures which are location specific have been outlined however most mitigation measures tend to be general mitigation measures or recommendations that can be implemented across the Site.	N/A
	It is confirmed that the potential BESS site is partly located within Flood Zone 3 and therefore may be subject to high risk of flooding. The BESS will include the most vulnerable infrastructure elements of the proposed site and the impact of flooding on this would potentially cause significant operational issues.	Within Green Hill BESS the Field BESS 1 is within Flood Zone 1, Field BESS 2 is within Flood Zone 3, and BESS 3 is no longer included within the proposals. It is acknowledged that BESS 2 is within Flood Zone 3 on the Flood Map for Planning; however, Site-specific hydraulic modelling shows the BESS Site to be outside of the floodplain, based on real topographic levels versus flood levels.	Refer to the supporting Appendix 10.11 for further details.
	It is confirmed that a climate change credible maximum scenario applies to the site. This has not been fully detailed and	The climate change credible maximum scenario has been run and acts as a sensitivity test for the hydraulic modelling updates	Refer to Appendix 10.11 for further details.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	presented within the submitted FRA. In accordance with NPS EN-1, the FRA must include an assessment of the credible maximum scenario. The FRA would be considered incomplete without this assessment.	undertaken. The credible maximum scenario utilises the 36% climate change allowance as per the requirements for the Upper End scenario for the 2080s epoch for any essential infrastructure development as part of a NSIP.	
	It is stated that solar panel supports are insignificant in size within the floodplain and should not increase flood risk elsewhere. We do not consider this a suitable assumption. Whilst this may be the case there is no evidence provided to support this claim. The layouts of each the sites have not been confirmed, so the volume of development within the floodplain is not clear. Flood risk could be increased because of the scheme.	Following design freeze and the March 2025 update to the EA's Flood Map for Planning, three panelled areas (located in Fields EF10, FF3 and FF32), and one Field within Green Hill BESS are shown to be within Flood Zones 2 and 3. Following the completion of Site-specific modelling, the BESS 2 Field is not considered to be in the floodplain. However, for the three affected panelled areas, volume loss calculations have been undertaken, utilising the cross sectional area taken by panel supports. It is considered that the volume lost by placing the panels in the floodplain in this area is negligible (8 m^3).	See the supporting Appendices 10.8 and 10.9.
	It is stated that there will be no loss of floodplain resulting from the proposed development, however layouts of the	Following design freeze and the March 2025 update to the EA's Flood Map for Planning, three panelled areas (located in Fields	See the supporting Appendices 10.8 and 10.9.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	proposed sites have not yet been confirmed. There is a potential for development located within areas at risk of flooding to cause loss of floodplain volume and to impact flood risk elsewhere, and potentially to neighbouring sites.	EF10, FF3 and FF32), and one Field within Green Hill BESS are shown to be within Flood Zones 2 and 3. Following the completion of Site-specific modelling, the BESS 2 Field is not considered to be in the floodplain. However, for the three affected panelled areas, volume loss calculations have been undertaken, utilising the cross sectional area taken by panel supports. It is considered that the volume lost by placing the panels in the floodplain in this area is negligible (8 m^3).	
	All development should be located within Flood Zone 1, however where this is not possible, flood risk will be mitigated as outlined in Paragraph 3.2.3. Raising equipment within the floodplain, if needed, would cause loss of floodplain volume. There is a potential for development located within areas at risk of flooding to cause loss of floodplain volume and to impact flood risk elsewhere, and potentially to neighbouring sites.	Following design freeze and the March 2025 update to the EA's Flood Map for Planning, three panelled areas (located in Fields EF10, FF3 and FF32), and one Field within Green Hill BESS are shown to be within Flood Zones 2 and 3. Following the completion of Site-specific modelling, the BESS 2 Field is not considered to be in the floodplain. However, for the three affected panelled areas, volume loss calculations have been undertaken, utilising the cross sectional area taken by panel	See the supporting Appendices 10.8 and 10.9.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
		supports. It is considered that the volume lost by placing the panels in the floodplain in this area is negligible (8 m^3).	
	Table 10.2 identifies the sensitivity of environmental receptors, with floodplain or flood defences having a high sensitivity. There should also be included confirmation of all flood defence assets potentially affected by the site development and construction works, this should include within the cable search area. The site construction and operation have the potential to impact of existing flood defence assets and impact their operation.	Table 10.3 of the ES Chapter outlines flood defences to have a high sensitivity. As part of the EIA, Arthian have mapped all watercourse crossings within the cable route 50m corridor. Flood defences (taken from the EA's AIMS Spatial Defences with Standardised Attributes dataset) have been included within the mapping and indicate that formal flood defences are not within the cable route corridor, with the exception of one 'Natural High Ground' flood defence (Asset ID 163619) which is located between Green Hill E and BESS 2.	See supporting Appendix 10.2 for mapping of Watercourse Crossings and commentary.
	The cable search area includes some areas of Flood Zones 2 and 3 around the River Nene. It is stated that 'no specific mitigation is required'. However, it is not clear what construction is proposed, or the location of	Table 10.3 of the ES Chapter outlines flood defences to have a high sensitivity. As part of the EIA, Arthian have mapped all watercourse crossings within the cable route 50m corridor. Flood defences (taken from the EA's	See Section 10.4 of this ES Chapter. See supporting Appendix 10.2 for mapping of Watercourse Crossings and commentary.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	this. It is understood that the Cable Corridor has yet to be finalised, however some consideration of watercourse crossings, and indicative methodology could be presented within the report. Flood risk mitigation for construction within the cable search area may be required. For example, any Main River crossings would need to be carefully considered. Lack of indicative methodology for watercourse crossings, either for access to /within array sites or cable routing make commenting on suitability problematic.	AIMS Spatial Defences with Standardised Attributes dataset) have been included within the mapping and indicate that formal flood defences are not within the cable route corridor, with the exception of one 'Natural High Ground' flood defence (Asset ID 163619) which is located between Green Hill E and the BESS 2 Field. Commentary on any works within Flood Zones / areas proposed for cabling across watercourses during construction has been presented in the ES Chapter.	
	The Mannings open channel flow mapping outputs and calculations are not presented within Annex C or Annex D within the Flood Risk Assessment. Consequently, it is not possible to appraise the flood risk calculations and outputs or validate the statement that the Risk of Flooding for Surface Water	Appendix 10.4 (Green HIll A.2) has been updated to present the Manning's Open Channel flow mapping calculations. Appendix 10.5 (Green Hill B) does not require them as there are no areas of flood risk identified within the Site.	See Appendix 10.4.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	(RoFSW) mapping is suitable where the 0.1% (1 in 1000) annual exceedance probability scenario is used as a proxy for the design flood. It is not possible to appraise the calculations or outputs regarding the Mannings open channel flow calculations and outputs. The assessment of flood risk may be inaccurate.		
	This section notes that there are no formal flow routes picked up by the surface water mapping. This is not correct, the Risk of Flooding from Surface Water (RoFSW) Mapping shows flow routes associated with Ordinary Watercourses which bisect Green Hill Solar A. These typically flow from northeast to southwest. Flood risk could be underestimated.	Text has been updated to correctly refer to the flow routes specified	See Section 10.6 (baseline conditions assessment) and Appendix 10.3.
	This section notes that there are no formal flow routes picked up by the surface water mapping. This is not correct, the Risk of Flooding from Surface Water (RoFSW) Mapping shows a	Text has been updated to correctly refer to the flow routes specified	See Section 10.6 (baseline conditions assessment) and Appendix 10.6.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	clear flow route which cuts right through the centre of Green Hill C. Flood risk could be underestimated.		
	This section notes that there are no formal flow routes picked up by the surface water mapping. This is not correct, the Risk of Flooding from Surface Water (RoFSW) Mapping shows multiple flow routes which bound and bisect the site for Green Hill Solar E. Flood risk could be underestimated.	Text has been updated to correctly refer to the flow routes specified	See Section 10.6 (baseline conditions assessment) and Appendix 10.8.
	This section notes that there are no formal flow routes picked up by the surface water mapping. This is not correct, the Risk of Flooding from Surface Water (RoFSW) Mapping shows multiple flow routes which bisect the site for Green Hill Solar F. Flood risk could be underestimated.	Text has been updated to correctly refer to the flow routes specified.	See Section 10.6 (baseline conditions assessment) and Appendix 10.9.
	This section notes that in the absence of modelled flood data the Surface Water Flood Maps can be used as a proxy for fluvial flood risk. Furthermore,	Text has been updated to refer to the fluvial 1D hydraulic model of the Grendon Brook / River Aire to improve the understanding of flood risk in Solar Panel Area F.	See Section 10.6 (baseline conditions assessment) and Appendix 10.9.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	this section notes that the Mannings equation can be used to cross check the validity of the Surface Water Flood maps for informing fluvial flood risk. There is a detailed 1-dimensional hydraulic model available for some of the watercourses which bisect Solar Panel Area F. This has not been referenced in the Flood Risk Assessment although the applicant has used this model to inform flood risk to other locations such as the BESS. The assessment of flood risk could be inaccurate and does not refer to detailed hydraulic modelling which the applicant has undertaken.		
	This section notes that a direct rainfall methodology was undertaken to assess fluvial flood risk to the BESS site from neighbouring sections of the River Nene and Grendon Brook. This is not correct; a fluvial 1-dimensional modelling approach has been undertaken	Text has been corrected in the relevant sections to refer to the fluvial 1D hydraulic modelling undertaken for Grendon Brook / River Aire and 2D direct rainfall model for the Field Drain, as per the EA's comment.	See Appendix 10.11.

Consultee and Date	Comments	How has this comment been addressed	Location of response in the ES
	to model flood risk from the River Nene and Grendon Brook using Flood Modeller. A 2d direct rainfall approach has been undertaken for the small ordinary watercourseOrdinary Watercourse known as "Field Drain" which runs through the proposed BESS site. The text does not reflect the modelling approach undertaken for the Grendon Brook and River Nene. Whilst this does not affect the model outputs the text should be updated to avoid confusion.		
	It is noted that BESS1 and BESS 2 are in areas of flood risk associated with the Grendon Brook and the Field Drain. Placing the BESS in areas of fluvial flood risk could increase flood risk elsewhere if not mitigated for appropriately. Flood risk because of the BESS could be increased.	Development proposed within BESS1 is sequentially located in Flood Zone 1. A Site-specific hydraulic model has been undertaken which indicates flood depths in BESS2 as <0.3m during all modelled events.	See baseline conditions assessment and Appendix 10.11.

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.

European Legislation

The Water Environment Framework Directive (WFD) 2000 (Ref 10.2)

10.3.2 The Water Framework Directive (WFD) establishes 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) (Ref 10.3)

10.3.3 The Groundwater Directive (2006/118/EC as amended) 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') (Ref 10.4)

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'), 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') (Ref 10.5)

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

UK Legislation

The Land Drainage Act 1991 (Ref 10.6)

10.3.6 The Land Drainage Act 1991, 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.~~ The regulation of surface-water and flood-risk activities under the Land Drainage Act 1991 is shared between the Environment Agency, Lead Local Flood Authorities and Internal Drainage Boards, alongside riparian landowners. Each body holds distinct powers depending on whether a watercourse is classified as a Main River or an ordinary watercourse.

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

The Flood and Water Management Act (2010) (Ref 10.7)

10.3.8 The Flood and Water Management Act 2010, 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.

Building Regulations (2010) Part H of Schedule 1 ('Building Regulations Part H') (Ref 10.8)

10.3.9 Buildings Regulations Part H, 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.

10.3.10 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.

10.3.11 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.

The Nitrates Directive (91/676/EEC)(the "Nitrates Directive") and the Nitrate Pollution Prevention Regulations 2015 (Ref 10.9)

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

10.3.13 The Nitrates Directive is implemented by the Nitrate Pollution Prevention Regulations 2015, 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.

10.3.14 Paragraph 10.3.6 includes reference to Nitrate Vulnerable Zones (NVZs) for baseline context. NVZs are designated by the Environment Agency under the Nitrate Pollution Prevention Regulations 2015 and form part of the environmental baseline used to inform this assessment.

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

The Environmental Permitting (England and Wales) Regulations 2016 (Ref 10.10)

~~10.3.14~~10.3.16 Regulation 12 of the Environmental Permitting (England and Wales) Regulations 2016, 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 Water Environment (WFD) (England and Wales) Regulations 2017 (Ref 10.11)

~~10.3.15~~10.3.17 The Water Environment (WFD) (England and Wales) Regulations 2017 (2000/60/EC) implement the EU directive on water protection in Europe, provide a framework for managing the water environment in England and Wales. The Directive aims for 'good status' of all ground and surface water (rivers, lakes, transitional water, and coastal waters). Under the WFD Regulations, a river basin management plan must be prepared for each river basin district. The plan includes environmental objectives and a summary of the programmes of measures required to achieve those objectives.

Planning Policy

National Planning Policy

National Policy Statement (NPS) for Energy EN-1 (Ref 10.12)

~~10.3.16~~10.3.18 The Overarching NPS for Energy (EN-1), 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.

~~10.3.17~~10.3.19 Specific policy relating to Flood Risk is set out in Section 5.8 of NPS EN-1.

10.3.1810.3.20 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; and
- 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.

10.3.1910.3.21 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 report;
- 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); and
- 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.

10.3.2010.3.22 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*."

NPS for Renewable Energy Infrastructure EN-3 (Ref 10.13)

~~10.3.21~~10.3.23 Section 2.10 reaffirms the government commitment to sustained growth in solar capacity to align with the net-zero emissions by 2050 target. With reference to section 2.4 (Adaptation) and paragraph 2.4.11 for solar photovoltaic.

~~10.3.22~~10.3.24 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*."

~~10.3.23~~10.3.25 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).*"

~~10.3.24~~10.3.26 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.*"

~~10.3.25~~10.3.27 Paragraphs 2.10.84 – 2.10.88 relevantly provide that:

- 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*."
- 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*."
- 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*."
- Paragraph 2.10.87 – "*Culverting existing watercourses/drainage ditches should be avoided.*"
- 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) (Ref 10.14)

~~10.3.26~~10.3.28 The NPS for Electricity Networks Infrastructure (EN-5), 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.

~~10.3.27~~10.3.29 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) (Ref 10.15)

~~10.3.28~~10.3.30 The revised National Planning Policy Framework (NPPF) was last updated in December 2024. It should be read in conjunction with the National Planning Practice Guidance (NPPG).

~~10.3.29~~10.3.31 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.

~~10.3.30~~10.3.32 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.

~~10.3.31~~10.3.33 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

North Northamptonshire Joint Core Strategy (Ref 10.16)

10.3.3210.3.34 The existing North Northamptonshire Joint Core Strategy 2011-2031, adopted in July 2016, contains the following policies in relation to flood risk and drainage:

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

"*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*:*

- 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;
- 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;
- Development should be designed from the outset to incorporate SuDS wherever practicable, to reduce flood risk, improve water quality and promote environmental benefits;
- Where appropriate, development should, subject to viability and feasibility, contribute to flood risk management in North Northamptonshire;
- 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;
- 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).

West Northamptonshire Joint Core Strategy (Ref 10.17)

10.3.3310.3.35 The existing West Northamptonshire Joint Core Strategy (Part 1), (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

"*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.

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.

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.

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.

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.

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*

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

- *Separate surface water from foul and combined sewer;*
- *Be accompanied by a long-term management and maintenance plan; and*
- *Protect and enhance water quality.*

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.

Northamptonshire County Council has identified within their 'Local Standards And Guidance For Surface Water Drainage In Northamptonshire', 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…'"*

~~10.3.34~~10.3.36 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.

~~10.3.35~~10.3.37 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.

~~10.3.36~~10.3.38 A new local plan for the area to guide development in the period up to 2041 is currently being drafted. An emerging draft plan was released in 2024 and contains the following draft policy related to flood risk:

- Policy PL5 - Flood Risk

"A. All proposals for development of 1 hectare or above in flood zone 1 and for development in flood zones 2, 3a or 3b must be accompanied by a flood risk assessment (FRA) that sets out the mitigation and resilience measures for the site. An FRA should also accompany proposals where they may be subject to other sources and forms of flooding or where other bodies have indicated that there may be drainage problems. The FRA should be agreed with the Council as Lead Local Flood Authority.

B. In order to meet the exception test, development must:

i. demonstrate that it provides wider sustainability benefits to the community that outweigh the flood risk; and

ii. 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.

C. 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 sewers;

b. be accompanied by a long-term management and maintenance plan; and

c. protect and enhance water quality.

D. Surface water attenuation should be provided to the design standard for the Upper Nene catchment (through Northampton and within the Nene catchment upstream of Northampton) i.e. the 0.5% probability (1 in 200 chance of occurring in any year) event plus climate change.

E. For all development suitable access must be provided and maintained for water supply and drainage infrastructure."

Milton Keynes MK Plan (Ref 10.18)

~~10.3.37~~10.3.39 The new Local Plan for Milton Keynes, Plan:MK, 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

"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.

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).

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.

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

- *To be supported by a site-specific Flood Risk Assessment (FRA) (subject to the triggers set out below);*
- *To take into account all forms of flooding including, but not limited to: fluvial, groundwater, surface water and reservoir flooding;*
- *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;

- *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);*
- *When applying the sequential test, to clearly demonstrate that the impacts of climate change are taken into account;*
- *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;*
- *To build resilience into a site's design;*
- *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);*
- *To provide a safe access and egress route for future users of the development;*
- *To attenuate surface water run-off in line with Policy FR2; and*
- *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.*

A site-specific FRA will be required for:

- *All sites of 1ha or more in Flood Zone 1;*
- *All sites within Flood Zone 2 or 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; and*
- *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

"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.

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:

- *Flood risk management and SuDS will be provided at a strategic scale and in an integrated manner, wherever possible;*
- *Space will be specifically set aside for SuDS and fluvial flood risk reduction features and used to inform the overall layout of development sites;*
- *Above ground attenuation will be provided in preference to below ground attenuation;*
- *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;*
- *SuDS will be designed with an allowance for climate change and the potential impact it may have over the lifetime of the proposed development;*
- *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;*
- *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;*
- *Development will ensure no adverse impact on the functions and setting of a watercourse and its associated corridor;*
- *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

"*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.

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."

Bedford Borough Council (Ref 10.19)

~~10.3.38~~10.3.40 The Bedford Borough Council Local Plan 2030 contains the following flood risk / drainage policies:

- Policy 92: Flood Risk

"In considering new development water management and flood risk must be addressed by:

i. Directing development to areas at lowest risk of flooding by applying the sequential test and, where necessary, the exception test, in line with national policy. Development will not be permitted in flood zone 3b unless defined as 'water compatible' in table 2 of the Planning Practice Guidance. Development will not be permitted in flood zone 3a unless defined as 'less vulnerable' or 'water compatible' in table 2 of the Planning Practice Guidance.

ii. Considering all sources of flooding including fluvial, groundwater, surface water, reservoir overspill, infrastructure/sewer failure. Allowances for climate change must be included in the assessment of flood risk in accordance with latest national guidance.

iii. Demonstrating that suitable infrastructure capacity is present or can be provided to serve the development.

iv. Ensuring proposed development assesses and mitigates its impact on flood risk on and off site and includes measures to reduce overall flood risk.

v. Where the assessment has identified that the proposed development is at flood risk (from any source) it must be demonstrated that the development will be safe for its lifetime through appropriate flood resilient and resistant design and include the provision of safe access and egress to an area of safe refuge.

vi. Demonstrating how the cumulative impact of development on flooding to the immediate and surrounding area, and the Natura 2000 sites Portholme (SAC) and the Ouse Washes (SAC/SPA/Ramsar) downstream, has been addressed and reduced through the proposed development.

Site specific flood risk assessments will need to be submitted in support of development where:

vii. Development proposals in flood zone 1 exceed 1ha, in accordance with national policy; or

viii. Development proposals are in flood zones 2, 3a or 3b; or

ix. *Evidence exists (e.g. in the Strategic Flood Risk Assessment or areas identified by the Lead Local Flood Authority) of areas with a high risk of flooding or known to be at risk of flooding from other sources, such as surface water. Where an increase in built footprint is proposed in undefended flood zone 3a or flood zone 3b, a site specific flood risk assessment should demonstrate that level-for- level and volume-for-volume floodplain compensation can be provided to ensure there is no increase in flood risk elsewhere."*

- Policy 93: Sustainable Drainage Systems

"All development proposals must incorporate suitable surface water drainage systems appropriate to the nature of the site. Post-development run off rates should aim to achieve greenfield equivalents. The fact that a site is previously developed and has an existing high run-off rate will not constitute justification. Development proposals will need to demonstrate:

i. *The discharge location has sufficient capacity to receive the post development flows.*

ii. *The proposed surface water drainage system has been designed to prevent flooding of internal property and neighbouring for all rainfall events up to the 1% annual exceedance probability event including the appropriate allowance for climate change.*

iii. *Sufficient treatment stages have been incorporated to adequately remove pollutants and protect the local water environment, following the principles of the latest national guidance.*

iv. *Provisions for safe conveyance and storage of flood waters should the capacity of the proposed drainage system become exceeded.*

v. *Adequate arrangements for the management and maintenance of the proposed drainage system for its lifetime have been provided.*

vi. *Compliance with national guidance, and that regard has been given to Bedford Borough Council's SuDS Supplementary Planning Document, and industry best practice.*

vii. *Opportunities to improve water quality, amenity and biodiversity benefits have been realised. Priority should be given to the following order of discharge locations:*

- *To ground via infiltration techniques;*
- *To an above ground water body;*
- *To a surface water sewer."*

~~10.3.39~~10.3.41 Bedford Borough Council is currently preparing the Local Plan 2040.

Guidance

Non-Statutory Technical Standards for Sustainable Drainage (2015) (Ref 10.20)

~~10.3.40~~10.3.42 The National Standards for SuDS published by the Department of Environment, Food and Rural Affairs (DEFRA), 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.

~~10.3.41~~10.3.43 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 and Significance Criteria

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 ~~Description~~ **[~~EN010170/APP~~EX1/GH6.2.3_A]** of the ES, the Study Area comprises nine Sites (A-G and BESS) and the Cable Route Corridor (typically 50m). Please see Chapter 4: Scheme Description **[~~EN010170/APP~~EX1/GH6.2.4_A]** of the ES which provides a description of the proposed Scheme including the physical characteristics and key activities. See the supporting Appendices for further information and mapping for the Scheme.

10.4.3 The assessments have identified and assessed the risks of all forms of flooding to and from the proposed Scheme in line with NPS, NPPF and PPG guidance and have:

- Identified and evaluated the significant effects and receptors at risk;
- Undertaken consultation with the Environment Agency, Lead Local Flood Authority, IDB and other stakeholders;
- Identified whether the proposed Scheme is likely to be affected by current or future flooding from any source;
- Assessed whether it will cause increased flood risk elsewhere;
- Assessed whether the measures proposed to deal with these effects and risks are appropriate;
- Undertaken a review of the Sequential Test and, if required, the Exception Test as detailed in Paragraph 5.7.9, 5.7.12 to 5.7.17 of NPS EN-1. Please refer to the Green Hill Site Selection Report (Appendix B of the Planning Statement **[~~EN010170/~~APP~~/GH7.15~~-559]**) for further commentary on flood risk in relation to the alternative sites; and
- Provided an assessment to ensure that any potential increases in Site runoff are mitigated utilising SuDS. This has been determined in consultation with the Environment Agency and North Northamptonshire and West Northamptonshire Councils as Lead Local Flood Authorities.

Sources of Information

10.4.4 The relevant information sources used for the assessment are as follows:

- DEFRA LiDAR data service platform[i];
- EA Flood Map for Planning (updated March 2025)[ii];
- EA Long Term Flood Risk Map (updated January 2025)[iii];
- EA Catchment Data Explorer[iv];
- British Geological Survey (BGS) database[v];
- DEFRA Magic Mapping[vi]; and
- LandI Soilscapes mapping[vii].

Impact Assessment Methodology

10.4.5 This chapter considers potential impacts to the Zone of Influence (ZoI) over the lifetime of the Scheme 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 impacts during the construction, operation and decommissioning phases. Mitigation measures are then applied, and any residual likely significant effects are identified.

10.4.6 The ZoI for the assessment of hydrology, flood risk and drainage is limited to the Order Limits of the Scheme, this includes Green Hill A – G, the Cable Route Corridor and the Green Hill BESS. The ZoI is limited to the Order Limits of the Scheme as there has been no allowance for increases in flood risk within or downstream of the Sites, nor detrimental impacts on water quality.

10.4.7 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 10.3** 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.

Sensitivity of Receptors

10.4.8 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 where practicable.

~~Table 10.3:~~Table 10.3: Sensitivity of the Identified Environmental Receptor

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

Magnitude of Impacts

~~Table 10.4:~~Table 10.4: Methodology for determining impact magnitude

Sensitivity	Definition
High	Loss of Protected Area. Pollution of potable sources of water abstraction.

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

Assessment of Significance

~~Table 10.5:~~Table 10.5: Methodology for determining significant effects

	Sensitivity	High	Medium	Low	Negligible
	Magnitude				
Adverse	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

10.4.9 When 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.

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

10.4.11 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.

10.4.12 Where effects fall on the boundary between categories (e.g. Moderate/Minor), professional judgement has been applied considering the context, available data, receptor sensitivity and likelihood of occurrence. In these cases, a precautionary approach is taken, and justification for classification is provided where relevant.

10.5 Assessment Assumptions and Limitations

10.5.1 The methodology for the hydrology, flood risk and drainage assessment and ES 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;
- Runoff from construction, operational or decommissioning activities that could contain contaminants or construction-related waste will be collected, contained and prevented from entering local watercourses. This includes runoff from areas such as laydown zones, construction compounds and fuel or chemical storage areas. These measures will be secured through the Outline Construction Environmental Management Plan (OCEMP), Outline Operational Environmental Management Plan (OOEMP) and Outline Decommissioning Statement (ODS);
- That 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, EA flood data and updates made to existing hydraulic models obtained from the EA;
- The Scheme is anticipated to be unmanned during the operational phase, with infrequent attendance for routine maintenance, however there will be periods of increased activity associated with the replacement of solar panels and batteries at the end of their operational life. The replacement 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; and

- All assumptions and limitations outlined above as part of the methodology are standard assumptions made in the development of such solar farm schemes and therefore, the above are not considered to have a significant impact on the validity of the assessment made in this ES Chapter.

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. Green Hill is subdivided into 9 distinct Sites. The Sites are referred to as Green Hill A, Green Hill A.2, Green Hill B, Green Hill C, Green Hill D, Green Hill E, Green Hill F, Green Hill G and Green Hill BESS. Furthermore, the Cable Route Corridor is also assessed. The baseline conditions for each of the Sites has been detailed in full in **Appendix 10.1 [EX1/GH6.3.10.1 A]** and the supporting **Appendices (10.2 to 10.11 [~~EN010170/~~APP-098 to APP-102, EX1/GH6.3.10.~~1~~6 A, APP-104 to APP-107, EX1/GH6.3.10.11 A])**.

10.6.2 The risk of tidal and fluvial flooding has been interpreted from the EA's online Flood Map for Planning (Ref 10.21), updated in March 2025. The risk of surface water flooding has been assessed from the EA Long Term Flood Risk Map (Surface Water) (Ref 10.22), updated in January 2025, and where necessary Site-specific hydraulic modelling has been utilised.

10.6.3 The Environment Agency's Flood Map for Planning does not distinguish between Flood Zone 3a (high probability of flooding) and Flood Zone 3b (functional floodplain). For the Green Hill Solar Farm, detailed hydraulic modelling undertaken for the Grendon Brook and River Nene systems associated with the BESS and southern sites (reported in **Annex D [APP-102] (Green Hill B)**, **Annex F [APP-104] (Green Hill D)** and **Annex J [EX1/GH6.3.10.11 A] (Green Hill BESS)**) demonstrates that areas corresponding to Flood Zone 3b are confined to narrow corridors immediately adjoining these watercourses. These areas are limited to peripheral sections of agricultural land and do not include any permanent operational infrastructure. Through embedded mitigation and design buffers, all built infrastructure, including the Battery Energy Storage System, substations and access tracks, is located outside land corresponding to functional floodplain. Any remaining areas of Flood Zone 3 within the Order Limits are occupied only by raised solar panels that are resilient to shallow flooding.

~~10.6.3~~10.6.4 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~~10.6.5 The Scheme is situated within Anglian River Basin Management Plan (RBMP) area. Within the Anglian RBMP, Green Hill A to F and the BESS are located in the Nene Management Catchment, where the higher central and upper end allowances for peak river flow in the 2080s are 13% and 36% respectively. Green Hill G is located in the Upper and Bedford Ouse Management Catchment, where the higher central and upper allowances for peak river flow in the 2080s

are 30% and 58% respectively. The Cable Route Corridor spans both catchments, and both allowances have been considered in the assessment.

~~10.6.5~~10.6.6 The local land drainage network feeds into local watercourses, several of which are WFD surface waterbodies. The WFD waterbodies are identified in the WFD assessment **[~~EN010170/APP~~EX1/GH7.22_A]**.

10.6.7 Baseline mapping from the British Geological Survey and the Environment Agency's Aquifer Designation Dataset identifies the Blisworth Limestone Formation beneath much of the Order Limits as a Principal Aquifer, which is therefore considered to be of High sensitivity. Secondary A and B deposits present locally are of Medium sensitivity, details of these are outlined within ES Chapter 22: Ground Conditions and Contamination **[EX1/GH6.2.22_A]**. While superficial deposits and other units classed as Unproductive Strata are of Low sensitivity. This classification aligns with ES Chapter 22: Ground Conditions and Contamination **[EX1/GH6.2.22_A]**, This classification follows the Environment Agency's Aquifer Designation Dataset and the site-specific hydrogeological information presented in the FRA Annexes.

10.6.8 The Blisworth Limestone Formation represents a High-sensitivity groundwater receptor. Depth to groundwater across the majority of the Order Limits is significant, and low-permeability superficial deposits provide natural attenuation. No groundwater abstractions or Source Protection Zones are present within the Order Limits.

~~10.6.6~~10.6.9 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 where required.

~~10.6.7~~10.6.10 Site-specific hydraulic modelling, such as at the Green Hill BESS site, has included the required climate change 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~~10.6.11 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.

~~10.6.9~~10.6.12 The Scheme is anticipated to have a 60-year life, therefore a 75- year timeframe should be applied, consistent with the Government's National Planning Practice Guidance. An Upper End Allowance for the 2080s epoch should also be evaluated as a sensitivity test. Further details can be found within the assessment of baseline conditions below and in the relevant supporting appendices.

10.6.13 Only parts of Green Hill D and Green Hill F fall within the Environment Agency's Flood Warning Service area. Coverage is determined by the Environment Agency and cannot be amended or extended by the Applicant.

Existing Baseline

~~10.6.10~~10.6.14 The existing baseline conditions are derived from the Flood Risk Assessment and Drainage Strategy.

Green Hill A

Flood Risk and Drainage Designations

Fluvial Flood Risk

~~10.6.11~~10.6.15 A network of land drainage ditches is located within Green Hill A (see Appendix 10.~~2 [EN010170/~~3 [**APP/~~GH6.3.10.2~~-100]** -** 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~~drainage ditches are Ordinary Watercourses and are therefore the responsibility of the riparian owner to maintain (whereas main rivers fall under the responsibility of the EA).

~~10.6.12~~10.6.16 Fluvial flooding could occur if the land ~~drains~~drainage ditches overtopped their banks during or following an extreme rainfall event.

~~10.6.13~~10.6.17 According to the EA's Flood Map for Planning (updated March 2025), the entirety of the Green Hill A is situated in Flood Zone 1 (has less than a 1 in 1,000 annual probability of river or sea flooding), with the exception of a small section (Fields AF25 – 28) where the flood extents encroach slightly into the Site Boundary. However, these extents remain outside of any areas of proposed development.

~~10.6.14~~10.6.18 The EA Historical Flood Map indicates that Green Hill A has not historically flooded and neither has the area in near vicinity.

~~10.6.15~~10.6.19 Considering the above, Green Hill A is therefore considered to be at low risk of fluvial flooding.

Surface Water Flood Risk

~~10.6.16~~10.6.20 The EA's National Flood Risk Assessment Mapping (NaFRA), known as the Long Term Flood Risk Map (Surface Water) was updated in January 2025.

~~10.6.17~~10.6.21 The NaFRA mapping provides an updated view of surface water flooding across the site, however it should be noted that at the time of writing, the NaFRA mapping only delivers climate change insight up to the year 2060.

~~10.6.18~~10.6.22 The previous EA Risk of Flooding from Surface Water (RoFSW) mapping 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).

~~10.6.19~~10.6.23 The updated NaFRA mapping has been assessed and indicates that there is no visible change in surface water risk across the Green Hill A Site. As described in the fluvial section above, the surface water flooding extents largely correspond with the land drainage ditches which flow throughout Green Hill A. The mapping indicates that there is a flow route associated with the drainage ditch that bisects Green Hill A which flows in a south-westerly direction, along with some other minor flow routes.

~~10.6.20~~10.6.24 Based on the above, the overall baseline risk of surface water flooding at Green Hill A is considered to be low.

Green Hill A.2

~~10.6.21~~10.6.25 There are no watercourses or land ~~drains~~drainage ditches present within the Green Hill A.2 Site Boundary. There is however a series of land ~~drains~~drainage ditches in the vicinity of the Site, with the closest land ~~drain~~drainage ditch positioned adjacent to the north-western border of the Site. Based on the local topography, flows within these ditches are expected to move in a south-westerly direction.

~~10.6.22~~10.6.26 Fluvial flooding could occur if the land ~~drains~~drainage ditches overtopped their banks during or following an extreme rainfall event.

~~10.6.23~~10.6.27 According to the EA's updated Flood Map for Planning, the entirety of 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.

~~10.6.24~~10.6.28 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.

Considering the above, Green Hill A.2 is therefore considered to be at low risk of fluvial flooding.

Surface Water Flood Risk

~~10.6.25~~10.6.29 The previous EA RoFSW mapping 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).

~~10.6.26~~10.6.30 The updated NaFRA mapping has been assessed and indicates that there is no visible change in surface water risk across the Green Hill A.2 site. 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.

~~10.6.27~~10.6.31 Based on the above the overall risk of surface water flooding at Green Hill A.2 is considered to be low.

Green Hill B

Flood Risk and Drainage Designations

Fluvial Flood Risk

~~10.6.28~~10.6.32 There are no watercourses within Green Hill B. There are two land drainage ditches located within 200m of Green Hill B (see Appendix 10.5 **[~~EN010170/~~APP~~/GH6.3.10.5~~-102]** - 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~~drainage ditches are Ordinary Watercourses and are therefore the responsibility of the riparian owner to maintain.

~~10.6.29~~10.6.33 Fluvial flooding could occur if the land ~~drains~~drainage ditches

overtopped their banks during or following an extreme rainfall event.

~~10.6.30~~10.6.34 According to the EA's updated Flood Map for Planning, 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.

~~10.6.31~~10.6.35 The EA Historical Flood Map indicates that Green Hill B has not historically flooded and neither has the area nearby.

~~10.6.32~~10.6.36 Considering the above, Green Hill B is therefore considered to be at low risk of fluvial flooding.

Surface Water Flood Risk

~~10.6.33~~10.6.37 The previous EA RoFSW 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).

~~10.6.34~~10.6.38 The updated NaFRA Mapping indicates that there is no visible change in the surface water risks posed to Green Hill B.

~~10.6.35~~10.6.39 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches.

~~10.6.36~~10.6.40 Based on the above the overall risk of surface water flooding at Green Hill B is considered to be low.

Green Hill C

Flood Risk and Drainage Designations

Fluvial Flood Risk

~~10.6.37~~10.6.41 There is one land drainage ditch which runs through the centre of Green Hill C (Appendix 10.6 **[~~EN010170/APP~~EX1/GH6.3.10.6_A]** - Green Hill C). Flows within the ditches are expected to flow in a south-westerly direction based on local topography.

~~10.6.38~~10.6.42 Fluvial flooding could occur if the land ~~drains~~drainage ditches overtopped their banks during or following an extreme rainfall event.

~~10.6.39~~10.6.43 According to the EA's updated Flood Map for Planning, 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.

~~10.6.40~~10.6.44 The EA Historical Flood Map indicates that the Green Hill has not historically flooded and neither has the area nearby.

~~10.6.41~~10.6.45 Green Hill C is therefore considered to be at low risk of fluvial flooding.

Surface Water Flood Risk

~~10.6.42~~10.6.46 The previous EA RoFSW 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).

~~10.6.43~~10.6.47 In the absence of modelled flood data, surface water flood maps can be used as a proxy to provide an understanding of potential fluvial flood risk. Surface water mapping indicates that there is a flow route associated with the drainage ditch that bisects Green Hill C which flows in a south westerly direction.

~~10.6.44~~10.6.48 The updated NaFRA mapping indicates that there is no visible change in the risk from surface water posed to Green Hill C.

~~10.6.45~~10.6.49 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches.

~~10.6.46~~10.6.50 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.

Green Hill D

Flood Risk and Drainage Designations

Fluvial Flood Risk

~~10.6.47~~10.6.51 There is an unnamed ~~ordinary watercourse~~Ordinary Watercourse located along the western boundary of Green Hill D, flowing in a south-westerly direction (see Appendix 10.7 **[~~EN010170/~~APP~~/GH6.3.10.7~~-104]** - Green Hill D). Fluvial flooding could occur if the ~~ordinary watercourse~~Ordinary Watercourse overtopped its banks during or following an extreme rainfall event.

~~10.6.48~~10.6.52 According to the EA's updated Flood Map for Planning, 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 alongside the western boundary of all Fields within Green Hill D is identified as being in Flood Zone 3, associated with an ~~ordinary watercourse~~Ordinary Watercourse known as Swanspool Brook. However, these extents remain outside of any areas of proposed development.

~~10.6.49~~10.6.53 The EA Historical Flood Map indicates that Green Hill D has not historically flooded and neither has the area nearby.

~~10.6.50~~10.6.54 Green Hill D is therefore considered to be at low risk of fluvial flooding.

Surface Water Flood Risk

~~10.6.51~~10.6.55 The previous EA RoFSW 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).

~~10.6.52~~10.6.56 The updated NaFRA Map indicates that there is no visible change in the risks from surface water posed to Green Hill D.

~~10.6.53~~10.6.57 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches and ~~ordinary watercourses~~Ordinary Watercourses.

~~10.6.54~~10.6.58 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.

Green Hill E

Flood Risk and Drainage Designations

Fluvial Flood Risk

~~10.6.55~~10.6.59 A network of land drainage ditches is located within Green Hill E (see Appendix 10.8 **[~~EN010170/~~APP~~/GH6.3.10.8~~-105]** – Green Hill E). Flows within the ditches are expected to flow in a south-westerly direction based on local topography.

~~10.6.56~~10.6.60 According to the EA's updated Flood Map for Planning, the majority of Green Hill E is situated in Flood Zone 1. However, an area that bisects Fields EF23 and EF33, the southern and eastern boundaries, and an area that bisects Fields EF9 and EF10 are indicated to be within Flood Zone 3. The Flood Zones are largely shown to remain outside the extents of the proposed development with the exception of Field EF10 where flood zone extents are shown to encroach into the proposed panelled areas.

~~10.6.57~~10.6.61 The Environment Agency has advised that, for any development located within Flood Zone 3a (i.e. the 1 in 100-year plus climate change flood extent), floodplain storage compensation should be incorporated into the design. Compensation should be provided on a level-for-level and volume-for-volume basis, ensuring direct replacement of any lost storage. In line with this, calculations have been undertaken in accordance with Section A3.3.10 of CIRIA Guide C624: Development and Flood Risk – guidance for the construction industry.

~~10.6.58~~10.6.62 Flood volume loss has been conservatively estimated based on the cross-sectional area of the proposed panel supports (28.65 cm²), multiplied by the number of supports located within Flood Zones 2 and 3 across the Site (assumed as 10 piles per 100 m of panels, equating to approximately 2,200 piles), and applying a worst-case flood depth of 1.2 m. This results in a total displaced volume of just 8 m³ across the entire submission area.

~~10.6.59~~10.6.63 The floodplain area within the Green Hill E catchment has been calculated as approximately 27,000 m², with a downstream boundary defined approximately 180 m south of Wilby Road, where a land ~~drain~~drainage ditch appears to be culverted beneath Wilby Road. When the conservatively estimated displaced volume of 8 m³, representing the total potential flood storage displacement across the entire DCO application area, is spread across the full floodplain extent, the theoretical increase in flood depth is approximately 0.296 mm. This is considered negligible, well within the natural variability of floodplain behaviour, and would result in no perceptible change in flood levels or

flow routes. It therefore represents a highly conservative assessment of worst-case impacts.

~~10.6.60~~10.6.64 Given the extremely limited displacement, the conservative assumptions applied, and the imperceptible increase in flood depth, the impact on flood storage capacity is considered de minimis. On this basis, it is concluded that further consideration or provision of compensatory flood storage resulting from panelled areas encroaching into the flood extents is not necessary or proportionate for the Scheme.

~~10.6.61~~10.6.65 The EA Historical Flood Map indicates that Green Hill E has not historically flooded and neither has the neighbouring land.

~~10.6.62~~10.6.66 Green Hill E is therefore considered to be at low risk of fluvial flooding.

Surface Water Flood Risk

~~10.6.63~~10.6.67 The previous EA RoFSW 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).

~~10.6.64~~10.6.68 The updated NaFRA Map indicates that there is no visible change in the risks from surface water posed to Green Hill E. Surface water mapping indicates multiple flow routes are present which bound and bisect Green Hill E. The flow routes are largely retained within existing ditches with the exception of the flow route which bisects Fields EF9 and EF1.

~~10.6.65~~10.6.69 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches and ~~ordinary watercourses~~Ordinary Watercourses.

~~10.6.66~~10.6.70 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.

Green Hill F

Flood Risk and Drainage Designations

Fluvial Flood Risk

~~10.6.67~~10.6.71 A network of land drainage ditches is located within Green Hill F (see Appendix 10.9 **[~~EN010170/~~APP~~/GH6.3.10.9~~-106]** – 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.

~~10.6.68~~10.6.72 According to the EA's updated Flood Map for Planning, the majority of Green Hill F lies within Flood Zone 1, indicating a low risk of flooding. However, sections of several fields, particularly in the north are indicated to be within Flood Zone 3. The Flood Zones are largely shown to remain outside the extents of the Proposed Development with the exception of Fields FF3 and FF32 where flood zone extents are shown to encroach into the proposed panelled areas.

Historically, flooding has affected the northern part of Green Hill F, most notably during the River Nene flood event in March 1947.

~~10.6.69~~10.6.73 It is acknowledged that the Grendon Brook hydraulic model (2013) covers Green Hill F. However, given the minimal area of the EA's Flood Zones which encroach into the Site Boundary, and that there are no structures proposed within the Flood Zones other than solar panel structures, further hydraulic modelling of Green Hill F was not considered necessary. See below for floodplain loss calculations for the relevant affected areas marked for proposed panels.

~~10.6.70~~10.6.74 Flood volume loss has also been conservatively estimated for Fields FF3 and FF32, based on the cross-sectional area of the proposed panel supports (28.65cm²), multiplied by the number of supports located within Flood Zones 2 and 3 across the Site (assumed as 10 piles per 100 m of panels, equating to approximately 2,200 piles), and applying a worst-case flood depth of 1.2m. This results in a total displaced volume of just 8m³ across the entire submission area.

~~10.6.71~~10.6.75 To assess the potential uplift in flood levels resulting from the loss of floodplain storage in Field FF3, the downstream extent of the floodplain has been defined at the location of the main road crossing. This point was selected as a practical hydrological boundary, as the road is likely to act as a flow restriction during flood events, limiting downstream floodplain connectivity. Any potential impact from the minor loss of flood storage would therefore be most likely to affect areas upstream of the road, making it an appropriate and conservative boundary for this assessment. This catchment has been calculated as approximately 318,482.07m^2. When the conservatively estimated displaced volume of 8m³, representing the total potential flood storage displacement across the entire DCO application area, is spread across the full floodplain extent, the theoretical increase in flood depth is approximately 0.000025mm.

~~10.6.72~~10.6.76 To assess the potential uplift in flood levels resulting from the loss of floodplain storage in Field FF32, the location of the downstream limited was selected as Home Farm given the morphology of the flood risk extent. The floodplain area within the Green Hill Field FF32 catchment has been calculated as approximately 20,483.7m. When the conservatively estimated displaced volume of 8m³, representing the total potential flood storage displacement across the entire DCO application area, is spread across the full floodplain extent, the theoretical increase in flood depth is approximately 0.39mm.

~~10.6.73~~10.6.77 Both flood depths are considered negligible, well within the natural variability of floodplain behaviour, and would result in no perceptible change in flood levels or flow routes. It therefore represents a highly conservative assessment of worst-case impacts.

~~10.6.74~~10.6.78 Given the extremely limited displacement, the conservative assumptions applied, and the imperceptible increase in flood depth, the impact on flood storage capacity is considered de minimis. On this basis, it is concluded that further consideration or provision of compensatory flood storage resulting from panelled areas encroaching into the flood extents is not necessary or proportionate for the Scheme.

10.6.7510.6.79 The 2013 Grendon Brook model has been run based on the 13% higher central allowance for the Nene Management Catchment. The 36% upper end allowance, as per the NPPG Flood Risk Assessments: Climate Change Allowances – Credible Maximum Scenario guidance, acts as the credible maximum scenario (and a sensitivity test) for peak river flows. Running the model based on the credible maximum scenario as required for NSIPs, can be treated as a sensitivity test for the model, to assess how sensitive the Proposed Scheme is to changes in the climate for different future scenarios.

10.6.7610.6.80 Crucially, the flood risk onsite is largely confined to the immediate vicinity of Grendon Brook. The baseline fluvial flood risk to the Green Hill F is considered to be **Moderate**.

Surface Water Flood Risk

10.6.7710.6.81 The previous EA RoFSW 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).

10.6.7810.6.82 The updated NaFRA Map indicates that the surface water flooding extents at Green Hill F are reduced and therefore improved in comparison to the previous Long Term Flood Risk Mapping. The remaining surface water risk continues to be associated with the watercourses that run through Green Hill F, however the extents are much smaller and sparser. There are multiple flow routes that bisect the Green Hill F Site. All development will be outside of these extents.

10.6.7910.6.83 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.

10.6.8010.6.84 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches ~~and ordinary watercourses~~/ Ordinary Watercourses.

10.6.8110.6.85 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.

Green Hill G

Flood Risk and Drainage Designations

Fluvial Flood Risk

10.6.8210.6.86 There is a network of land ~~drains~~drainage ditches which join and flow southwards through the centre of the Green Hill G. The land ~~drains~~drainage ditches become a more rational watercourse flowing through Lavendon to the south and ultimately discharges to the River Great Ouse approximately 1.8km south of Green Hill G at its closest point (see Appendix 10.10

[~~EN010170/~~APP~~/GH6.3.10.10~~-107] - Green Hill G). Flows within the ditches are expected to flow in a south-westerly direction based on local topography.

~~10.6.83~~10.6.87 Fluvial flooding could occur if the land ~~drains~~drainage ditches overtopped their banks during or following an extreme rainfall event.

~~10.6.84~~10.6.88 According to the EA's updated Flood Map for Planning, the entirety of Green Hill G is situated in Flood Zone 1 with the exception of a limited area within Field GF13 which is identified as being in Flood Zone 3, associated with a land ~~drain~~drainage ditch and unnamed ~~ordinary watercourse~~ Ordinary Watercourse. However, these extents remain outside of any areas of proposed development. The EA Historical Flood Map indicates that Green Hill G has not historically flooded and neither has the area nearby.

~~10.6.85~~10.6.89 Green Hill G is therefore considered to be at low risk of fluvial flooding.

Surface Water Flood Risk

~~10.6.86~~10.6.90 The previous EA RoFSW 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).

~~10.6.87~~10.6.91 The updated NaFRA Map indicates that there is no visible change in the risks from surface water posed to Green Hill G.

~~10.6.88~~10.6.92 As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches.

~~10.6.89~~10.6.93 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.

Green Hill BESS

Flood Risk and Drainage Designations

Fluvial Flood Risk

~~10.6.90~~10.6.94 The nearest watercourse is Whiston Brook, an EA main river that flows in an easterly direction past the Green Hill BESS site, approximately 190 m north of the BESS2 Field (see Appendix 10.11 **[~~EN010170/APP~~EX1/GH6.3.10.11_A]** – BESS Site).

~~10.6.91~~10.6.95 A further EA main river named Grendon Brook flows in a northerly direction and forms the eastern boundary of BESS1 Field within the Green Hill BESS site. Whiston Brook and Grendon Brook flow in a general north-eastern direction before they all converge to the River Nene approximately 3.7km north-west of the BESS2 Field.

~~10.6.92~~10.6.96 According to the EA's updated Flood Map for Planning, BESS1 is largely situated in Flood Zone 1 with an area in the eastern extents shown to be within Flood Zones 2 and 3. BESS 2 is largely situated in Flood Zone 3 with areas

of Flood Zone 2 in the west and south, and a small area of Flood Zone 1 in the west.

~~10.6.93~~10.6.97 Fluvial flooding could occur if the land ~~drains~~drainage ditches overtopped their banks during or following an extreme rainfall event.

~~10.6.94~~10.6.98 The EA Historical Flood Map indicates that BESS1 has historically flooded in March 1947 due to the overtopping of 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 the Green Hill BESS site was not impacted. Further flooding in September 2024 was widely reported, it is understood the Green Hill BESS site was not impacted.

~~10.6.95~~10.6.99 In order to understand the risk of fluvial flooding to the Sites in greater detail, hydraulic modelling was requested from the EA for the BESS Site. 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 Arthian Ltd.

~~10.6.96~~10.6.100 Arthian Ltd conducted modelling for a range of return periods to assess fluvial flood risk at Green Hill BESS, with a particular focus on the 1% AEP +13% Climate Change (CC) scenario, known as the design scenario. In this scenario, flood depths in the east of the BESS1 field are predicted to reach up to 1.5 m, and the BESS2 field is modelled to have depths of <0.3 m during all events (including the 0.1% AEP flood event). The main substation infrastructure is proposed for construction in the western portion of BESS1, which is located within Flood Zone 1 and remains flood-free during the 1% AEP +13% CC modelled scenario.

~~10.6.97~~10.6.101 Given the locations of the proposed BESS developments, excluding the east of BESS1, the Site is considered to be at **Low** risk of fluvial flooding. However, since the east of BESS1 is modelled to experience depths of up to 1.4 m during the 1% AEP + 13% CC scenario, the risk in that area is considered to be **Moderate**.

~~10.6.98~~10.6.102 See Appendix 10.11 **[~~EN010170/APP~~EX1/GH6.3.10.11_A]** for further in-depth commentary on the hydraulic modelling.

Surface Water Flood Risk

~~10.6.99~~10.6.103 The previous EA RoFSW 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).

~~10.6.100~~10.6.104 The updated NaFRA Map indicates that the BESS Sites are largely at very low to low risk of surface water flooding, with small isolated areas of medium to high risk within both Sites.

~~10.6.101~~10.6.105 As described in the fluvial section above, the surface water flooding extents largely match the courses of the watercourses and land drainage ditches.

~~10.6.102~~10.6.106 The overall risk of surface water flooding at Green Hill BESS is considered to be low.

Cable Route Corridor

Flood Risk and Drainage Designations

Fluvial Flood Risk

~~10.6.103~~10.6.107 Given the scale of the Cable Route Corridor, it will come within close proximity to existing watercourses, and in 21 instances will cross existing watercourses.

~~10.6.104~~10.6.108 According to the EA's updated Flood Map for Planning the vast majority of the cable route corridor is within Flood Zone 1 (1% Annual Exceedance Probability (AEP)) for river flooding (Appendix 10.2 **[~~EN010170/~~APP~~/GH6.3.10.2~~-098** and **APP-099]** – Cable Route Corridor). A very minor section between Green Hill B and C and a small section between Green Hill C and D are noted as being partially within Flood Zones 2 and 3. Furthermore, multiple areas between Green Hill E, Green Hill BESS and Green Hill F (which are in the vicinity of the River Nene and its tributaries) are situated within Flood Zones 2 and 3.

~~10.6.105~~10.6.109 Based on the nature of the proposals (sub surface cable) it can be concluded that the Cable Route Corridor is at low risk of fluvial flooding.

Surface Water Flood Risk

~~10.6.106~~10.6.110 The previous EA RoFSW Map indicates that the majority of the Cable Route Corridor 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 Corridor and along parts of the eastern Cable Route Corridor boundary.

~~10.6.107~~10.6.111 The updated NaFRA Map indicates that the Cable Route Corridor (50m) indicates risk levels largely in line with the previous mapping, particularly in locations where watercourses are present.

~~10.6.108~~10.6.112 The extents of the surface water risk largely concur with the courses of the watercourses which run through the wider area.

~~10.6.109~~10.6.113 Based on the above and considering the nature of the proposals (sub surface cable) the overall risk of surface water flooding is considered to be Very Low.

Future Baseline

~~10.6.110~~10.6.114 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 **[~~EN010170/~~APP~~/GH6.2.2~~-039]**.

~~10.6.111~~10.6.115 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 in Appendix 10.~~2 [EN010170/APP~~1 [EX1/GH6.3.10.~~21 A]** and respective hydraulic modelling. This includes potential impacts on both surface water and fluvial flood risks, which are expected to evolve over time.

10.7 Embedded Mitigation Measures

10.7.1 The following embedded mitigation measures for the construction, operational and decommissioning phases have been incorporated into the Scheme's design.

Embedded Mitigation Measures

10.7.2 The following control documents will be used:

- Outline Construction Environmental Management Plan (OCEMP) **[~~EN010170/APP~~EX1/GH7.1 A]** and Water Management Plan which will form part of the OCEMP.

10.7.3 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.

10.7.4 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. Accompanying management plans will be secured by DCO requirement. It should be noted that any site-specific mitigation required has been outlined in the respective site-specific Flood Risk Assessment and Drainage Strategies in the supporting appendices:

Flood Risk and Resilience

- Critical infrastructure within the Scheme (the conversion units, substations and energy storage compounds) are sequentially located within Flood Zone 1 and therefore in land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%) - this is detailed in the supporting Outline Landscape and Ecological Management Plan (OLEMP) **[~~EN010170/APP~~EX1/GH7.4 A]**;
- 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 metres depth of flooding during the same event;
- Flexibility for either tracker or fixed panels has been included for in the draft DCO. 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. The galvanised steel poles will be narrow in diameter and will remove negligible area from any floodplains (see baseline conditions assessment and Appendices 10.8 and 10.9 [~~EN010170/~~**APP**~~/GH6.3.10.8-9~~**-105** and **APP-106**]);

- 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 metres above the surrounding peak flood level; and
- Tracker panel units will be mounted on raised frames (raised a minimum of 0.4 metres 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 metres above ground level. This ensures that all sensitive and electrical equipment on the solar panel is raised to a minimum of 2.5 metres above ground level in the horizontal position.

Drainage and Surface Water Management

- A minimum 8 metres buffer has been maintained from all Main Rivers and Ordinary Watercourses in accordance with Environment Agency guidance. This buffer has been increased to 9 metres where required by local policy, including for Ordinary Watercourses within the jurisdiction of North and West Northamptonshire Councils and Milton Keynes City Council. There are no Internal Drainage Board (IDB) watercourses within the Site;
- Linear infiltration trenches will be incorporated around isolated infrastructure (e.g. ~~string inverters or~~ cable jointing pillars) within panelled areas to manage surface water at source, mimic the undeveloped state, and prevent lateral surface water migration;
- Where practical, runoff from equipment and access tracks will be directed to permeable SuDS features such as gravel-filled trenches or French drains, or similar passive drainage features appropriate to local conditions;
- The construction of the cable route will include several watercourse crossings which are described and mapped within Appendix 10.2. Many of these crossings minimise having any direct impact as they utilise existing crossings where possible. Where required, the relevant Land Drainage Consents and Flood Risk Activity Permits will be obtained;
- 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; and
- 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.

Water Quality and Pollution Control

- The ~~Outline Construction Environment Management Plan (~~OCEMP~~)~~ **~~[EN010170/APP~~ [EX1/GH7.1_A]** accompanying the DCO application, describes water management measures to control surface water run-off and drain hardstanding and other structures during the construction, operation and decommissioning of the Scheme. This will form part of a Pollution Prevention Plan (PPP) to be implemented for the Scheme;
- In addition, a Water Management Plan (which will form part of a detailed OCEMP) 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;
- Where trenchless crossing techniques such as HDD are used, appropriate environmental controls will be implemented to manage the risk of drilling fluid escape. This includes procedures to detect and respond to potential breakouts. These measures will be secured through the final Construction Environmental Management Plan, based on the commitments set out in the OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]**;
- 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 practice guidance; and
- Beyond this, the separation of construction/decommissioning groundworks will be kept as far from watercourses / drainage ditches as practicable.

Baseline Improvement Measures

- It is also noted that, currently, the fields within the ZoI 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;
- The solar panels have the potential to concentrate rainfall under the leeward edge of the panels themselves. Research in the United States by Cook and McCuen (Ref 10.23) suggested this increase would not be significant however, there is a potential increase in silt-laden 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. This is detailed in the supporting OLEMP **[~~EN010170/APP~~EX1/GH7.4_A]**;
- All embedded mitigation measures set out above will be secured by DCO requirement, including through the ~~Outline Construction Environmental Management Plan (~~OCEMP~~)~~ **~~[EN010170/APP~~ [EX1/GH7.1_A]**, the ~~Outline~~

~~Landscape and Ecological Management Plan (~~OLEMP~~) [EN010170/APP~~ **[EX1/GH7.4_A],** and the accompanying Water Management Plan; and

- These embedded mitigation measures have been factored into the assessment of likely significant effects set out in the following sections. The assessments presented therefore reflect a "with embedded mitigation" scenario, in line with standard EIA practice.

Identification and Evaluation of Likely Significant Effects

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

10.8 Assessment of Impacts and Effects

10.8.1 The main receptors assessed in this Chapter are flood risk and drainage and water resources. Groundwater ~~Quality~~quality is assessed separately within Chapter 22: Ground Conditions and Contamination **[~~EN010170/APP~~EX1/GH6.2.22~~].~~_A]**.

10.8.2 Baseline mapping and Environment Agency aquifer-designation data indicate that the Blisworth Limestone Formation underlies parts of the Order Limits and is designated as a Principal Aquifer (High sensitivity). Secondary A and B aquifers are present locally and are considered to be of Medium sensitivity, while superficial deposits and other units classed as Unproductive Strata are of Low sensitivity.

10.8.3 The magnitude of potential impact on groundwater from the Scheme is considered to be Low Adverse prior to mitigation, reflecting the limited potential for pollutant release during construction and decommissioning. Groundwater across the majority of the Order Limits occurs at depth, and low-permeability superficial deposits provide effective natural attenuation. There are no groundwater abstractions or Source Protection Zones within or adjacent to the Order Limits.

10.8.4 Embedded mitigation measures for pollution prevention and spill control are secured through the OCEMP **[EX1/GH7.1_A]**, Outline Operational Environmental Management Plan (OOEMP) **[EX1/GH7.2_A]**, Outline Decommissioning Statement **[EX1/GH7.3_A]**, and the Outline Soil Management Plan **[APP-550]**. These measures include the use of impermeable bases for fuel and chemical storage, secondary containment, designated refuelling areas, and emergency response procedures. Permanent infrastructure such as the substations and Battery Energy Storage System incorporates lined drainage systems with isolation valves and sufficient capacity to contain any contaminated runoff.

10.8.5 With these measures in place, there is no credible pathway for pollutants to reach the underlying aquifer. The magnitude of effect is therefore reduced to Negligible, and the residual significance for groundwater receptors is assessed as **Negligible**, which is not significant in EIA terms.

~~10.8.1~~

Construction /Decommissioning

Effects on Flood Risk and Drainage

Mud and Debris Blockages

~~10.8.2~~10.8.6 There is the potential for mud and debris arising from the construction / decommissioning works to enter the existing surface water / land drainage system, causing blockages and restricting flow. This could result in localised flooding onsite, especially after heavy or prolonged rainfall. As the Site is at present predominantly agricultural the initial effect is considered to be limited. However, given the scale and phased nature of the Scheme, the potential for temporary, localised effects due to blockages may increase during construction.

~~10.8.3~~10.8.7 The sensitivity of construction workers and equipment to mud and debris blockages is considered to be **Medium**. The potential for mud and debris to block drainage networks is considered to have an impact of **Low Adverse** magnitude on flooding to the Site itself and surrounding area which would result in flood risk to construction workers and equipment at the Site. The effect is considered to be Moderate Adverse significance.

~~10.8.4~~10.8.8 With the embedded mitigation measures set out in Section 10.7, including retention of vegetated groundcover, use of existing access routes, and appropriate site layout to avoid excessive disturbance near ditches, the magnitude of effect is reduced. These measures will help minimise sediment mobilisation and reduce the likelihood of blockages occurring. The residual effect is considered to be of **Negligible** significance.

Temporary Increase in Impermeable Area

~~10.8.5~~10.8.9 Temporary increase in impermeable area during construction and decommissioning has the potential to increase flooding both on and offsite. Temporary hardstanding or compacted areas could result in rapid surface water runoff to local watercourses or cause an increase in overland flow. As the Site is currently Greenfield, there is potential for overland flow paths to form and for localised flooding to occur.

~~10.8.6~~10.8.10 Uncontrolled discharges to nearby watercourses could also elevate downstream flood risk if not appropriately managed.

~~10.8.7~~10.8.11 The sensitivity of construction workers and equipment is considered to be **Medium**. The unmitigated impact magnitude, taking into account embedded mitigation only, is considered **Medium Adverse**, particularly where rainfall coincides with peak construction activity. The resulting effect is of **Moderate Adverse** significance.

Compaction of Soils

~~10.8.8~~10.8.12 Construction of access tracks and the movement of vehicles and heavy plant during the construction and decommissioning phases has the potential to compact soils. Compaction reduces soil permeability and aeration, which can increase surface water runoff and reduce the soil's ability to support vegetation. While the superficial geology underlying the Scheme is typically of

low permeability and currently in agricultural use, construction activity could lead to temporary, localised deterioration in soil structure.

~~10.8.9~~10.8.13 Uncontrolled compaction may lead to changes in the hydrological function of the soil and, in turn, impact the ability of existing drainage infrastructure to perform effectively. If drainage pathways become impaired, this could cause waterlogging or temporary localised flooding, particularly during high rainfall events.

~~10.8.10~~10.8.14 Embedded mitigation measures relevant to soil compaction are outlined in Section 10.7. These include the retention of existing access tracks where practicable, thereby reducing the requirement for new access infrastructure that may disturb soils; appropriate soil handling and storage protocols as outlined in the Outline Soil Management Plan **[~~EN010170/~~APP~~/GH7.6~~-550]**; and demarcation of unstripped ground to ensure it is not trafficked. The Soil Management Plan confirms that soils will be stripped, stored, and reinstated in accordance with best practice, and that unstripped ground will not be trafficked. Drainage infrastructure will be retained and protected during the works.

~~10.8.11~~10.8.15 With these embedded measures in place, the sensitivity of construction workers and equipment to temporary surface water impacts is considered to be Medium. The magnitude of effect is considered to be Low Adverse, due to the localised and short-term nature of potential impacts. The resulting effect is considered to be **Minor Adverse**, which is **not Significant** in EIA terms.

Effects on Water Resources

Silt Laden Runoff

~~10.8.12~~10.8.16 During the construction and decommissioning phases of the Scheme, a number of activities have the potential to negatively affect the local water environment. Activities such as dewatering of excavations, concreting, earthworks, and the use of heavy plant can lead to significant quantities of silty runoff. This runoff may also be contaminated with oil, fuel and other construction materials, all of which have the potential to pollute watercourses or infiltrate to ground, with associated impacts on water quality and aquatic ecology.

~~10.8.13~~10.8.17 The sensitivity of surface water and groundwater bodies to silt contamination is **Medium**. Without mitigation, the magnitude is **Medium Adverse**, resulting in a **Moderate Adverse** effect, which is **Significant** in EIA terms.

~~10.8.14~~10.8.18 Embedded mitigation measures, as set out in Section 10.7, include silt management through the OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]** and Water Management Plan. These measures will control silty runoff at source using features such as buffer zones, silt fences, and designated plant washout areas. With these measures in place, the residual effect is **Minor Adverse**, and therefore **not Significant** in EIA terms.

Spillages, Leaks and Pollutants

~~10.8.15~~10.8.19 During construction and decommissioning, fuel, hydraulic fluids, solvents, grouts, paints, detergents and other potentially polluting substances will be stored and used on the Site. Leaks or spillages of these substances could pollute surface watercourses or infiltrate to groundwater if not carefully managed. This risk is particularly relevant where construction laydown areas are located near existing flow pathways.

~~10.8.16~~10.8.20 The sensitivity of surface water and groundwater receptors is **Medium**. Without mitigation, spillages of chemicals or fuel could result in **Medium Adverse** impacts on water quality. The resulting effect is of **Moderate Adverse** significance.

~~10.8.17~~10.8.21 Embedded mitigation measures, as set out in Section 10.7 and secured through the OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]**, include bunded storage areas, designated refuelling zones away from sensitive areas, regular inspection and maintenance of plant and equipment, provision of spill kits at key locations, and staff training in spill response. These measures will reduce the risk of uncontrolled discharges to water.

~~10.8.18~~10.8.22 With these embedded measures in place, the residual effect is **Minor Adverse**, and therefore **Not Significant**.

Inappropriate Wastewater Disposal from Welfare Facilities

~~10.8.19~~10.8.23 In the absence of nearby public foul water sewers to which foul water from welfare facilities could be connected, suitably sized self-contained welfare should be provided by a specialist Contractor.

~~10.8.20~~10.8.24 In the absence of nearby public foul water sewers, foul water from welfare facilities will be managed using suitably sized self-contained units provided by a specialist contractor. No discharges to watercourses will occur under any circumstances.

~~10.8.21~~10.8.25 The sensitivity of surface water to inappropriate wastewater disposal is **Medium** with **Low Adverse** Magnitude. Given the containment approach proposed, the impact is **Minor Adverse**, and therefore **Not Significant**.

Disposal of Surface and Foul Water from the Site

~~10.8.22~~10.8.26 Access to the solar PV array during construction and decommissioning will be taken from grassed/permeable tracks and existing farm tracks accessed from the wider highway network, limiting the requirement for new hardstanding.

~~10.8.23~~10.8.27 Currently there is no known existing foul network on the Site or adjacent. Due to the nature of the Scheme wastewater 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.

~~10.8.24~~10.8.28 The sensitivity on surface water is considered **Medium**. This is considered to have an impact of **Low Adverse** magnitude on downstream watercourses. The significance of effect is **Minor Adverse** for the receiving watercourses.

10.8.29 Temporary and permanent watercourse crossings will be designed in accordance with the measures set out in the **FRA Annex A [APP-098** and **APP-099]** and OCEMP **[EX1/GH7.1_A]**, ensuring no increase in flood risk.

Operation

Effects on Flood Risk and Drainage

Increase in Permanent Impermeable Area

~~10.8.25~~10.8.30 Given the size of the Scheme, the increase in permanent impermeable area on the Site is negligible in comparison to the total area covered by the Scheme. The panelled areas are designed to remain permeable, with grassland beneath and between the panels maintained to encourage infiltration and minimise runoff. However, infrastructure such as the substations and energy storage compounds will introduce impermeable surfacing, which may generate increased surface water runoff relative to the existing greenfield conditions.

~~10.8.26~~10.8.31 This could potentially increase localised flooding on the Site and elevate flood risk to nearby people and property if not appropriately managed.

~~10.8.27~~10.8.32 Embedded mitigation measures, as set out in Section 10.7, include the use of permeable surfacing for access tracks, the retention of vegetated groundcover across panelled areas, and the sequential location of critical infrastructure within Flood Zone 1. These features reduce runoff generation and help maintain the existing surface water regime.

~~10.8.28~~10.8.33 The sensitivity of people and property during operation is **Medium**. Without mitigation, the impact is **Medium Adverse**, resulting in a **Moderate Adverse** effect, which is **Significant** in EIA terms. With embedded mitigation in place, the residual effect is **Minor Adverse**, and therefore **Not Significant**.

Increase in Discharge to Local Watercourse

~~10.8.29~~10.8.34 An increase in the volume of water discharged to local watercourses in areas where discharge is proposed has the potential to increase flood risk downstream of the Scheme. This is relevant only to locations where discharge to watercourse may be required, such as the substations or BESS infrastructure. Discharge from panelled areas is not proposed and will continue to mimic the existing greenfield regime.

~~10.8.30~~10.8.35 The sensitivity of downstream receptors is **Medium**, reflecting the presence of people and property potentially at risk. Without mitigation, the impact is **Low Adverse**, due to the limited discharge volumes and the localised nature of affected areas.

~~10.8.31~~10.8.36 Embedded mitigation, as set out in Section 10.7, includes locating impermeable infrastructure within Flood Zone 1 where practicable, maintaining permeable surfacing across panelled areas, and minimising discharge volumes through layout design. These measures help to preserve the greenfield surface water regime and reduce the likelihood of increased runoff to local watercourses.

~~10.8.32~~10.8.37 With embedded mitigation in place, the residual effect is **Minor Adverse**, and therefore **Not Significant**.

Mud and Debris Blockages

10.8.3310.8.38 There is the potential for mud and debris naturally arising during operation which may cause blockages and restrict flow during operation. This could result in localised flooding onsite, especially after heavy or prolonged rainfall. As the Site is at present predominantly agricultural and embedded mitigation measures will ensure planting is undertaken across the Site, the effect during operation is considered to be limited. There is potential for mud and debris naturally arising during operation to enter the Site's surface water and land drainage systems, particularly following heavy or prolonged rainfall. This could cause partial blockages or localised restrictions in flow, potentially resulting in minor flooding onsite.

10.8.3410.8.39 However, the Site is predominantly agricultural and the design includes embedded mitigation such as retention of grassed groundcover beneath and between panels, the use of permeable access tracks, and ongoing vegetation management across the Site. These features will reduce sediment mobilisation and help maintain drainage system performance.

10.8.3510.8.40 The sensitivity of the Site to drainage blockages is considered to be **Low**, and the magnitude of effect, without further mitigation, is considered **Medium Adverse** given the potential for disruption. The resulting effect is therefore **Moderate Adverse** and considered **Significant**.

Summary

Effects on Water Resources

Diffuse Pollution Contained in Urban Runoff

10.8.3610.8.41 The operation of the Scheme may negatively effect upon the local water environment. Urban runoff from the Site, along with the associated infrastructure, could contain diffuse urban pollutants such as hydrocarbons, heavy metals, and nutrients as well as debris and silt which could ultimately be discharged to the nearby watercourses via surface water runoff or infiltrate to ground. The sensitivity of surface water and groundwater bodies is **Medium**. Without mitigation, the impact is assessed as **Medium Adverse**, resulting in a **Moderate Adverse** effect, which is **Significant**.

10.8.3710.8.42 Embedded mitigation, as set out in Section 10.7, includes maintaining vegetated groundcover across the Site, use of permeable access tracks, and appropriate layout design to limit concentrated runoff and promote infiltration. These measures reduce the potential for pollutants to be mobilised and carried offsite.

10.8.3810.8.43 With these measures in place, the residual effect is **Minor Adverse**, and therefore **Not Significant**.

Diffuse Pollution Resulting from Fire

10.8.3910.8.44 Given the nature of the Scheme there is a potential risk of fire during operation which may negatively effect upon the local water environment. Runoff from the Site, along with the associated infrastructure, following a fire could contain diffuse urban pollutants such as hydrocarbons, heavy metals, as well as debris and silt which could ultimately be discharged to the nearby watercourses

via surface water runoff or infiltrate to ground. Without mitigation this could have a moderate adverse effect on water quality.

10.8.4010.8.45 There is a potential risk of fire during operation that may negatively affect the local water environment. While the risk of fire associated with the panelled areas is considered low, a higher risk exists at the BESS and substations due to the nature of the components.

10.8.4110.8.46 Runoff generated during or following a fire could contain diffuse pollutants such as hydrocarbons, heavy metals, debris and silt, which may be discharged to nearby watercourses or infiltrate to ground. If not appropriately managed, this could lead to deterioration in water quality.

10.8.4210.8.47 The sensitivity of surface water and groundwater bodies is **Medium**. Without mitigation, the impact is assessed as **Medium Adverse**, resulting in a **Moderate Adverse** effect, which is **Significant**.

10.8.4310.8.48 Embedded mitigation, as set out in Section 10.7, includes maintaining vegetated groundcover across the Site and locating infrastructure away from watercourses where practicable. In the panelled areas, where fire risk and contaminant load are low, these measures are considered sufficient to reduce the likelihood and extent of pollution. The distance from receptors combined with vegetation provides a slowing and filtering effect, which offers a degree of treatment and reduces the potential impact.

10.8.4410.8.49 However, these embedded measures are potentially not sufficient to manage firewater runoff from the BESS or substation areas, where a fire could mobilise a greater volume and concentration of pollutants. In those areas, the potential for an uncontrolled discharge to the environment remains.

10.8.4510.8.50 The residual effect is therefore assessed as **Moderate Adverse**, and is considered **Significant** in the absence of additional mitigation.

Increase in Highway Routine Runoff

10.8.4610.8.51 Traffic on existing roads to and from the Site, during operation in periods where replacement or maintenance activities are ongoing, will increase albeit negligibly during operation. Any increase in traffic flows could lead to the introduction of new sources (or changed discharges) of highway runoff into receiving watercourses. Surface water runoff from roads can contain pollutants such as hydrocarbons, heavy metals and inert particulates which can cause chronic pollution of the water environment if allowed to enter watercourses without appropriate management.

10.8.4710.8.52 The sensitivity of surface water is considered **Medium**. Without mitigation, the impact is considered to be of **Low Adverse** magnitude, resulting in a **Minor Adverse** effect, which is N**ot Significant**.

10.8.4810.8.53 Embedded mitigation, as outlined in Section 10.7, includes the use of permeable access tracks and the retention of vegetated margins, which help to reduce the volume and pollutant load of any surface water runoff by encouraging infiltration and limiting direct discharges to watercourses.

10.8.4910.8.54 With these measures in place, the residual effect remains **Minor Adverse**, and is therefore **Not Significant.**

Increase in Highway Spillage Risk

~~10.8.50~~10.8.55 Spillages of pollutants (e.g. oil) on highways during operation can be transported to nearby watercourses via runoff, where they could impact upon ecological receptors or infiltrate to ground.

~~10.8.51~~10.8.56 The receptors at risk are surface watercourses and groundwater bodies, which are considered to be of **Medium** sensitivity. Without mitigation, the potential for spillages during the operational phase is considered to have an impact of **Low Adverse** magnitude resulting in a **Minor Adverse** effect. This reflects the limited frequency of vehicle movements during operation, the low probability of spillage events, and the small-scale, localised nature of any such incident.

~~10.8.52~~10.8.57 Embedded mitigation, as set out in Section 10.7, includes the use of permeable access tracks and vegetated margins, which reduce runoff velocity and promote infiltration, thereby lowering the likelihood of uncontrolled discharge to sensitive receptors.

~~10.8.53~~10.8.58 The residual effect is assessed as **Minor Adverse, and** is therefore **Not Significant**.

HDD and Drilling Fluid Breakout Risk

~~10.8.54~~10.8.59 The use of horizontal directional drilling (HDD) to install cable beneath watercourses and other sensitive areas presents a risk of drilling fluid escaping to the surface or entering the water environment. This may occur during a breakout event (also referred to as a 'frac-out') if drilling pressures exceed the surrounding ground strength, particularly in areas of fractured geology or shallow groundwater. If drilling fluid were to break out, there is potential for temporary pollution of nearby watercourses or shallow groundwater bodies.

~~10.8.55~~10.8.60 The sensitivity of surface water and groundwater bodies is considered **Medium**. Without mitigation, this is considered to have an impact of **Medium Adverse** magnitude. The significance of effect is **Moderate Adverse**, which is considered to be **Significant** in EIA terms.

~~10.8.56~~10.8.61 Embedded mitigation, as secured through the OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]**, includes the use of closed-loop drilling systems and a Water Management Plan, which will include a breakout contingency procedure. This will set out the response in the event of a breakout, including temporary suspension of works, containment and clean-up measures, and notification protocols.

~~10.8.57~~10.8.62 With these measures in place, the residual magnitude of effect is considered to be **Low Adverse**, and the residual significance is **Minor Adverse**, which is **Not Significant**.

Increased Demand on Water Supply

~~10.8.58~~10.8.63 Due to the nature of the Scheme, there is no requirement for a permanent water supply during operation. However, water will be temporarily required for periodic panel washing, which will be delivered to Site by tanker. This is not considered to result in any adverse surface water quality effects, as no water will be abstracted from local watercourses or groundwater. The Scheme

would not proceed without a confirmed and reliable offsite water supply. Water consumption associated with future Site users will be minimised through the use of appropriate water efficiency measures.

~~10.8.59~~10.8.64 The receptors at risk are **surface waters**, which are considered to have **Low Sensitivity**. The increased demand on water supply is considered to have an impact of **Negligible magnitude** (i.e. to locations where water is sourced). The significance of effect is therefore **Negligible** which is considered **not to be Significant** in EIA terms.

Disposal of Surface and Foul Water from the Site

~~10.8.60~~10.8.65 Access to the solar PV array during operation will be taken from grassed/permeable tracks and existing farm tracks accessed from the wider highway network, limiting the requirement for new hardstanding.

~~10.8.61~~10.8.66 Currently there is no known existing foul network on the Site or adjacent. Due to the nature of the Scheme wastewater 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.

~~10.8.62~~10.8.67 The sensitivity on surface water is considered **Medium**. This is considered to have an impact of **Low** magnitude on downstream watercourses. The significance of effect is **Minor Adverse** for the receiving watercourses which is considered **not to be Significant** in EIA terms.

Equipment replacement

~~10.8.63~~10.8.68 During the site-wide equipment replacement (solar arrays and batteries) process which will take place during the planned lifetime of the development, it should be noted that the impacts and effects described during the construction / decommissioning phase (see above) may temporarily apply during the operational phase, and relevant mitigation should apply accordingly on a temporary basis until the replacement is complete and the Scheme is again fully operational.

10.9 Additional Mitigation Measures

10.9.1 The following additional mitigation measures have been identified. These are separate from embedded mitigation and are expected to be secured through DCO requirements and associated management plans:

Mitigation by Design associated with Water Resources

Diffuse Pollution Resulting from Fire

10.9.2 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 Appendix 10.6 **[~~EN010170/APP~~EX1/GH6.3.10.6_A]** (Green Hill C) and Appendix 10.11 **[~~EN010170/APP~~EX1/GH6.3.10.11_A]** (BESS) provides further assessment for pollution control in the event of a fire.

10.9.3 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.~~ a sealed, impermeable containment system. Containment may be achieved using a robust geotextile composite, impermeable pond liner, or another construction that provides the same level of impermeability and structural performance. This would ensure that no impacts on water quality are had, particularly in areas of the Scheme such as Green Hill BESS which is located in an SPA/Ramsar/SSSI. 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 offsite as necessary and in consultation with the relevant consultees at the time.

10.9.4 Local fire water provision will be included within the Green Hill BESS. In line with the NFCC Grid Scale Battery Energy Storage System planning guidance, fire hydrant supplies for boundary cooling purposes will be located close to BESS containers where feasible, considering safe access. The design target is 1,900 l/min for at least two hours, and fire and rescue services may request increased provision depending on their operational requirements and ability to supplement onsite supplies.

10.9.5 Consultation has been undertaken with Northamptonshire Fire and Rescue Service during pre-application and statutory consultation stages. Their feedback informed the BESS design, including site access, drainage, and water supply layout. The Emergency Response Plan will be finalised with NFRS at the detailed design stage and will reflect any updated NFCC guidance.

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

10.9.7 An initial overview of possible SuDS features, and possible future maintenance are provided in the Drainage Strategy sections of the supporting appendices.

10.9.8 Following the implementation of mitigation measures the residual effect is considered to be **Negligible** and therefore not significant.

Site Specific Mitigation associated with Flood Risk and Drainage

Mud and Debris Blockages

10.9.9 Where deemed necessary (i.e. in areas where structures such as BESS or substations are proposed), a temporary drainage network will be installed prior to the commencement of construction and a robust maintenance plan, confirmed through the ~~Outline Construction Environmental Management Plan (~~OCEMP~~)~~ **~~[EN010170/APP~~ [EX1/GH7.1_A]**, 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.

10.9.10 An OCEMP and Outline Decommissioning Statement **[~~EN010170/APP~~EX1/GH7.3_A]** will be submitted in support of the DCO application.

10.9.11 Following the implementation of mitigation measures the residual effect of mud and debris entering the surface water / land drainage system is considered **Negligible** and therefore not significant in EIA terms.

Temporary Increase in Impermeable Area

10.9.12 During construction, there may be a temporary increase in impermeable areas, particularly around infrastructure platforms such as substations and energy storage compounds. These areas may temporarily generate additional surface water runoff before permanent drainage infrastructure is in place.

10.9.13 To mitigate this risk, a temporary drainage system will be provided where required, supported by phased installation of permanent drainage as construction progresses. The design will seek to minimise hardstanding and use permeable surfacing wherever possible, in line with construction-phase best practice.

10.9.14 These measures will be secured through the ~~Outline Construction Environmental Management Plan (~~OCEMP~~) [~~**EN010170/APP**~~ [EX1/GH7.1_A]** and the Outline Decommissioning Statement **[~~EN010170/APP~~EX1/GH7.3_A].**

10.9.15 Following implementation, the residual effect is considered to be Negligible, and therefore **not Significant** in EIA terms.

Blockages of Drainage Networks

10.9.16 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.

10.9.17 Following the implementation of mitigation measures the residual effect is considered to be **Negligible** and therefore not significant in EIA terms**.**

Additional Mitigation associated with Water Resources

Silt-laden Runoff

10.9.18 The following mitigation measures will be incorporated into the OCEMP **[~~EN010170/APP~~EX1/GH7.1~~], Outline Operational Environmental Management Plan (~~_A], OOEMP~~) [EN010170/APP~~ [EX1/GH7.2_A]** and Outline Decommissioning Statement **[~~EN010170/APP~~EX1/GH7.3_A]** 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 surrounded 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.

10.9.19 Following the implementation of mitigation measures the residual effect is considered to be **Negligible** and therefore not significant in EIA terms.

Spillages and Leaks of Pollutants

10.9.20 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 OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]**.

- 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 Sites 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 OCEMP. 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);
- Where HDD is used, a breakout contingency procedure will be included in the OCEMP to manage accidental releases of drilling fluid, including immediate containment and clean-up measures; and
- Concrete wash water will be adequately contained and removed from the Sites.

10.9.21 Following the implementation of the mitigation measures the residual effect is considered to be **Negligible** and therefore **not significant**.

10.10 Residual Effects

10.10.1 This section summarises the residual effects of the Scheme on hydrology, flood risk and drainage and receptors following the adoption of embedded and additional mitigation.

10.10.2 With the embedded and additional mitigation by design measures described above and those within the OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]**, all identified likely significant effects have been assessed as being of **negligible significance**, and therefore not significant.

10.10.3 No further mitigation is proposed.

10.11 Cumulative Effects

10.11.1 A list of cumulative projects can be found in Appendix 25.1 **[~~EN010170/~~APP~~/GH6.3.25.1~~-188]** of the ES. A summary of Cumulative effects will be listed within Chapter 25: Cumulative Effects and Effects Interaction **[~~EN010170/~~APP~~/GH6.2.25~~-062]** of this ES.

Cumulative effects

10.11.2 During the construction phase, 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, with respect to the hydrology, flood risk and drainage receptors being assessed.

10.11.3 During the operational phase, all relevant developments as outlined in Chapter 25: Cumulative Effects and Effects Interaction **[~~EN010170/~~APP~~/GH6.2.25~~-062]** are assumed to be supported their own 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 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 ES 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

10.11.4 Referring to the list of receptors in Chapter 25: Cumulative Effects and Effects Interaction **[~~EN010170/~~APP~~/GH6.2.25~~-062]**, 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 of this ES, with particular focus on climate change impacts, which have been specifically addressed in this chapter and the supporting Appendices. Following the respective mitigation measures outlined, any cumulative impacts on the Scheme are considered to be effectively managed.

10.12 Summary

10.12.1 This chapter 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 supporting flood risk assessment and drainage strategies for each Green Hill A to G, Green Hill BESS, and the Cable Route Corridor (Appendices 10.1 to 10.11 **[~~EN010170/APP~~EX1/GH6.3.10.1~~-~~_A, APP-098 to APP-102, EX1/GH6.3.10.6_A, APP-104 to APP-107, EX1/GH6.3.10.11_A]**).

10.12.2 Embedded and additional mitigation measures are described in Section 10.7 and 10.10 have been described with potential residual effects outlined, considered to be of **Negligible or Minor Adverse** significance and therefore **Not Significant**.

~~Table 10.6:~~Table 10.6: Summary of Residual Effects for Hydrology, Flood Risk and Drainage

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
Construction / Decommissioning Phases							
Mud & Debris Blockages	Potential for mud and debris arising from the construction / decommissioning works to enter the existing surface water / land drainage system, causing blockages and restricting flow.	Medium	Low Adverse	Section 10.7 - includes retention of vegetated groundcover, use of existing access routes, and appropriate site layout to avoid excessive disturbance near ditches, the magnitude of effect is reduced.	Moderate Adverse - Significant	Where deemed necessary (i.e. in areas where structures such as BESS or substations are proposed), a temporary drainage network will be installed prior to the commencement of construction and a robust maintenance plan, confirmed through the ~~Outline Construction Environmental Management Plan (~~OCEMP~~)~~ ~~[EN010170/APP~~ [EX1/GH7.1_A], 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,	**Negligible (Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
						during decommissioning a Decommissioning Statement should be maintained. An OCEMP and Outline Decommissioning Statement **[~~EN010170/APP~~EX1/GH7.3_A]** will be submitted in support of the DCO application.	
Temporary increase in impermeable area	Temporary increase in impermeable area during construction / decommissioning has the potential to increase flooding both on and offsite. Temporary hardstanding or compacted areas could result in rapid surface water	Medium	Medium Adverse	Section 10.7 - includes the use of permeable surfacing for access tracks and avoidance of extensive temporary hardstanding.	Moderate Adverse – Significant.	A temporary drainage system will be provided where required, supported by phased installation of permanent drainage as construction progresses. The design will seek to minimise hardstanding and use permeable surfacing wherever possible, in line with construction-phase best practice. These measures will be secured through the ~~Outline Construction Environmental Management Plan (~~OCEMP~~)~~ **~~[EN010170/APP~~**	**Negligible (Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
	runoff to local watercourses or cause an increase in overland flow.					**[EX1/GH7.1_A]** and the Outline Decommissioning Statement **[~~EN010170/APP~~EX1/GH7.3_A]**.	
Compaction of Soils	Construction of access tracks and the movement of vehicles and heavy plant during the construction and decommissioning phases has the potential to compact soils.	Medium	Low Adverse	These include the retention of existing access tracks where practicable, thereby reducing the requirement for new access infrastructure that may disturb soils; appropriate soil handling and storage protocols as outlined in the Outline Soil Management Plan **[~~EN010170/~~APP~~/GH7.6~~-550]**; and demarcation of unstripped ground to ensure it is not trafficked.	Minor Adverse – not significant.	N/A	**Minor Adverse (Not Significant)**
Silt-laden runoff	During the construction and decommissionin	Medium	Medium Adverse	Embedded mitigation measures, as set out in Section 10.7, include silt management through the	Minor Adverse – not significant.	N/A	**Minor Adverse**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
	g phases of the Scheme, a number of activities have the potential to negatively affect the local water environment. Activities such as dewatering of excavations, concreting, earthworks, and the use of heavy plant can lead to significant quantities of silty runoff.			OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]** and Water Management Plan. These measures will control silty runoff at source using features such as buffer zones, silt fences, and designated plant washout areas.			**(Not Significant)**
Spillages, Leaks and Pollutants	During construction and decommissioning, fuel, hydraulic	Medium	Medium Adverse	Section 10.7 and measures secured through the OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]**, include bunded storage areas, designated refuelling	Minor Adverse – not significant.	N/A	**Minor Adverse (Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
	fluids, solvents, grouts, paints, detergents and other potentially polluting substances will be stored and used on the Site. Leaks or spillages of these substances could pollute surface watercourses or infiltrate to groundwater if not carefully managed.			zones away from sensitive areas, regular inspection and maintenance of plant and equipment, provision of spill kits at key locations, and staff training in spill response			
Inappropriate Wastewater Disposal from	n/a	Medium	Low Adverse	Section 10.7	Minor Adverse – not significant.	N/A	**Minor Adverse (Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
Welfare Facilities							
Disposal of Surface and Foul Water from the Site	n/a	Medium	Low Adverse	Section 10.7	Minor Adverse – not significant.	N/A	**Minor Adverse (Not Significant)**
Cumulative effects	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.	Medium	Medium Adverse	Implement standard and good practice mitigation on the construction sites through 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.	Negligible – not significant	N/A	**Negligible (Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
Operational Phase							
Increase in Permanent Impermeable Area	Given the size of the Scheme, the increase in permanent impermeable area on the Site is negligible in comparison to the total area covered by the Scheme. The panelled areas are designed to remain permeable, with grassland beneath and between the panels maintained to encourage infiltration and minimise runoff. However, infrastructure	Medium	Medium Adverse	Section 10.7, includes the use of permeable surfacing for access tracks, the retention of vegetated groundcover across panelled areas, and the sequential location of critical infrastructure within Flood Zone 1. These features reduce runoff generation and help maintain the existing surface water regime.	Minor Adverse – not Significant	N/A	**Minor Adverse (Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
	such as the substations and energy storage compounds will introduce impermeable surfacing, which may generate increased surface water runoff relative to the existing greenfield conditions. This could potentially increase localised flooding on the Site and elevate flood risk to nearby people and property if not appropriately managed.						

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
Increase in Discharge to Local Watercourses	An increase in the volume of water discharged to local watercourses in areas where discharge is proposed has the potential to increase flood risk downstream of the Scheme. This is relevant only to locations where discharge to watercourse may be required, such as the substations or BESS infrastructure.	Medium	Low Adverse	Section 10.7, includes locating impermeable infrastructure within Flood Zone 1 where practicable, maintaining permeable surfacing across panelled areas, and minimising discharge volumes through layout design. These measures help to preserve the greenfield surface water regime and reduce the likelihood of increased runoff to local watercourses.	Minor Adverse – not significant	N/A	**Minor Adverse (Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
Mud and Debris Blockages	There is the potential for mud and debris naturally arising during operation which may cause blockages and restrict flow during. This could result in localised flooding onsite, especially after heavy or prolonged rainfall. As the Site is at present predominantly agricultural and embedded mitigation measures will ensure planting is undertaken across the site,	Low	Medium Adverse	Section 10.7 - includes retention of vegetated groundcover, use of existing access routes, and appropriate site layout to avoid excessive disturbance near ditches, the magnitude of effect is reduced.	Moderate Adverse – Significant	Where deemed necessary (i.e. in areas where structures such as BESS or substations are proposed), a temporary drainage network will be installed prior to the commencement of construction and a robust maintenance plan, confirmed through the ~~Outline Construction Environmental Management Plan (~~OCEMP~~)~~ ~~[EN010170/APP~~ [EX1/GH7.1_A], 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.	**Negligible** **(Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
	the effect during operation is considered to be limited.					An OCEMP and Outline Decommissioning Statement **[~~EN010170/APP~~EX1/GH7.3_A]** will be submitted in support of the DCO application.	
Diffuse Pollution Contained in Urban Runoff	The operation of the Scheme may negatively effect upon the local water environment. Urban runoff from the Site, along with the associated infrastructure, could contain diffuse urban pollutants such as hydrocarbons, heavy metals, and nutrients as well as debris and silt which	Medium	Medium Adverse	Section 10.7 includes maintaining vegetated groundcover across the Site, use of permeable access tracks, and appropriate layout design to limit concentrated runoff and promote infiltration. These measures reduce the potential for pollutants to be mobilised and carried offsite.	Minor Adverse – not significant	N/A	**Minor Adverse** **(Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
	could ultimately be discharged to the nearby watercourses via surface water runoff or infiltrate to ground.						
Diffuse Pollution Resulting From Fire	Given the nature of the Scheme there is a potential risk of fire during operation which may negatively effect upon the local water environment.	Medium	Medium Adverse	Section 10.7, includes maintaining vegetated groundcover across the Site and locating infrastructure away from watercourses where practicable. In the panelled areas, where fire risk and contaminant load are low, these measures are considered sufficient to reduce the likelihood and extent of pollution. The distance from receptors combined with vegetation provides a slowing and filtering effect, which offers a	Moderate Adverse - Significant	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. This would ensure that no impacts on water quality are had, particularly in areas of the Scheme such as Green Hill BESS which is located in an SPA/Ramsar/SSSI. In the event of a fire a system of	**Negligible** **(Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
				degree of treatment and reduces the potential impact.		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 offsite as necessary and in consultation with the relevant consultees at the time. Local fire water provision will be included within the Green Hill BESS Site. In line with the NFCC Grid Scale Battery Energy Storage System planning guidance, fire hydrant supplies for boundary cooling purposes will be located close to BESS containers where feasible, considering safe access. The design target is 1,900 l/min for at least two hours, and	

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
						fire and rescue services may request increased provision depending on their operational requirements and ability to supplement onsite supplies. Consultation has been undertaken with Northamptonshire Fire and Rescue Service during pre-application and statutory consultation stages. Their feedback informed the BESS design, including site access, drainage, and water supply layout. The Emergency Response Plan will be finalised with NFRS at the detailed design stage and will reflect any updated NFCC guidance. Inclusion of aforementioned features should provide sufficient mitigation should a fire event occur.	

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
						An initial overview of possible SuDS features, and possible future maintenance are provided in the Drainage Strategy sections of the supporting appendices.	
Increase in Highway Routine Runoff	Traffic on existing roads to and from the Site, during operation in periods where replacement or maintenance activities are ongoing, will increase albeit negligibly during operation. Any increase in traffic flows could lead to the introduction of new sources (or changed discharges) of	Medium	Low Adverse	Section 10.7 includes the use of permeable access tracks and the retention of vegetated margins, which help to reduce the volume and pollutant load of any surface water runoff by encouraging infiltration and limiting direct discharges to watercourses.	Minor Adverse – not Significant	Section 10.10.	**Minor Adverse** **(Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
	highway runoff into receiving watercourses. Surface water runoff from roads can contain pollutants such as hydrocarbons, heavy metals and inert particulates which can cause chronic pollution of the water environment if allowed to enter watercourses without appropriate management.						
Increase in Highway	Spillages of pollutants (e.g. oil) on highways	Medium	Low Adverse	Section 10.7 includes the use of permeable access tracks and vegetated margins,	Minor Adverse –	Section 10.10	**Minor Adverse**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
Spillage Risk	during operation can be transported to nearby watercourses via runoff, where they could impact upon ecological receptors or infiltrate to ground.			which reduce runoff velocity and promote infiltration, thereby lowering the likelihood of uncontrolled discharge to sensitive receptors.	not Significant		**(Not Significant)**
HDD and Drilling Fluid Breakout Risk	The use of horizontal directional drilling (HDD) to install cable beneath watercourses and other sensitive areas presents a risk of drilling fluid escaping to the surface or entering the	Medium	Moderate Adverse	Secured through the OCEMP **[~~EN010170/APP~~EX1/GH7.1_A]**, embedded mitigation includes the use of closed-loop drilling systems and a Water Management Plan, which will include a breakout contingency procedure. This will set out the response in the event of a breakout, including temporary suspension of works, containment and clean-up	Minor Adverse – not Significant	Section 10.10	**Minor Adverse** **(Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
	water environment.			measures, and notification protocols.			
Increased Demand on Water Supply	Due to the nature of the Scheme, there is no requirement for a permanent water supply during operation. However, water will be temporarily required for periodic panel washing, which will be delivered to site by tanker.	Low	Negligible	N/A	Negligible – not Significant	N/A	**Negligible** **(Not Significant)**
Disposal of Surface and Foul Water from the Site	n/a	Medium	Low Adverse	Section 10.7	Minor Adverse – not Significant	Section 10.10	**Minor Adverse**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
							(Not Significant)
Cumulative effects	The potential for pollutants generated during operation from both the Scheme and adjacent developments to impact on watercourses in the study area.	Medium	Medium Adverse	All relevant developments are assumed to be supported their own 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 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 ES 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	Negligible – not Significant	N/A	**Negligible** **(Not Significant)**

Receptor	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Embedded Mitigation	Significance of Effect (with embedded mitigation)	Additional Mitigation Measures	Residual Effect (with additional mitigation)
				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.			

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