

Green Hill Solar Farm Preliminary Environmental Information Report

Chapter 22 Ground Conditions and Contamination

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22 Ground Conditions and Contamination

22.1 Introduction

22.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential impacts of the Scheme in relation to Ground Conditions and Contamination during the construction, operation and maintenance, and decommissioning phases.

22.1.2 This chapter describes and identifies the likely significant effects and associated mitigation measures, in relation to risks to human health and controlled waters receptors.

22.1.3 For more details about the Scheme, refer to **Chapter 4: Scheme Description** of this PEIR.

Appendices

22.1.4 This chapter is supported by the following appendices in **PEIR Volume 3**:

- **Appendix 22.1:** Preliminary Geo-Environmental Risk Assessment, Green Hill Solar Farm, Northampton, dated October 2024.

22.2 Consultation

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

22.2.2 A summary of consultation and responses to the Scoping Report is outlined below in **Table 22.1**.

Table 22.1: Summary of Consultation and Responses

Consultee and Date	Response	Outcome and any further steps anticipated
The Planning Inspectorate Scoping Opinion 30 th August 2024	ID: 3.5.3 The River Nene is described as approximately 1 kilometre (km) from the BESS site in the Hydrology, Flood Risk and Drainage chapter and approximately 620m in the Ground Conditions and Contamination chapter. Baseline information should be consistent across the assessments.	The River Nene is located at its closest point 620 m north-west of the Green Hill BESS site. Hydrology chapter has been updated.
The Planning Inspectorate Scoping Opinion 30 th August 2024	The potential impacts on receptors should be identified and the relevant measures contained in the OCEMP and ODEMP outlined.	OCEMP, OOEMP and ODEMP mitigation measures are outlined in Section 22.7. Further detail regarding impacts on receptors is provided in Section 22.8.
The Planning Inspectorate Scoping Opinion 30 th August 2024	ID: 3.5.1 In agreement to scope out “Effects on construction workers, including groundworkers; and adjacent users and adjacent residents from exposure to contamination through direct contact/ingestion and inhalation of dust, vapours and asbestos fibres” – construction and decommissioning	Aligned with the Planning Inspectorate and not addressed further.
The Planning Inspectorate Scoping Opinion 30 th August 2024	ID: 3.5.2 In agreement to scope out “Effects on controlled waters, including underlying groundwater, from mobilisation of existing contamination via vertical/lateral migration through permeable	Aligned with the Planning Inspectorate and not addressed further.



Consultee and Date	Response	Outcome and any further steps anticipated
	deposits below the site” – construction and decommissioning	
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.3</p> <p>“Effects on controlled waters, including underlying groundwater, from mobilisation of existing contamination via vertical/lateral migration through permeable deposits below the site” – construction and decommission.</p> <p>The information provided in para 10.6.8 (which conflicts with para 10.7.6) suggests that construction and decommissioning of the Proposed Development could potentially result in a major/moderate or moderate effect on controlled waters.</p> <p>The River Nene is described as approximately 620m to the north of the BESS site and would be crossed by the Cable Corridor, where construction works would occur. In the absence of evidence demonstrating no LSE and/or clear agreement of the conclusion with relevant statutory bodies, the Inspectorate is not in a position to agree to scope out this matter from the assessment. Accordingly, the ES should include an assessment where significant effects may occur or evidence of the absence of a LSE and agreement with the relevant consultation bodies.</p>	<p>Assessment of significance of effect for each receptor has been amended in Section 22.8.</p> <p>Mitigation measures for the construction of the cable route across the River Nene, has been included in Section 22.7.</p> <p>Assessment of the likely significance of effect / impact on controlled waters, from the construction of the cable route across the River Nene, has been included in Section 22.8.</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.4</p> <p>In agreement to scope out “Effects on future scheme users, including maintenance workers and PRow users; and adjacent users and adjacent residents from exposure to contamination through direct contact/ingestion and inhalation of dust, vapours and asbestos fibres” - operation</p>	<p>Aligned with the Planning Inspectorate and not addressed further.</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.4</p> <p>Works during operation would be limited to maintenance activities and replacement of panels and batteries (the details of which should be set out in the ES).</p>	<p>Details to be provided within the ES Chapter.</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.5</p> <p>“Effects on controlled waters, including underlying groundwater, from mobilisation of existing contamination via vertical/lateral migration through permeable deposits below the site” – operation.</p> <p>The information provided in para 10.6.9 (which conflicts with para 10.7.6) suggests that operation of the Proposed Development could potentially result in a major/moderate or moderate effect on controlled waters.</p> <p>The River Nene (part of an SPA, Ramsar site and SSSI) is described as approximately 620m to the north of the BESS site, which is identified</p>	<p>Assessment of significance of effect for each receptor has been amended in Section 22.8.</p> <p>Operational mitigation measures, including those for a potential BESS fire, use of fire-fighting agents containing chemicals, leaching of batteries and leaching of cables are outlined in Section 22.7</p> <p>Assessment of the likely significance of effect / impact</p>



Consultee and Date	Response	Outcome and any further steps anticipated
	<p>as on a Secondary A aquifer, and also would be crossed by the Cable Corridor. The identified mitigation measures relate only to the construction phase and no information is provided on potential operational mitigation. That would need to include measures to address potential contamination impacts on controlled waters and flooding of watercourses arising from waters used to extinguish a BESS fire. In the absence of evidence demonstrating no LSE and/or clear agreement of the conclusion with relevant statutory bodies, the Inspectorate is not in a position to agree to scope out this matter from the assessment. Accordingly, the ES should include an assessment where significant effects may occur or evidence of the absence of a LSE and agreement with the relevant consultation bodies.</p>	<p>on controlled waters and ecology and sensitive land uses, in the event of a potential BESS fire, has been included in Section 22.8.</p> <p>Moved into the scope of assessment..</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.5</p> <p>In agreement to scope out “Effects on future users, including maintenance workers; and the built environment and buildings on site from hazardous ground gases accumulating and migrating into buildings, enclosed spaces and subfloor voids, with subsequent asphyxiation and/or the potential for explosion” - operation</p>	<p>Aligned with the Planning Inspectorate and not addressed further.</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.6</p> <p>It has been identified that parts of the site are within land potentially impacted by elevated Radon, ranging from less than 1% to 10-30% of homes being above the action level for Radon. Consideration of impacts resulting from elevated levels of Radon on the site should be included in the ES and an assessment of effects made and mitigation proposed where LSE are likely to occur. Efforts should be made to agree the approach and conclusions with the relevant statutory bodies.</p>	<p>Assessment of the likely significance of effect / impact on future users and the built environment, in the event of elevated Radon, has been included in Section 22.8.</p> <p>Mitigation measures for potential enclosed buildings within areas of elevated Radon, have been included in Section 22.9.</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.7</p> <p>The ES should include consideration of potential impacts on ecological receptors resulting from contamination during all phases of the Proposed Development and an assessment of effects made and mitigation proposed where LSE are likely to occur. Efforts should be made to agree the approach and conclusions with the relevant statutory bodies</p>	<p>Ecology and Sensitive Land Uses receptors have been included as part of the assessment for ground conditions and contaminated land.</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.8</p> <p>The Inspectorate notes that the EA has identified a number of apparent discrepancies in the geological site characterisation for Sites A – G and the BESS site within the SR and PRA and that groundwater levels are only specified for isolated areas. The baseline conditions at Site A and A.2 requires separation. Identify non-potable groundwater abstraction points within 500 m of</p>	<p>Geological discrepancies, aquifer designations, groundwater levels, Green Hill Site A.2 descriptions and non-potable groundwater abstraction points have been amended within the PRA (reissued as Appendix 22.1) and updated in Section 22.6.</p>



Consultee and Date	Response	Outcome and any further steps anticipated
	<p>the Sites. The baseline must be accurately and comprehensively described for the entire site within the ES and supporting documents so that relevant receptors, impacts and effects are identified.</p>	
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.9 Controlled waters and the built environment are described here as of 'moderate' sensitivity. The sensitivity criteria set out in Table 10.1 to be used for the assessment are described as high, medium, low and negligible. Care should be taken within the ES to ensure that the methodology and related terminology are consistently applied.</p>	<p>Sensitivity and magnitude terminology has been amended in Section 22.8.</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.10 The receptor sensitivity and impact magnitude values set out in the conclusions in Section 7 paras 10.7.3 – 10.7.7, combined therein to determine the level of significance of the resulting effect, differ to those set out in the assessment information within Section 6 paras 10.6.5 10.6.9 in respect of the same receptors. According to the significance matrix contained in Table 10.3 the values assigned in Section 6 would result in a different (higher) level of significance of effect for the following: Controlled waters during construction, operation and decommissioning; Exposure of future scheme users, including maintenance workers and PRow users; and adjacent users and adjacent residents to contamination through direct contact/ingestion and inhalation of dust, vapours and asbestos fibres during operation; Direct contact between and accumulation of gas in buildings, enclosed spaces and sub-floor voids of future users during the construction and decommissioning phases. In addition, the sensitivity of future users and the built environment is considered separately in para 10.6.9 and differs between the two receptors, but this is not reflected in the conclusion contained in 10.7.7, and results in a different conclusion, as set out above.</p>	<p>Assessment of significance of effect for each receptor has been amended in Section 22.8.</p>
<p>The Planning Inspectorate Scoping Opinion 30th August 2024</p>	<p>ID: 3.5.11 Mitigation as detailed in the “Detailed UXO Risk Assessment Site G” recommends implementing a UXO Risk Management Plan and site-specific UXO Awareness Briefings to all personnel undertaking intrusive works; and UXO Specialist On-Site Support specifically for open excavations. The ES should include consideration of potential impacts on receptors resulting from UXO on the site and an assessment of effects made and mitigation</p>	<p>Assessment of the likely significance of effect / impact on receptors from potential on-site UXO, has been included in Section 22.8. Mitigation measures for potential on-site UXO have been included in Section 22.9.</p>



Consultee and Date	Response	Outcome and any further steps anticipated
	<p>proposed where LSE are likely to occur. Efforts should be made to agree the approach and conclusions with the relevant statutory bodies.</p>	
<p>Bedford Borough Council Response to Scoping Opinion</p>	<p>In general, BBC is in agreement regarding this aspect's approach as set out by the Applicant and makes limited comment in this regard.</p> <p>The ES will need to address the potential leaching of contaminated fire water and leachants from batteries into the surrounding ground water and water courses including the Ramsar, SSSI and SPA sites. This matter is raised in §10.6.8 (and §10.7.6) but should be addressed in terms of the Chief Fire Officers Guidance; it is suggested that the impact magnitude may currently be understated.</p> <p>§10.9.1) In light of BESS / lithium battery fires being an evolving understanding, it is suggested the 'cumulative effects to human health' should be stated as an unknown.</p> <p>(Table 10.4) In light of the concerns raised regarding the BESS facility (fire and contamination), it is suggested that the Applicant reviews Table 10.4 in terms of matters scoped out, or states that the matters are unknown.</p>	<p>Operational mitigation measures, including those for a potential BESS fire, use of fire-fighting agents containing chemicals, leaching of batteries and leaching of cables are outlined in Section 22.7</p> <p>Assessment of the likely significance of effect / impact on controlled waters and ecology and sensitive land uses, in the event of a potential BESS fire, has been included in Section 22.8.</p> <p>Cumulative effects have been amended, Section 22.11.</p>
<p>The Environment Agency, 22nd August 2024 Response to Scoping Opinion</p>	<p>We advise that these documents are used:</p> <p>The Environment Agency's approach to groundwater protection (February 2018): The Environment Agency's approach to groundwater protection (publishing.service.gov.uk).</p> <p>Protect groundwater and prevent groundwater pollution (March 2017): Protect groundwater and prevent groundwater pollution - GOV.UK (www.gov.uk).</p>	<p>Used within assessment and included in Section 22.3.</p>
<p>The Environment Agency, 22nd August 2024 Response to Scoping Opinion</p>	<p>BESS fires are a risk to groundwater as it can contain harmful chemicals – both from the batteries that have been burnt, and the chemicals used as fire-suppressants in the water or foam itself. A BESS fire can release lithium, PFAS and hydrofluoric acid, amongst other hazardous substances into the ground water. As the site is on a Secondary A aquifer (and close to an SSSI and the River Nene), we recommend that the BESS has a pollution control method, such as a sealed drainage strategy, to contain firewater or contaminated surface-waters. This is necessary to contain and manage any fire-fighting effluent, or contaminated surface waters generated by a fire, or other spillages, at the site. We request that the risks to groundwater from fire water during the operational phase be scoped into the EIA.</p>	<p>Moved into scope.</p> <p>Operational mitigation measures, including those for a potential BESS fire, use of fire-fighting agents containing chemicals, leaching of batteries and leaching of cables are outlined in Section 22.7</p> <p>Assessment of the likely significance of effect / impact on controlled waters and ecology and sensitive land uses, in the event of a potential BESS fire, has been included in Section 22.8.</p> <p>Moved into scope.</p>



Consultee and Date	Response	Outcome and any further steps anticipated
<p>The Environment Agency, 22nd August 2024</p> <p>Response to Scoping Opinion</p>	<p>We have identified several historic landfill sites within the proposed site area and in close proximity to the development. The PRA considers Sywell Aerodrome, which has been active since 1928, as well as nearby industrial activities and an historical inert waste landfill. This area is underlain by superficial Secondary (undifferentiated) aquifer, and bedrock Secondary A aquifer. The report assumes the cable route will not pass through the known landfill, but justification for this is not given. We recommend the applicant to address the aerodrome and landfill sites with respect to contamination in the scoping report. While the OCEMP Discovery Strategy, discussed in Section 10.8.1, should be sufficient to address the potential risks posed, we cannot rule out the requirement of further investigation in the area, dependent on the final cable route.</p>	<p>Full assessment to be included in ES Chapter, following the refinement and determination of the final cable route.</p>
<p>The Environment Agency, 22nd August 2024</p>	<p>Section 8.3.15 states that horizontal directional drilling may be used at some locations of ecological sensitivity, where traditional trenching methods are not feasible. This work could involve the use of drilling muds, and their use may require a risk assessment and a mitigation strategy, to ensure they do not pose a risk to controlled waters. The proposed use of directional drilling techniques will therefore be assessed with the Preliminary Environmental Impact Report (PEIR), and the Environmental Statement (ES), which we welcome.</p>	<p>Mitigation measures for the construction of the cable route across the River Nene, utilising horizontal directional drilling methods, has been included in Section 22.7.</p>
<p>Grendon Parish Council</p> <p>Response to Scoping Opinion</p>	<p>“Spillages or leakages of fuels and chemicals. Leaching of chemicals from faulty battery incidents (fire damage, ash deposition and extinguishing waters)” are requested to be moved to in scope.</p>	<p>Moved in to scope.</p>
<p>Holcot Parsh Council, 20th August 2024</p> <p>Response to Scoping Opinion</p>	<p>“Spillages or leakages of fuels and chemicals. Leaching of chemicals from faulty battery incidents (fire damage, ash deposition and extinguishing waters)” are requested to be moved to in scope.</p>	<p>Moved in to scope.</p>
<p>Mears Ashby Parish Council, 21st August 2024</p> <p>Response to Scoping Opinion</p>	<p>Battery Storage Systems are notoriously unsafe, liable to catch fire and require hundreds of gallons of water to extinguish. Run-off from such a fire contains significant amounts of pollutants and can contaminate watercourses. Both areas are close to water courses that eventually run into Sywell reservoir at the Country Park.</p>	<p>Operational mitigation measures, including those for a potential BESS fire, use of fire-fighting agents containing chemicals, leaching of batteries and leaching of cables are outlined in Section 22.7</p> <p>Assessment of the likely significance of effect / impact on controlled waters and ecology and sensitive land uses, in the event of a</p>



Consultee and Date	Response	Outcome and any further steps anticipated
		potential BESS fire, has been included in Section 22.8. Moved in to scope.
North Northamptonshire Council, 22 nd August 2024 Response to Scoping Opinion	In agreement to scope out ground conditions.	No amendments required.
West Northamptonshire Council, 22 nd August 2024. Response to Scoping Opinion	No comment provided.	No amendments required.

22.3 Legislation, Planning Policy and Guidance

22.3.1 This section provides an overview of the legislation, planning policy and guidance against which the Scheme will be considered for Ground Conditions and Contamination.

Legislation

UK Legislation

Environmental Protection Act 1990 (as amended) (Ref.1)

22.3.2 Part IIA of the Environmental Protection Act 1990 (EPA 1990) aims to ensure that contaminated land is identified and remediated where it poses unacceptable levels of risk. Section 78A(2) of the EPA 1990, provides the definition of “contaminated land” for the purposes of Part 2A, which is:

22.3.3 “Contaminated Land” is any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that

- (a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) significant pollution of controlled water is being caused; or there is a significant possibility of such pollution being caused’.

22.3.4 In Section 78A(4) of the EPA 1990, harm is defined as meaning ‘harm to the health of living organisms or other interference with the ecological systems of which they form part and in the case of man includes harm to his property’.

Water Resources Act 1991 (as amended) (Ref.2)

22.3.5 In addition, Sections 161 to 161D of the Water Resources Act 1991 give powers to the Environment Agency to take action to prevent or remedy the pollution of controlled waters. A “works notice” served under Section 161A specifies what works or operations have to be carried out and in what time periods. A “works notice” is served on any responsible person where it appears that:

- any poisonous, noxious or polluting matter or any waste matter is or has been present in, or is likely to enter, any controlled waters; or
- any controlled waters are being or have been harmed, or are likely to be harmed, by any event, process or other source of potential harm.



Town and Country Planning Act 1990 (as amended) (Ref.3)

- 22.3.6 The Town and Country Planning Act 1990 is UK based legislation that outlines the framework for land use planning and development control. It authorises local planning authorities to create and implement policies that promote the effective and sustainable use of land. Key components of the Act include the requirement for planning permission, the assessment of planning applications, and the enforcement of regulations. Additionally, it addresses designated areas, environmental protection, and the rights to appeal planning decisions. This legislation is essential for balancing development needs with environmental and community interests.

Planning Policy

National Planning Policy

- 22.3.7 National Policy Statements (NPSs) form a principal part of the decision-making process for Nationally Significant Infrastructure Projects (NSIPs); the policy statements of relevance to the Facility are:

- The overarching NPS for Energy (EN-1) (Ref.5);
- NPS for Electricity Networks Infrastructure (EN-5) (Ref.6); and
- NPS for Renewable Energy Infrastructure (EN-3) (Ref.7).

- 22.3.8 The following paragraphs of the NPS EN-1 are considered to be relevant to this chapter:

- 4.12.1 - *Issues relating to discharges or emissions from a proposed project, and which lead to other direct or indirect impacts on terrestrial, freshwater, marine, onshore, and offshore environments, or which include noise and vibration may be subject to separate regulation under the pollution control framework or other consenting and licensing regimes*
- 5.11.8 - *The ES should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan.*
- 5.11.11 - *During any pre-application discussions with the Applicant the LPA (Local Planning Authority) should identify any concerns it has about the impacts of the application on land use, having regard to the development plan and relevant applications and including, where relevant, whether it agrees with any independent assessment that the land is surplus to requirements.*
- 5.11.2 - *Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations.*
- 5.11.13 - *Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed. For developments on previously developed land, Applicants should ensure that they have considered the risk posed by land contamination.*

- 22.3.9 The NPPF (Ministry of Housing, Communities and Local Government (MHCLG), 2023) (Ref.8) does not contain specific policies relating to NSIPs. However, some policy requirements detailed in the NPPF may be of relevance. The policies relating to this chapter include:

- Planning policies and decisions should contribute to and enhance the natural and local environment by inter alia preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate. Opportunities to incorporate biodiversity improvements into developments are encouraged,



especially where they can achieve measurable net gains. Development proposals that result in the loss of irreplaceable habitats, such as ancient woodlands or veteran trees, should generally be refused unless there are exceptional reasons and a suitable compensation strategy. For non-irreplaceable habitats, compensatory measures should be used to ensure a net gain in biodiversity is achieved. (para 180).

- Planning policies and decisions should also ensure that:
 - (a) A site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);
 - (b) After remediation, as a minimum land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990;
 - (c) Adequate site investigation information, prepared by a competent person, is available to inform these assessments. (para 189)
- Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner. (para 190)
- Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. (para 191).

Overarching National Policy Statement for Energy (EN-1) (Ref.5)

- 22.3.10 Section 5.11 Land Use, including Open Space, Green Infrastructure and Green Belt requires that any risks arising from land instability and contamination is managed such that the site is suitable for use following development. These requirements follow those stated in NPPS.

National Policy Statement for Renewable Energy Infrastructure (EN-3) (Ref.7)

- 22.3.11 Section 2 requires Soil Management plans to facilitate sustainable management of soils and minimise impacts on soil health and contamination.

National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref.6)

- 22.3.12 Section 2.9.25 considers the potential impacts on soils and geology and the need for soil resource and management plans.

Local Planning Policy

- 22.3.13 Green Hill Solar Farm is located within the jurisdiction of West Northamptonshire Council, North Northamptonshire Council and Milton Keynes Council and adjacent to
- 22.3.14 Local Policy 16 - Development on Land Affected by Contamination is relevant to this chapter. The planning aspects of ground conditions is dealt with by the legislation, policy and guidance in this section.

Guidance

Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance ^[2]

- 22.3.15 The statutory government guidance to Part 2A (DEFRA, 2012), describes the concept of the 'contaminant linkage' in Sections 3.8 to 3.11 as quoted below:
- 22.3.16 (3.8) "Under Part 2A, for a relevant risk to exist there needs to be one or more contaminant-pathway-receptor linkages – "contaminant linkage" – by which a relevant receptor might be affected by the contaminants in question. In other words, for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters. For the purposes of this Guidance:



(a) A “contaminant” is a substance which is in, on or under the land and which has the potential to cause significant harm to a relevant receptor, or to cause significant pollution of controlled waters.

(b) A “receptor” is something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property, or controlled waters. The various types of receptors that are relevant under the Part 2A regime are explained in later sections.

(c) A “pathway” is a route by which a receptor is or might be affected by a contaminant.

22.3.17 (3.9) The term “contaminant linkage” means the relationship between a contaminant, a pathway and a receptor. All three elements of a contaminant linkage must exist in relation to particular land before the land can be considered potentially to be contaminated land under Part 2A, including evidence of the actual presence of contaminants. The term “significant contaminant linkage”, as used in this Guidance, means a contaminant linkage which gives rise to a level of risk sufficient to justify a piece of land being determined as contaminated land. The term “significant contaminant” means the contaminant which forms part of a significant contaminant linkage.

22.3.18 (3.10) In some cases the local authority may encounter land where risks are presented by groups of substances which are likely to behave in the same manner, or a substantially very similar manner, in relation to the risks they may present (e.g. as may be the case with organic substances found in oils). For the purposes of identifying and assessing contaminant linkages and taking regulatory decisions in relation to such linkages, the local authority may treat such groups of contaminants as being in effect a single contaminant and multiple contaminant linkages as being in effect a single contaminant linkage. The authority should only do this if there is a scientifically robust reason for doing so, and it should state clearly why this approach has been taken in relevant documentation (including the risk summary discussed later in this Section) if the land is later determined as contaminated land.

22.3.19 (3.11) In considering contaminant linkages, the local authority should consider whether:

(a) The existence of several different potential pathways linking one or more potential contaminants to a particular receptor or class of receptors may result in a significant contaminant linkage.

(b) There is more than one significant contaminant linkage on any land. If there are, the authority should consider whether or not each should be dealt with separately, since different people may be responsible for the remediation of individual contaminant linkages.”

22.3.20 The guidance also mentions that its broader approach may include using the planning system to ensure land is made ‘suitable for use’.

22.3.21 The UK government guidance titled ‘Land affected by contamination’, updated in July 2019 (Ref.9) provides guiding principles on how planning can deal with land affected by contamination including identifying and remediating statutorily defines contaminated and, the use of buildings regulations and permitting. Guidance is also provided as to how to determine if land is contaminated through the use of several recommended data sources (such as River Basin Management Plans, National Land Use Database, Historical Ordnance Survey Maps, Local Planning Authority Records and Natural England’s MAGIC site).

22.3.22 This assessment has been undertaken in general accordance with guidance on Land Contamination: Risk Management pages (Ref.10) of the GOV.UK website, the relevant requirement of the National Planning Policy Framework (NPPF) (Ref.8) (as revised December 2023) (paragraphs 180 and 189-194) and the Planning Practice Guidance (Land Affected by Contamination) (Ref.9).

22.3.23 Further UK Guidance relevant to this chapter includes;

- British Standard BS 5930:2015 + A1:2020: Code of practice for site investigations ^[12]



- British Standard BS 8485:2015 + A1:2019: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings ^[13]
- British Standard BS 8576:2013: Guidance on investigations for ground gas – permanent gases and volatile organic compounds ^[14]
- British Standard BS 10175:2011 + A2:2017: Code of practice for investigations of potentially contaminated sites ^[15]
- CIRIA C665:2007: Assessing risks posed by hazardous ground gases to buildings ^[16]
- CIRIA C681:2009: Unexploded ordnance (UXO) A guide for the construction industry ^[17]
- CIRIA C762: 2016: Environmental good practice on site ^[18]
- CIRIA C733:2014: Asbestos in soils and made ground ^[19]
- The Environment Agency approach to groundwater protection (February 2018 + 2023) ^[20]
- Environment Agency guidance: protect groundwater and prevent groundwater pollution (March 2017 + 2024) ^[21]
- Environment Agency guidance: contaminated land exposure assessment (CLEA) tool (May 2014 + 2015) ^[22]
- Environment Agency science report: human health toxicological assessment of contaminants in soil (2009) ^[23]
- Environment Agency guidance: land contamination risk management (LCRM) Stage 3 remediation and verification (October 2020 + 2023) ^[24]
- Environment Agency research and analysis: land contamination: remedial targets methodology (RTM) (January 2006 + 2014) (Ref.24).

22.4 Assessment Methodology

22.4.1 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 Ground Conditions and Contamination.

Study Area

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

22.4.3 The Site locations can be classified into the following:

- Green Hill A - Land east of Broughton Road, Old;
- Green Hill A.2 - Land north-east of Walgrave;
- Green Hill B - Land south of Holcot;
- Green Hill C - Land north of Sywell Road, Sywell;
- Green Hill D - Land west of Highfield Road, Mears Ashby;
- Green Hill E - Land at Wilby Road, Mears Ashby;
- Green Hill F - Land west of Bozeat;
- Green Hill G - Land at Warrington; and
- Green Hill BESS - Land at Grendon Substation.

22.4.4 The final cable route has not yet been determined, but a Cable Route Search Area has been identified for the potential cable route. Only a narrow section within this search area will be needed



for the final cable corridor and its construction. The exact placement of these elements will be refined before the DCO application is submitted.

22.4.5 For this preliminary assessment, the Study Area includes both the Sites and the Cable Route Search Area.

Impact Assessment Methodology

22.4.6 The baseline conditions for soil and groundwater have been established through a desktop review (Preliminary Geo-Environmental Risk Assessment (PRA)) to identify potential contaminant linkages and assess the risk to human health and controlled waters. The methodology utilised within this assessment is detailed as followed:

- review of the environmental setting of the Scheme, including the current use / status of the Sites, Cable Route Search Area and surrounding area, and review of the geology, hydrogeology and hydrology;
- review of the historical activities of the Sites, Cable Route Search Area and surrounding area;
- review of regulatory information, including the Local Authority / Petroleum Officer / EA in relation to Part 2A of the Environmental Protection Act 1990, relating to the Sites and Cable Route Search Area;
- review of the online planning records for the Site and Cable Route Search Area;
- review online records associated with potential unexploded ordnance risks;
- complete a reconnaissance by undertaking a visual inspection of readily accessible areas of the Site and Cable Route Search Area, to identify current conditions and highlight potential risks and constraints;
- review of readily available third-party reports relating to the Site, Cable Route Search Area or surrounding area;
- develop an outline Conceptual Site Model, including site zoning, and undertake a Preliminary Risk Assessment with respect to potential contamination focused on the proposed land use; and
- provide commentary on potential land contamination and geotechnical constraints in the context of the Scheme.

22.4.7 The underlying principle is the evaluation of contaminant linkages via the Conceptual Site Model (CSM) as outlined under Part 2A, in order to assess whether the presence of a source of contamination could potentially lead to significant harm.

Assessment Process

22.4.8 Following the PRA, the sensitivity and magnitude of impact has been determined by considering the nature of the change, its severity, the duration of an effect, the likelihood of an effect occurring, and the relative extent of the effects of contamination to the receptor. The risk assessment has been based on a qualitative assessment and professional judgement. Potential effects in terms of ground conditions tend to be local given the nature of potential sources of contamination, with the exception of naturally occurring elevated contaminants. Therefore, the effects have not been considered in relation to different geographical contexts.

Sensitivity of Receptors

22.4.9 The sensitivity is based on the relative importance of the receptor, as detailed in Table 22.1.



Table 22.1: Sensitivity Criteria

Sensitivity	Definition
High	Land to be used for human consumption (e.g. agricultural, allotments), highly sensitive ecosystems (e.g. SPA, SAC, SSSI, NNR) and the receptor being a public drinking water supply.
Medium	Parks and open spaces, regional or locally sensitive ecosystems and water bodies of medium quality.
Low	Commercial or industrial land uses, low to nonsensitive ecosystems (e.g. derelict land, Solar Farms), water bodies of low quality and not a public water supply.
Negligible	Land with no sensitive environmental receptors. Residual risk considered to be so minor that it would not be detectable. No appreciable change in environmental risk to environmental receptors.

Magnitude of Impacts

22.4.10 The magnitude of impact on the receptor is detailed in **Table 22.2**.

Table 22.2: Magnitude of Impact

Sensitivity	Definition
High	The proposal will cause the release of contamination which is significantly above guideline values (such as C4SLs, soil guidance values, SoBRA guidance values, etc. specific to the source, receptor and development) or release hazardous contamination for the operational timescale of the development. Remediation will be required.
Medium	The proposal will cause the release of contamination close to the guidance values (such as C4SLs, soil guidance values, SoBRA guidance values, etc. specific to the source, receptor and development) during construction or operational timescale of the development. Remediation may be required.
Low	The proposals will cause the release of contamination which is below the guideline values (such as C4SLs, soil guidance values, SoBRA guidance values, etc. specific to the source, receptor and development) for short period of time. Remediation will be not required; however, mitigation measures may be used to reduce the potential impact.
Negligible	Contaminants found at very low concentrations. Remediation not required.
Neutral	No change from baseline conditions.

Assessment of Significance

22.4.11 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative. Effects from moderate and above are considered to be significant. Where an effect has been anticipated to be negligible or minor, these are classed as ‘not significant’ effects. Effects which are moderate/minor are considered to be not significant. The significance matrix is set out in **Table 22.3**.

Table 22.3: Impact Significance Matrix

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



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

22.5 Assessment Assumptions and Limitations

- 22.5.1 This preliminary assessment is based on baseline and Scheme design information available at the time of writing this chapter. A full assessment is being undertaken as part of the EIA, the assessment will be developed and refined following statutory consultation and as additional information becomes available with the final assessment presented within the ES.
- 22.5.2 Where the Scheme designs and details are either not yet known or incomplete at this stage, either assumptions have been made based on professional judgment, or, in the event that it is not possible to make any assumptions, no attempt at a full assessment has been made. This assessment is an iterative process and will be both expanded and made more specific as survey data is collected, analysed and reported on, and designs are further developed. This process will be carried out in conjunction with relevant consultees and third parties as necessary to achieve the most robust outcome.
- 22.5.3 The methodology for Ground Conditions and Contamination accounts for the assumptions and limitations that, at the time of writing, the exact location of the Cable Route Corridor had not been determined. As a result, the Cable Route Search Area has been included in the current assessment and preliminary assessed, a detailed assessment will be completed once the Cable Corridor has been refined.

22.6 Baseline Conditions

- 22.6.1 This section describes the baseline environmental characteristics for the Scheme and surrounding areas with specific reference to Ground Conditions and Contamination.

Existing Baseline

- 22.6.2 The existing baseline conditions are derived from the completed desk-based Preliminary Geo-Environmental Risk Assessment (PRA). This assessment comprised the identification of the environmental site setting and surrounding area, including the geology, hydrogeology, hydrology and the historical uses including quarrying and the potential presence of unexploded ordnance. This description is provided given it forms the basis of the CSM, identifying potential sources, pathways and receptors.
- 22.6.3 The environmental setting information has been obtained from a variety of sources including: British Geological Survey (BGS) online data, Environment Agency (EA) data, a Landmark Envirocheck® Report for the assessment sites, Coal Authority (CA) online data and information provided by Wellingborough Council, West Northamptonshire Council, North Northamptonshire Council and Milton Keynes Council. Delta-Simons’ PRA for the development site and Cable Route Search Area is included as **Volume 3, Appendix 22.1** and should be read in conjunction with this chapter.
- 22.6.4 Overlay plans showing the sites in the context of the underlying bedrock and superficial geology are appended as Figures 1.1, 1.2, 2.1 and 2.2.
- 22.6.5 **Chapter 9: Ecology and Biodiversity** outlines the statutory and non-statutory sites designated for nature conservation at international, national and local levels. Section 9.6 outlines the existing baseline conditions and designated sites within proximity to the Scheme. Of consideration is the The Upper Nene Valley Gravel Pits Special Protection Area (Upper Nene Valley GP SPA) which comprises a network of exhausted sand and gravel pits extending across approximately 35km of alluvial deposits of the River Nene floodplain. The SPA lies closest to Green Hill BESS (parts of the SPA lie adjacent to the Site boundary).



22.6.6 **Chapter 11: Minerals** considers the aspects in relation to minerals resources. Section 11.6 considers the existing baseline conditions for the Scheme, the following summaries have been taken from **Chapter 11: Minerals**:

- **Green Hill A and A.2** are together with the Cable Route Search Area connecting the two are within MSAs protecting sand and gravel resources.
- **Green Hill B** is also within 2 MSAs protecting sand and gravel resources, however in this case the MSA is more peripheral extending beyond the Site, to the north and west and southwest.
- **Green Hill C, D and E plus the connecting Cable Route Search Area** linking sites A.2, C, D and E do not affect any safeguard mineral resources.
- **Green Hill BESS** lies within the safeguarded Nene Valley deposits; however, it is not specifically allocated for future mineral extraction.
- **Green Hill F**, the northern part of the site is also within a sand and gravel MSA.
- **Green Hill G** covers a narrow area of safeguarded sand and gravel in the southern western corner.

Green Hill A

Geology

22.6.7 Published BGS data indicates Green Hill A to be underlain by superficial Diamicton of the Oadby Member in the north-east and west, Glacio-fluvial Deposits (Sand and Gravel) in the western area and limited Alluvium Deposits (Clay, Silt, Sand and Gravel) along the unnamed waterway in the south-western portion of Green Hill A.

22.6.8 The bedrock is mapped as the Northampton Sand Formation (Ironstone, Ooidal) and Whitby Mudstone Formation (Mudstone) in the western portion of Green Hill A, with the Stamford Member (Sandstone and Siltstone) and Rutland Formation (Mudstone) in the east.

22.6.9 Made Ground is anticipated in the concrete storage area located to the north of Green Hill A, however, is likely to be limited in thickness. The concrete storage area in Site A was noted to be in use largely for the storage of hay. A stockpile of rubble including brick and concrete was noted and a metal silage container was also present at the time of the walkover.

Hydrogeology and Hydrology

22.6.10 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer, the Glacio-fluvial Deposits and Alluvium as Secondary A Aquifers.

22.6.11 Bedrock of the Northampton Sand Formation and the Stamford Member are classified as Secondary A Aquifers, the Rutland Formation as Secondary B and the Whitby Mudstone Formation as Unproductive Strata.

22.6.12 The EA also indicate that Green Hill A is not located within a Groundwater Source Protection Zone (SPZ).

22.6.13 There are no licensed groundwater abstractions for potable water within 500 m of Green Hill A. A non-potable groundwater abstraction point relating to general farming and domestic uses is located 345 m north-west. Two surface water abstractions (variation of one license) relating to general farming and domestic uses located 240 m south-west. Four additional surface water abstractions (variation of two licences) relating to general farming and domestic use are located 210 and 390 m south.

22.6.14 Borehole SP87SW72 (300 m east of Green Hill A), struck groundwater at 27.3 m bgl (metres below ground level), with a resting groundwater level of 23.1 m bgl.

22.6.15 A drainage ditch is orientated north-east to south-west in Green Hill A.



Mining

- 22.6.16 There is no recorded coal or underground non-coal mining within Green Hill A.
- 22.6.17 Three BGS Recorded Mineral Sites are mapped on Green Hill A including a sand pit in the north-west, a clay pit in the central southern area and an old gravel pit along the southwestern boundary. All entries are now noted to be ceased.

Historical Summary

- 22.6.18 Green Hill A has largely remained undeveloped and comprises a series of agricultural fields.
- 22.6.19 Walgrave Lodge Sand Pit is present in the north-western area of Green Hill A from 1884 until no longer mapped by 1974.

Unexploded Ordnance

- 22.6.20 A low risk of UXO has been determined for Green Hill A. However, an archaeological survey has recently identified the presence of a suspected UXO. Details of the find and associated additional risk assessment are currently awaited and will be included as part of the ES Chapter.

Green Hill A.2

Geology

- 22.6.21 Published BGS data indicates Green Hill A.2 to be underlain primarily by superficial Diamicton of the Oadby Member.
- 22.6.22 The bedrock is mapped as the Wellingborough Limestone Member (Limestone and Mudstone) and Rutland Formation (Mudstone) primarily in the eastern portion of Green Hill A.2, with the Stamford Member (Sandstone and Siltstone) in the west. The Northampton Sand Formation (Ironstone, Ooidal) may encroach onto the western portion of Green Hill A.2.

Hydrogeology and Hydrology

- 22.6.23 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer.
- 22.6.24 Bedrock of the Wellingborough Limestone Member, Stamford Member and Northampton Sand Formation are classified as Secondary A Aquifers, with Rutland Formation as a Secondary B Aquifer.
- 22.6.25 The EA also indicate that Green Hill A.2 is not located within a Groundwater Source Protection Zone (SPZ).
- 22.6.26 There are no licensed groundwater abstractions for potable water within 500 m of Green Hill A.2. A non-potable groundwater abstraction point relating to general farming and domestic uses is located 370 m north of Green Hill A.2.
- 22.6.27 Borehole SP87SW69 located within the north of Green Hill A.2 struck groundwater at 25 m bgl, with resting levels recorded at 8.5 m bgl.
- 22.6.28 A drainage ditch is present adjacent to the north-west of Green Hill A.2.

Mining

- 22.6.29 There is no recorded, or evidence of mining within Green Hill A.2.

Historical Summary

- 22.6.30 Green Hill A.2 has largely remained undeveloped and comprises a series of agricultural fields.

Unexploded Ordnance

- 22.6.31 A low risk of UXO has been determined for Green Hill A.2.

Green Hill B

Geology

- 22.6.32 BGS data indicates Green Hill B to be underlain by superficial Diamicton of the Oadby Member.



- 22.6.33 The bedrock is mapped as the Rutland Formation (Mudstone) and Stamford Member (Sandstone and Siltstone), with Blisworth Limestone Formation (Limestone) mapped in the most northern portion of the Green Hill B.
- Hydrogeology and Hydrology*
- 22.6.34 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer.
- 22.6.35 Bedrock of the Blisworth Limestone Formation is classified as a Principal Aquifer, the Stamford Member as Secondary A and Rutland Formation as a Secondary B.
- 22.6.36 The EA also indicate that Green Hill B is not located within a Groundwater Source Protection Zone (SPZ).
- 22.6.37 There are no licensed groundwater abstractions for potable water within 500 m of Green Hill B. There are two non-potable groundwater abstraction points relating to general farming and domestic uses located 105 m south-east and 420 m south-west. An additional non-potable groundwater abstraction point relating to general farming and domestic uses is located 66 m south of the Green Hill B access roadway.
- 22.6.38 Borehole SP86NW78 (350 m east of Green Hill B), recorded resting groundwater levels at 4.1 m bgl. Borehole SP86NW79 (400 m east of Green Hill B), recorded resting groundwater levels at 3.0 m bgl.
- 22.6.39 A small pond is mapped present along the western boundary. A drainage ditch is present approximately 100 m east, and Pitsford Reservoir is approximately 1 km northwest of Green Hill B.
- Mining*
- 22.6.40 There is no recorded evidence of mining within Green Hill B.
- Historical Summary*
- 22.6.41 Green Hill B has remained undeveloped throughout its history and comprises a series of agricultural fields.
- Unexploded Ordnance*
- 22.6.42 A low risk of UXO has been determined for Green Hill B.
- Green Hill C**
- Geology*
- 22.6.43 BGS data indicates Green Hill C to be underlain by superficial Diamicton of the Oadby Member.
- 22.6.44 The bedrock is mapped as the Stamford Member (Sandstone and Siltstone), Northampton Sand Formation (Ironstone, Ooidal) and Wellingborough Limestone Member (Limestone and Mudstone).
- Hydrogeology and Hydrology*
- 22.6.45 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer.
- 22.6.46 Bedrock of the Stamford Member, Northampton Sand Formation and Wellingborough Limestone Member are classified as Secondary A Aquifers.
- 22.6.47 The EA also indicate that Green Hill C is not located within a Groundwater Source Protection Zone (SPZ).
- 22.6.48 There are no licensed groundwater abstractions for potable water within 500 m of Green Hill C. A surface water abstraction relating to spray irrigation is located on-Site in the south (status is noted as revoked). Two additional non-potable groundwater abstraction points relating to general farming and domestic and agricultural uses are located 280 m north-west and 450 m south, respectively, of an access roadway (north-west of Green Hill C).



- 22.6.49 Borehole SP86NW82 (10 m south-west of Green Hill C) recorded resting groundwater levels at 7.0 m bgl.
- 22.6.50 A small pond is located to the north-east of Green Hill C.
- Mining
- 22.6.51 There is no recorded coal or underground non-coal mining within Green Hill C. Mears Ashby Iron Ore Pit is located along the western boundary of Green Hill C. The entry is noted to be ceased.
- Historical Summary
- 22.6.52 Green Hill C has largely remained undeveloped and in agricultural use.
- 22.6.53 An agricultural building is mapped in the northern central area from 1900 until 1971.
- 22.6.54 Mears Ashby Iron Ore Pit is mapped along the western boundary of Green Hill C from 1901 until 1958.
- Unexploded Ordnance
- 22.6.55 A low risk of UXO has been determined for Green Hill C.
- Green Hill D**
- Geology
- 22.6.56 BGS data indicates Green Hill D to be underlain by superficial Diamicton of the Oadby Member, with Bozeat Till encroaching onto the western portion of Green Hill D.
- 22.6.57 The bedrock is mapped as the Rutland Formation (Mudstone), Wellingborough Limestone Member (Limestone and Mudstone), Stamford Member (Sandstone and Siltstone), and Northampton Sand Formation (Ironstone, Ooidal).
- Hydrogeology and Hydrology
- 22.6.58 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer and the Bozeat Till as Unproductive Strata.
- 22.6.59 Bedrock of the Wellingborough Limestone Member, Stamford Member and the Northampton Sand Formation are classified as Secondary A Aquifers. The Rutland Formation is classified as a Secondary B Aquifer.
- 22.6.60 The EA also indicate that Green Hill D is not located within a Groundwater Source Protection Zone (SPZ).
- 22.6.61 There are no licensed abstraction points for potable, non-potable and/or surface water within 500 m of Green Hill D.
- 22.6.62 Borehole SP86NW81 within the north of Green Hill D, recorded resting groundwater levels at 13.7 m bgl.
- 22.6.63 A drainage ditch is present in the centre of Green Hill D orientated north to south.
- Mining
- 22.6.64 There is no recorded, or evidence of mining within Green Hill D.
- Historical Summary
- 22.6.65 Green Hill D has remained undeveloped through its history and comprises a series of agricultural fields.
- Unexploded Ordnance
- 22.6.66 A low risk of UXO has been determined for Green Hill D.



Green Hill E

Geology

- 22.6.67 BGS data indicates Green Hill E to be underlain by superficial Diamicton of the Oadby Member across the northern and central areas. Pockets of Glacio-Fluvial (Sand and Gravel) are present in the south-west, pockets of Bozeat Till are present in the western portion of Green Hill E. Alluvium (Clay and Silt) may encroach onto the south-eastern portion of Green Hill E, along the unnamed waterway.
- 22.6.68 The bedrock is mapped as the Blisworth Limestone Formation (Limestone), Rutland Formation (Mudstone) and Wellingborough Limestone Member (Limestone and Mudstone) located within the northern portion of Green Hill E, the Stamford Member (Sandstone and Siltstone) within the central area, and the Northampton Sand Formation (Ironstone, Ooidal) and Whitby Mudstone Formation (Mudstone) in the southern portion.
- 22.6.69 A review of online imagery noted that made Ground is anticipated in the developed area located in the central area of the site consisting of a farmyard and agricultural building; however, it is likely to be limited in thickness.

Hydrogeology and Hydrology

- 22.6.70 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer, the Glacio-fluvial Deposits and Alluvium Deposits as Secondary A, and the Bozeat Till as Unproductive Strata.
- 22.6.71 Bedrock of the Blisworth Limestone Formation is classified as a Principal Aquifer, the Wellingborough Limestone Member, Stamford Member and the Northampton Sand Formation as Secondary A Aquifers, the Rutland Formation as a Secondary B Aquifer and the Whitby Mudstone Formation as Unproductive Strata.
- 22.6.72 The EA also indicate that Green Hill E is not located within a Groundwater Source Protection Zone (SPZ).
- 22.6.73 There are no licensed groundwater abstractions for potable water within 500 m of Green Hill E. Two non-potable groundwater abstraction points relating to general farming and domestic uses are located on-site in the south-west, and 30 m east of Green Hill E. Two surface water abstractions relating to spray irrigation are located 30 m east and 430 m west. Six additional non-potable groundwater abstraction points (variations of two licences) relating to general farming and domestic and extractive (dust suppression and mineral washing) uses are located 35 m east, 135 m south-east and 290 m south-east of Green Hill E access roadway.
- 22.6.74 Comments on groundwater were not made within BGS borehole records across Green Hill E or in close proximity to Green Hill E.
- Two drainage ditches are present on Site in the west and along the eastern perimeter. Sywell Reservoir is present approximately 450 m west of Green Hill E.

Mining

- 22.6.75 There is no recorded coal or underground non-coal mining within Green Hill E.
- 22.6.76 Ward's Barn Sand Pit is mapped along the western boundary of Green Hill E. The entry is noted to be ceased.

Historical Summary

- 22.6.77 The majority of Green Hill E has remained undeveloped and in agricultural use.
- 22.6.78 Agricultural barns/storage buildings are preset in the central area from the earliest map edition dated 1884 until present.
- 22.6.79 Ward's Barn Sand Pit is present along the western boundary from 1901 until 1988.



22.6.80 A sewage works is mapped in the western area of Green Hill E adjacent to the on-site stream from 1927 until 1958 when the area is mapped as a works. By 1999 the works are no longer mapped, and the area is noted to comprise woodland from 2004 onwards.

Unexploded Ordnance

22.6.81 A low risk of UXO has been determined for Green Hill E.

Green Hill F

Geology

22.6.82 BGS data indicates Green Hill F to be underlain by superficial Diamicton of the Oadby Member in the south, with pockets of Bozeat Till, Milton Formation (Sand and Gravel) and Alluvium (Clay and Silt) in the central and northern portions of Green Hill F.

22.6.83 The bedrock is mapped as the Wellingborough Limestone Member (Limestone and Mudstone), Rutland Formation (Mudstone), Stamford Member (Sandstone and Siltstone) and Whitby Mudstone Formation (Mudstone) in the northern portion of Green Hill F, with Blisworth Limestone Formation (Limestone) and Blisworth Clay Formation (Mudstone) and Cornbrash Formation (Limestone) recorded in the central to southern portion.

22.6.84 Made Ground is anticipated in the developed area however, it is likely to be limited in thickness.

Hydrogeology and Hydrology

22.6.85 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer, the Milton Formation and Alluvium Deposits as Secondary A Aquifers and the Bozeat Till as Unproductive Strata.

22.6.86 Bedrock of the Blisworth Limestone Formation is classified as a Principal Aquifer, the Wellingborough Limestone Member, Stamford Member, Cornbrash Formation are classified as Secondary A Aquifers, the Rutland Formation as a Secondary B Aquifer, with the Whitby Mudstone Formation and Blisworth Clay Formation as Unproductive Strata.

22.6.87 The EA also indicate that Green Hill F is not located within a Groundwater Source Protection Zone (SPZ).

22.6.88 There are no licensed groundwater abstractions for potable water within 500 m of Green Hill F. Two surface water abstractions relating to spray irrigation and agricultural uses are located on-Site in the north (status revoked) and east, respectively. An additional surface water abstraction relating to a public water supply located 30 m west (also listed as a non-potable groundwater abstraction) (status revoked).

22.6.89 Borehole SP85NE10 (150 m west of Green Hill F) recorded resting groundwater at 31 m bgl. Borehole SP85NE3 (250 m south of Green Hill F) recorded resting groundwater at 36.5 m bgl.

22.6.90 Two drainage ditches are present on Site in the west and central areas. In addition, a number of small ponds are present in the north.

Mining

22.6.91 There is no recorded coal or underground non-coal mining within Green Hill F.

22.6.92 From available online planning records, several historical planning applications for the extraction of sand and gravel were present within the northern area of Green Hill F, associated with the now exhausted Bozeat Quarry. For further information see Chapter 11.

Historical Summary

22.6.93 The majority of Green Hill F has remained undeveloped and in agricultural use.

22.6.94 Three agricultural barns/storage buildings are present in the western area of Green Hill F from the earliest map edition dated 1884. The most northern barn is no longer visible in 2003 aerial Imagery and the central and southern buildings remain until present.



Unexploded Ordnance

22.6.95 A low risk of UXO has been determined for Green Hill F.

Green Hill G

Geology

22.6.96 BGS data indicates Green Hill G to be underlain by superficial Diamicton of the Oadby Member in the central and northern portions. Superficial deposits are not mapped in the southern portion, however Alluvium (Clay and Silt) may encroach onto the south-eastern portion of Green Hill G, along the unnamed waterway.

22.6.97 The bedrock is mapped as the Cornbrash Formation (Limestone) across the majority of Green Hill G, with a pocket of the Kellaways Clay Member (Mudstone) and Kellaways Sand Member (Sandstone and Siltstone) mapped in the south-east portion of Green Hill G.

22.6.98 Made Ground is not anticipated at Green Hill G. If Made Ground is encountered, it will be limited to current field boundary farm tracks of likely minimal thickness.

Hydrogeology and Hydrology

22.6.99 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer and Alluvium as Secondary A Aquifer.

22.6.100 Bedrock of the Cornbrash Formation and the Kellaways Sand Member are classified as Secondary A Aquifer, with the Kellaways Clay Member as Unproductive Strata.

22.6.101 The EA also indicate that Green Hill G is not located within a Groundwater Source Protection Zone (SPZ).

22.6.102 There are no licensed groundwater abstractions for potable water within 500 m of Green Hill G. One non-potable groundwater abstraction point relating to domestic and agricultural uses is located 305 m south-east (status revoked).

22.6.103 Borehole SP95NW5 (500 m north of Green Hill G) recorded resting groundwater levels at 41 m bgl.

22.6.104 Multiple drainage ditches are present in the centre of Green Hill G, draining into a singular tributary of the River Great Ouse (1.60 km south).

Mining

22.6.105 No record, or evidence of mining is noted across Green Hill G.

Historical Summary

22.6.106 The majority of Green Hill G has remained undeveloped and in agricultural use.

22.6.107 A named farm, Tinick Farm is present in the centre of Green Hill G from the earliest map edition dated 1885 to 1981.

Unexploded Ordnance

22.6.108 A Detailed UXO Risk Assessment was undertaken by 1st Line Defence (ref: DA20134-00), dated 29th June 2024 for Land at Green Hill G after infield Geophysics results indicated evidence of suspected bomb craters and plane wreckage. A peer review of this report is currently being undertaken, with findings to be presented with the following ES chapter.

22.6.109 Green Hill G and the wider area was used during WWII as a practice bombing range (PBR) known as Lavenham PBR and covered an area of approximately 84,620 m², operational from at least 1944 under the operational authority of the USAAF 95th Bombing Group.

22.6.110 It is reported in 21st January 1957 a de Havilland Vampire crashed in the fields in proximity to Lower Farm, located in the far east of the Site with wreckage being scattered strewn across the south-east of the Site. However, it was not considered to pose a risk from unexploded ordnance as the aircraft was on a navigation exercise.



- 22.6.111 In summary, live ordnance (including American live ordnance) was dropped on the Site and therefore is classified as a Medium Risk from allied ordnance. The report from German UXO is Low to Medium Risk.

Green Hill BESS

Geology

- 22.6.112 BGS data indicates Green Hill BESS is underlain by superficial Alluvium (Clay and Silt), Ecton Member (Sand and Gravel) and Glaciofluvial Deposits (Sand and Gravel).

- 22.6.113 The bedrock is mapped as the Whitby Mudstone Formation (Mudstone).

Hydrogeology and Hydrology

- 22.6.114 The EA classifies the Alluvium, Ecton Member and Glaciofluvial Deposits as Secondary A Aquifers.

- 22.6.115 Bedrock of the Whitby Mudstone Formation is classified as Unproductive Strata.

- 22.6.116 The EA also indicate that Green Hill BESS is not located within a Groundwater Source Protection Zone (SPZ).

- 22.6.117 There are no licensed groundwater abstractions for potable water within 500 m of Green Hill BESS. One surface water abstraction relating to spray irrigation uses is located on-Site in the centre (status revoked). Eight non-potable groundwater abstraction points (variations of one licence) relating to extractive (dust suppression and mineral washing) uses are located 490 m north-west. Four additional surface water abstractions relating to mineral washing and spray irrigation are located 285 m west and 410 m east (revoked).

- 22.6.118 Borehole SP86SE51 located within the north of Green Hill BESS struck groundwater at 2.3 m bgl. Borehole SP86SE52 located within the south of Green Hill BESS did not encounter groundwater, with a maximum base depth recorded at 3.3 m bgl.

The northern land parcel is bounded by a stream along the north-western boundary which connects to a series of lakes located to the north. The eastern land parcel is also bound by a stream in the east which connects to a series of lakes in the north (Grendon Lakes) and south (Grendon Quarter Pond). In addition, the River Nene is located approximately 620 m north-west of Green Hill BESS at its closest point.

Mining

- 22.6.119 There are seven BGS Recorded Mineral Sites associated with Earls Barton Quarry (former sand and gravel) located within 300 m, to the north-east of Green Hill BESS. One entry is indicated to be within Green Hill BESS, with aerial imagery showing it being worked until 2004. The wider off-site area associated with Earls Barton Quarry to the north-east of the Green Hill BESS boundary has now been infilled and is listed as an EA Historical Landfill Area.

Historical Summary

- 22.6.120 The Green Hill BESS has remained undeveloped and in agricultural use throughout its history. The land is centred around Grendon Electrical Sub-Station, which was constructed in c.1970.

Unexploded Ordnance

- 22.6.121 A low risk of UXO has been determined for Green Hill BESS.

Cable Route Search Area

Geology

- 22.6.122 Published BGS data indicates that the Cable Route Search Area is largely underlain by superficial deposits of the Oadby Member with pockets of Glaciofluvial Deposits (Sand and Gravel), Alluvium (Clay and Silt), Bozeat Till, Milton Formation (Sand and Gravel) and Ecton Member (Sand and Gravel) mapped present.



22.6.123 The bedrock is mapped as the Whitby Mudstone Formation, Northampton Sand Formation, Stamford Member, Wellingborough Limestone Member, Rutland Formation, Blisworth Limestone Formation, Blisworth Clay Formation, Cornbrash Limestone Formation, Kellaways Sand Member and Kellaways Clay Member.

Hydrogeology and Hydrology

22.6.124 The EA classify the superficial Oadby Member as a Secondary Undifferentiated Aquifer, the Alluvium, Milton Formation, Ecton Member as Secondary A Aquifers and Bozeat Till as Unproductive Strata.

22.6.125 Bedrock of the Blisworth Limestone Formation is classified as a Principal Aquifer, the Northampton Sand Formation, Stamford Member, Wellingborough Limestone Member, Cornbrash Limestone Formation and Kellaways Sand Member as Secondary A Aquifers, the Rutland Formation as a Secondary B Aquifer and the Whitby Mudstone Formation, Blisworth Clay Formation and Kellaways Clay Member as Unproductive Strata,

22.6.126 The EA also indicate that the Cable Route Search Area is not located within a Groundwater Source Protection Zone (SPZ).

22.6.127 There are no licensed groundwater abstractions for potable water located within the Cable Route Search Area. Details of non-potable water abstractions will be provided following refinement of the Cable Route Corridor.

22.6.128 Groundwater levels are anticipated to vary throughout the Cable Route Search Area. Specific groundwater levels will be provided following refinement of the Cable Route Corridor.

22.6.129 The most significant surface water feature is the River Nene in the central area with associated ponds and tributaries.

Mining

22.6.130 There are a number of BGS recorded Mineral Sites adjacent to the Scheme and located within the Cable Route Search Area. Earls Barton Quarry in the central area adjacent to the River Nene is the only active entry.

22.6.131 Historical mineral extraction is noted throughout the Cable Route Search Area as discrete small-scale extraction and large-scale extraction adjacent to the River Nene.

Historical Summary

22.6.132 Historical maps indicate that the majority of the Cable Route Search Area has remained in agricultural use with discrete areas of development.

22.6.133 Small scale mineral (clay, sand and gravel) extraction is noted in discrete locations throughout the Cable Route Search Area. Large scale mineral extraction (sand and gravel) is mapped in the central area of the Cable Route Search Area adjacent to the River Nene. For further details on mineral extraction, see Chapter 11 'Minerals'.

Unexploded Ordnance

22.6.134 A low risk of UXO has been recorded across the Cable Route Search Area, increasing in risk towards Green Hill G. Specific evaluation of UXO risk will be provided following refinement of the Cable Route Corridor.

Future Baseline

22.6.135 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**.

22.6.136 In the absence of the Scheme, it is considered there will be no change to the future baseline for Ground Conditions and Contamination. The baseline details as presented above are not anticipated to change in the absence of the Scheme.



22.7 Embedded Mitigation Measures

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

22.7.2 The following embedded mitigation measures for construction, operation and decommissioning have been incorporated into the Scheme design, with detailed proposals and locations to be submitted with the DCO application.

Embedded Construction and Decommission Mitigation Measures

22.7.3 A Construction Environmental Management Plan (CEMP) and Decommissioning Environmental Management Plan (DEMP) will be required for the construction and decommissioning phases through a requirement in the DCO, which will be based on the Outline Construction Environmental Management Plan (OCEMP) and Outline Decommissioning Environmental Management Plan (ODEMP). The plans will describe the construction and decommission related mitigation measures and best practices to ensure any environmental impacts in terms of land and groundwater contamination are minimal.

22.7.4 Construction based mitigation measures included within the OCEMP will include not limited to:

- Horizontal directional drilling (HDD), it is assumed that this technique will be used to avoid and reduce adverse effects for the construction and placement of the cable route beneath the River Nene. This technique is preferred as it minimises disruption to the watercourse by avoiding open trenching, thereby reducing sediment displacement. To prevent sediment from entering the watercourse, barriers will be installed around the work area, and a vegetative buffer zone will be integrated to naturally filter potential runoff. If necessary, a sediment basin or trap will also be utilised. In coordination with the ecological team, drilling will be scheduled outside sensitive periods for aquatic species, such as fish spawning seasons, to minimise ecological impact. Additionally, regular monitoring of the River Nene's water quality, focusing on pollution control, sediment turbidity, and dissolved oxygen levels, can confirm no adverse effects pre- and post-development. Flood risk and drainage concerns associated with the HDD will be addressed within the Hydrology, Flood Risk and Drainage chapter.
- A spill response plan will be implemented during the HDD process to manage drilling fluids and fuels, with closed-loop drilling systems in place to minimise the risk of fluid escape. As stated above, all fuels on site will be securely stored within a contained, bunded system to prevent potential leakages.

22.7.5 The OCEMP and ODEMP shall include, but are not limited to, the following:

- Site workers will be made aware of the possibility of encountering localised contamination through toolbox talks. Good standards of personal hygiene, welfare facilities on-site and the use of appropriate levels of personal protective equipment (PPE), will be enforced. All personnel will be educated about the potential environmental impacts of their activities, ensuring that all workers are fully aware of the risks and the necessary precautions to take to minimise pollution.
- Workers will adhere to health, safety and environmental precautions to reduce the potential for accidents and incidents.
- A 'Discovery Strategy' protocol shall be included to ensure that contamination identified during construction or decommissioning is assessed by a specialist in land contamination. This will include but not be limited to stopping works in the area and ensuring the identified contamination does not pose a risk until an environmental specialist undertakes an assessment and a method is agreed to deal with the identified contamination. If required, the Local Planning Authority will be notified.
- To mitigate the risk of airborne contamination, a dust suppression and management system will be implemented. This system will control dust emissions during construction and



decommissioning activities, preventing them from migrating off-site and impacting neighbouring environments. Methods include washing down of vehicle's wheels and dampening down materials.

- Topsoil displaced within the construction and decommissioning of the cable route, should be appropriately stored and reused. Temporary stockpiles and/or excavated topsoil from the cable route is to be stored away from any Flood-Zone 3 areas.
- Bulk fuels or chemicals used on-site during the construction and decommissioning phases should be stored appropriately, within an impervious bund of 110% of the volume of the container to reduce the potential for impact to the environment in the event of a container failure/leak of battery chemicals during a fire and/or associated fire suppressant foam and waters. Any spillages will be promptly addressed by appropriate measures, such as spill kits, and an Emergency Spillage Plan will be developed. The contractor will ensure immediate notification of the Environment Agency in the event of any suspected pollution incidents, facilitating response measures.
- All equipment and vehicles will be regularly maintained and inspected to prevent leaks, with refuelling activities occurring on impermeable surfaces. Biodegradable hydraulic oils will be prioritised for use in any identified sensitive areas.
- To prevent pollution from accidental leaks or spills of construction materials, the contractor will implement robust pollution prevention plans adhering to established guidelines, such as the Guidance for Pollution Prevention (GPP). Drainage systems, including Sustainable Drainage Systems (SuDS), will be developed in line with hydrology requirements.

Embedded Operation Mitigation Measures

22.7.6 An Operational Environmental Management Plan (OEMP) will be required for the operational and maintenance phase through a requirement in the DCO, which will be based on the Outline Operational Environmental Management Plan (OOEMP). The plan will describe the operational related mitigation measures and best practices to ensure any environmental impacts during operation in terms of land contamination are minimal.

22.7.7 The OOEMP will implement measures which are outlined above for the CEMP, additional to this measurement specific to the operational phase will include the following:

- Mitigation measures to manage potential risks associated with BESS fires, particularly focused on the containment of hazardous substances. Battery storage units will be housed in fully contained systems, ensuring that release of chemicals or contaminated fire water is captured and prevented from leaching into the environment. Fire suppression systems will prioritise the use of environmentally safer foams or fire waters, with containment measures in place to manage runoff. In the event of a fire, hazardous materials from damaged battery systems will be managed through containment and cleanup protocols. An emergency response plan will be implemented, detailing fire control procedures and environmental protection measures. Post-incident environmental monitoring will be conducted to ensure soil and water quality is not compromised.
- The underground cables will employ high-quality, durable sheathing and insulation materials to prevent leaks and protect the cables from physical damage, moisture, and corrosion, ensuring they can withstand harsh underground conditions. In areas of particular environmental significance or sensitivity, such as beneath the River Nene, banded containment systems can be utilised as an additional protective measure to capture and contain any potential leaks, preventing hazardous substances from seeping into the soil or groundwater. Furthermore, leak detection systems can be installed to monitor the condition of the underground cables, allowing for real-time detection of any potential leaks. This proactive approach enables rapid responses to mitigate environmental impacts. In the event of a leak, a comprehensive spill response plan will be in place to quickly contain and remediate any contamination, including procedures for isolating the affected area and safely cleaning up any leaked materials. The implementation and further detail of these measures will be confirmed within the final ES.



- Regular inspections and maintenance of battery storage systems and solar panels will be routinely undertaken to identify any signs of potential leakage, wear, or faults. This ensures early detection and rectification of issues, thereby minimising operational risks. Additionally, solar panels will undergo periodic cleaning using non-toxic, biodegradable cleaning agents to prevent environmental contamination and maintain optimal performance.
- Real-time monitoring systems will be installed to continuously track the performance of the solar panels and battery systems. These systems enable the early identification of any performance issues or faults, helping to prevent more significant problems such as fires or equipment malfunctions, and ensuring efficient, safe operations throughout the facility's lifecycle.

22.8 Assessment of Likely Impacts and Effects

22.8.1 Taking into account the embedded mitigation measures as detailed in **Section 22.7**, the potential for the Scheme to generate effects was assessed using the methodology as detailed in **Section 22.4** of this Chapter. In the sections below, associated impacts and effects during the construction, operation and decommissioning phases of the scheme, pre-mitigation (other than embedded mitigation), are discussed in relation to the following key receptors: construction workers, third parties during construction (adjacent site users and adjacent residents), future users of the Scheme including maintenance workers and public rights of way users (PRoW), controlled waters including on and off-site land drains, adjacent rivers and the underlying aquifers, the built environment (new buildings and infrastructure/utilities), and ecology and sensitive land uses (SSSI, SAC, SPA and Ramsar).

Environmental Receptor [Construction Workers]

22.8.2 Construction workers (groundworkers involved with the Scheme's installation and decommission) may be exposed to contamination through direct dermal contact, ingestion and inhalation during the construction and decommission phases. Limited potential sources of contamination have been identified within the PRAs. Additionally, with the implementation of the mitigation measures to be contained in the CEMP and DEMP including toolbox talks, good standards of personal hygiene, welfare facilities and appropriate levels of personal protective equipment (PPE), outlined in Section 22.7, the likely significant effect of contaminants to construction workers is reduced.

22.8.3 During the operational phase maintenance and replacement activities will be required, it is anticipated that these activities will not require extensive amounts of intrusive works and will be less than that required for construction, minimising effects. Mitigation measures will be outlined in the OEMP which will align with those implemented for construction and decommissioning.

22.8.4 A significant potential for unexploded ordnance (UXO) has been identified within Green Hill G, with the central area of this site potentially used as a Practice Bombing Range (PBR) during World War II. As such, there is an increased risk of construction workers encountering unexploded ordnance during intrusive investigation work, such as trial pits and/or developing foundations, resulting in significant impact. Additional mitigation measures to protect construction workers from the potential UXO risk on site will be required and have been presented within Section 22.9, to reduce the likelihood of effects related to UXO.

22.8.5 As such, the assessment of significance of effects on construction workers, without additional mitigation, is detailed below:

- During construction and decommissioning phase – Medium Sensitivity and Medium to Low Magnitude: Moderate/Minor significance.
- During operational phase – Medium Sensitivity and Negligible Magnitude: Minor significance.

Environmental Receptor [Adjacent Users and Adjacent Residents]

22.8.6 Adjacent users may be exposed to contamination through direct dermal contact, ingestion and inhalation via windblow dust during all three stages of construction, operational and



decommissioning phases. Limited potential sources of contamination have been identified within the Section 3.3 of the PRA (**Volume 3, Appendix 22.1**).

22.8.7 As such, the assessment of significance for future scheme users is detailed below:

- During construction and decommissioning phase – Medium Sensitivity and Low Magnitude: Moderate/Minor significance.
- During operational phase – Medium Sensitivity and Negligible Magnitude: Minor significance.

Environmental Receptor [Controlled Waters]

22.8.8 Groundwater could become contaminated via the mobilisation of existing contamination during construction and decommissioning phase, however, limited potential sources of contamination have been identified within the PRAs. Historical inert landfills have been identified associated with Sywell Range. It is anticipated that the residual contamination presented by the historical landfills and any potential contamination from the firing range will present a low risk to the Scheme. Further to this, there are no licensed groundwater abstraction records for potable water within 500 m of the Site, as such, the risk to controlled waters is considered very low.

22.8.9 The cable route will cross beneath the River Nene using horizontal directional drilling (HDD) methods. This has the potential to impact the controlled water receptor, with an increase of sedimentation and potential release of contaminants including drilling fluid. However, with the implementation of the mitigation measures to be contained in the CEMP and DEMP, outlined in Section 22.7, the likely significant effect of HDD on controlled waters is reduced.

22.8.10 Controlled waters could also become contaminated via potential spillages or leakages of temporary fuels and chemicals during construction, operational and decommissioning phases, with the leaching of chemical contaminants from faulty batteries, leaching from cables, fires/damage to the storage of batteries and associated subsequent fire ash deposition/ extinguishing fire waters. However, with the implementation of the mitigation measures to be contained in the CEMP, OEMP and DEMP, outlined in Section 22.7, the residual impact and associated effects are reduced.

22.8.11 As such, the PEIR assessment of significance for controlled waters is outlined below:

- During construction and decommissioning phase – Medium Sensitivity and Low Magnitude: Moderate/Minor significance.
- During operational phase – Medium Sensitivity and Negligible Magnitude: Minor significance.

Environmental Receptor [Future Users and Built Environment]

22.8.12 There is a potential for hazardous ground gases to accumulate and migrate into buildings during the operational phase, with subsequent asphyxiation of future users, or the potential for explosion. Limited potential sources of ground gas have been identified and the potential for hazardous ground gases to accumulate in proposed solar farm infrastructure is considered very low.

22.8.13 Green Hill A, western portion of Green Hill A.2, Green Hill B, Green Hill D, the majority of Green Hill E and the western portion of Green Hill F are located within an elevated area of radon potential (10 – 30% above the action level for radon). Prolonged exposure to elevated radon has increased negative impact on human health, included the increased risk of lung cancer, with smokers being particularly vulnerable. The majority of the development is considered open and free venting, therefore would not require the implementation of mitigation measures. Any enclosed buildings within the elevated radon potential areas, would be subject to require radon protective mitigation measures. However, the placement of enclosed buildings will only be identified as the design of the Scheme is progressed, and therefore full details, together with appropriate assessment, is to be provided within the ES Chapter. The additional mitigation measures that will apply to enclosed buildings in areas of elevated radon have been provided in Section 22.9.



- 22.8.14 As such, the pre-mitigation assessment of significance for future users and the built environment is outlined below:
- During construction and decommissioning phase – Medium Sensitivity and Neutral Magnitude: Neutral significance.
 - During operational phase – Medium Sensitivity and Negligible Magnitude: Minor significance.

Environmental Receptor [Ecology and Sensitive Land Uses]

- 22.8.15 Ecological and sensitive land use receptors, including sites of special scientific interest (SSSIs), special areas of conservation (SACs), special protection areas (SPAs) and RAMSAR (Convention on Wetlands), and areas of sensitive flora and/or fauna, may become contaminated via the mobilisation of existing contamination during construction and decommissioning phase, however, limited potential sources of contamination have been identified within the PRA.
- 22.8.16 The cable route will cross beneath the River Nene using horizontal directional drilling (HDD) methods. This has the potential to impact ecological receptors within and surrounding the controlled water environment, as well as the downstream Upper Nene Valley Gravel Pits, an area classified as an SSSI, SAC SPA and RAMSAR. Ecological receptors are considered high sensitivity receptors.
- 22.8.17 HDD has the potential to increase sedimentation and the potential release of contaminants including drilling fluid. However, with the implementation of the mitigation measures to be contained in the CEMP and DEMP, outlined in Section 22.7, the likely significant effect of HDD on controlled waters is reduced.
- 22.8.18 Controlled waters leading to sensitive land use areas could become contaminated via potential spillages or leakages of temporary fuels and chemicals during construction, operational and decommissioning phases, with the leaching of chemical contaminants from faulty batteries, leaching from cables, fires/ damage to the storage of batteries and associated subsequent fire ash deposition/ extinguishing fire waters.
- 22.8.19 The magnitude of impacts would be low during the construction phase and negligible during the operational phase. With the implementation of the mitigation measures to be contained in the CEMP, OEMP and DEMP, outlined in Section 22.9, the residual impact and associated effects are reduced to negligible and not significant.

Environmental Receptor [Built infrastructure]

- 22.8.20 Alluvium deposits have been identified within Green Hill A, F, BESS, Cable Route Corridor, and possibly encroaching into Green Hill E and G. Limited potential areas of Made Ground have also been identified within Green Hill A, E, F and G, associated with former developed areas or agricultural tracks. Alluvial deposits have potentially low bearing capacity and unacceptable levels of total/differential settlement.

22.9 Additional Mitigation Measures

- 22.9.1 The following additional mitigation measures for the construction, operation and decommissioning phases are to be incorporated into the Scheme design, with detailed proposals and locations to be submitted with the DCO application.
- 22.9.2 The following mitigation measures for radon have been identified:
- Green Hill A, western portion of Green Hill A.2, Green Hill B, Green Hill D, the majority of Green Hill E and the western portion of Green Hill F are located within an elevated area of radon potential (10 – 30% above the action level for radon), therefore subject to potential radon protective measures. Any radon protection measures installed will need to be in accordance with BRE Report BR211 (2023) Radon: Protective measures for new buildings and as required by Building Regulations ^[26].



- The requirement for radon protection measures will be evaluated based on the placement of enclosed confined spaces, following the finalisation of the site design layout. Only a limited portion of the site is impacted by elevated radon levels where 10-30% of properties are above the action level. Should radon protection measures be deemed necessary, their implementation will effectively mitigate the potential risks associated with elevated radon concentrations. The specific measures required for implementation will be determined by the design team and architect during the subsequent phases of the project and confirmed through the CEMP.

22.9.3 The following mitigation measures for Unexploded Ordnance (UXO) have been identified:

- A significant potential for unexploded ordnance (UXO) has been identified within Green Hill G, with the central area of this site potentially used as a Practice Bombing Range (PBR) during World War II. A Detailed UXO Risk Assessment has been conducted and is included within **Volume 3, Appendix 22.1**. The assessment indicates a medium risk from Allied ordnance and a low to medium risk from German air-delivered UXO. A comprehensive peer review of this report is currently in progress to confirm and discuss the findings, and the results will be incorporated into the subsequent ES chapter of the project.
- A magnetometer survey conducted across Green Hill G has revealed numerous ground anomalies, which could indicate the presence of unexploded bombs or agricultural debris.
- An archaeological survey has recently identified the presence of a suspected UXO at Green Hill A, originally classified as a low risk area according to Zetica. Details of the find and associated additional risk assessment are currently awaited and will be included as part of the ES chapter of the project.
- Consequently, there is a substantial risk that necessitates the implementation of mitigation measures to safeguard human health and protect the underlying ground conditions. The mitigation strategies outlined in the Detailed UXO Risk Assessment include the establishment of a UXO Risk Management Plan, conducting site-specific UXO awareness briefings for all personnel involved in intrusive works, and ensuring the presence of a UXO specialist on-site during any open excavations, including trial pits, service pits, and foundations.

22.9.4 The following mitigation measures for unstable ground conditions have been identified:

- Alluvium and Made Ground deposits are considered to be too variable and compressible in their existing condition for conventional shallow foundations at the Site. It is recommended that floor loads should be transferred to ground improved soils or to piles through concrete ground beams/concrete frame or otherwise suspended.

22.9.5 No further mitigation measures for the Scheme are considered to be required given that no significant adverse effects are expected. However, this will be investigated further within the ES.

22.10 Residual Effects

22.10.1 With mitigation measures outlined above, with the implementation of well-established good industry practices, along with measures contained within the CEMP, OEMP and DEMP, it is considered that the potential effects on environmental factors, including human receptors and controlled waters, will be negligible and not significant.

22.11 Cumulative and In-combination Effects

Cumulative Effects

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

22.11.2 A list of cumulative projects can be found in **Volume 3, Appendix 2.2** of the PEIR, the list will be reviewed and refined in preparation of the DCO application submission through further consultation and will be presented and assessed in the ES. Cumulative effects will be listed within **Chapter 25: Cumulative Effects** of the ES.



- 22.11.3 A comprehensive CEMP, OEMP and DEMP will be required for this development to ensure there are no adverse impacts arising in respect of contamination. Given modern methods of construction and decommission and the low sensitivity end use, the risk of cumulative effects occurring is considered to be negligible. However, consideration will be provided regarding the cumulative effect to human health in relation to the potential of BESS fires.

In-combination Effects

- 22.11.4 The in-combination effect interaction is the effect over and above the individual effects assessed in other chapters and is described as the difference between the change caused to a receptor from one effect alone and the change caused to the receptor from all effects combined
- 22.11.5 Where different effect interactions are predicted to happen on single receptors, it is acknowledged that it may slightly increase the impact on the receiving receptor or local community, but it is not expected to be to a degree where together it noticeably elevates the significance of the likely effects above what is already reported in Environmental Statement.

22.12 Summary

- 22.12.1 This chapter of the PEIR has identified the existing environment in relation to Ground Conditions and Contamination and the assessment work that has been undertaken to date including completion of a Preliminary Geo-Environmental Risk Assessment (**Volume 3, Appendix 22.1**).
- 22.12.2 Embedded mitigation measures outlined in Section 22.7 and additional mitigation measures outlined in Section 22.9 are being continue to be developed as the design of the Scheme evolves. The potential residual effects with the currently identified mitigation measures in place has been outlined in Section 22.10. However, it should be acknowledged that not all environmental effects of the Scheme can be fully identified at this point, and this will be assessed further in the ES.
- 22.12.3 The scoping comments have been reviewed, and appropriate actions have been taken. The potential effects on Controlled Waters resulting from the mobilisation of existing contamination through vertical and lateral migration has been considered, with further details to be provided in the ES chapter.



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