

Rosefield Solar Farm

Environmental Statement

Volume 2
Chapter 11: Land and Groundwater
(Clean)

EN010158/APP/6.2.2
Revision 2
Deadline 1
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Rosefield Energyfarm Limited

APFP Regulation 5(2)(a)
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11. Land and Groundwater

11.1. Introduction

- 11.1.1. This document has been updated at Deadline 1 in response to the Relevant Representations received from the Environment Agency. The document references have not been updated from the original submission. Please refer to the **Guide to the Application [EN010158/APP/1.2.6]** for the list of current versions of documents.
- 11.1.2. This chapter presents an assessment of likely significant effects arising from the construction, operation (including maintenance) and decommissioning of the Proposed Development upon land and groundwater. The full description of the Proposed Development is provided within **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.2]**.
- 11.1.3. It should be noted that the Preliminary Environmental Information Report (PEIR) for the Proposed Development included the factor of soil within the same chapter as land and groundwater. The factors have now been separated, with soil covered in **ES Volume 2, Chapter 12: Soil [EN010158/APP/6.2]**, and land and groundwater covered in this chapter. This decision was made to provide a clearer distinction between the issues relating to soil, and those relating to land and groundwater. Consultation with Buckinghamshire Council also resulted in a request to amend the methodology with respect to land and groundwater, which means that those two factors are assessed in line with Design Manual for Roads and Bridges (DMRB), while soil is assessed in line with Institute of Environmental Management and Assessment (IEMA) guidance. The separation of the factors into two chapters means that the two methodologies are not both presented in the same chapter.
- 11.1.4. This chapter is supported by the following figures presented in **ES Volume 3 [EN010158/APP/6.3]**:
- **Figure 11.1: Order Limits and study area for land and groundwater;**
 - **Figure 11.2: Sensitive receptors relating to land;** and
 - **Figure 11.3: Sensitive receptors relating to groundwater.**
- 11.1.5. This chapter is further supported by the following technical appendices, presented in **ES Volume 4 [EN010158/APP/6.4]**:
- **Appendix 11.1: Preliminary Risk Assessment;**
 - **Appendix 11.2: UXO Risk Assessment;** and
 - **Appendix 11.3: Ground Investigation Report.**

11.1.6. This chapter is also supported by the following document:

- **Appendix 2 – Mineral Safeguarding Assessment of the Planning Statement [EN010158/APP/5.7].**

11.1.7. This chapter should also be read in conjunction with the following assessment chapter(s):

- **Chapter 12: Soil [EN010158/APP/6.2];**
- **Chapter 16: Water [EN010158/APP/6.2];**
- **Chapter 17: Cumulative Effects [EN010158/APP/6.2].**

11.2. Legislative framework, planning policy and guidance

11.2.1. This assessment has been undertaken with regard to the following legislation, planning policy and guidance.

11.2.2. It should be noted that this chapter does not assess the compliance of the Proposed Development against relevant planning policy. Such an assessment is presented in the **Planning Statement [EN010158/APP/5.7].**

Legislation

- Part IIA of the Environmental Protection Act 1990 **[Ref. 11-1];**
- The Water Resources Act 1991 **[Ref. 11-2];**
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 **[Ref. 11-3];**
- The Groundwater (Water Framework Directive) (England) Direction 2016 **[Ref. 11-4];**
- The Priority Substances Directive 2013/39/EC **[Ref. 11-5];**
- The Environmental Permitting (England and Wales) Regulations 2016 **[Ref. 11-6];**
- Environment Act 2021 **[Ref. 11-7];**
- Water Act 2003 **[Ref. 11-8];**
- Groundwater (England and Wales) Regulations 2009 **[Ref. 11-9];**
- Control of Pollution Act 1974 **[Ref. 11-10];**
- Anti-Pollution Works Regulations 1999 **[Ref. 11-11];**
- Control of Pollution (Oil Storage) (England) Regulations 2001 **[Ref. 11-12];** and
- Hazardous Waste (England and Wales) Regulations 2005 **[Ref. 11-13].**

National planning policy

- Overarching National Policy Statement for Energy (NPS EN-1) (2023)– Section 5.11 relates to land use and includes details of planning policy relating to land contamination **[Ref. 11-14]**;
- National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) (2023)– Section 2.10 contains details on solar energy generation **[Ref. 11-15]**;
- National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) (2023)– details issues relating to underground cables, in connection with contamination, although predominantly dealing with overhead cables **[Ref. 11-16]**;
- National Planning Policy Framework (NPPF) (2024) – Section 15 ‘Conserving and enhancing the natural environment’ provides guidance that policies and decisions applied by local authorities should ‘prevent new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability’ and should result in ‘remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate’ **[Ref. 11-17]**; and
- Environmental Improvement Plan 2023 – this plan identifies the need to explore improvements across a wide range of disciplines, including the approach to land use. The Plan includes a series of long term targets, with associated interim targets, including a number that relate to agricultural chemical use and reduction in production of waste **[Ref. 11-18]**.

Local planning policy

- Vale of Aylesbury Local Plan (VALP) 2013 – 2033 (adopted September 2021), specifically paragraphs 3.63 and 3.66 to 3.68 relating to previously developed land and brownfield land; paragraph 9.32 relating to pollution; paragraphs 9.40 to 9.45 relating to contaminated land; Policy NE5 ‘Pollution, air quality and contaminated land’; Policy I5 ‘Water resources and wastewater infrastructure’, which mentions groundwater; and Policy S7 ‘Previously developed land’ **[Ref. 11-19]**. The specific sections and policies include comments on the approach taken by the local authority to issues that relate to land and groundwater; and
- The Buckinghamshire Minerals and Waste Local Plan 2016-2036 (Adopted July 2019) **[Ref. 11-20]**. This document provides details of how to ensure that any proposed developments can be managed alongside the local authority’s responsibilities for managing minerals and waste.

Guidance

- Planning Practice Guidance (2023) – Renewable and Low Carbon Energy Guidance [Ref. 11-21];
- Land Contamination Risk Management (Environment Agency, 2025) [Ref. 11-22];
- Institute of Environmental Management and Assessment (IEMA) Guide: A New perspective on Land and Soil in Environmental Impact Assessment (2022) [Ref. 11-23];
- Design Manual for Roads and Bridges (DMRB) LA 109: Geology and Soils, Revision 0 (2019) [Ref. 11-24];
- DMRB LA 113: Road Drainage and the Water Environment, Revision 1 (2020) [Ref. 11-25];
- DMRB LA 104: Environmental Assessment and Monitoring, Revision 1 (2020) [Ref. 11-26];
- A Green Future: Our 25 Year Plan to Improve the Environment [Ref. 11-27];
- The Environment Agency’s approach to groundwater protection, Version 1.2 (2018) [Ref. 11-28];
- The Environment Agency, protect groundwater and prevent groundwater pollution (August 2024 update) [Ref. 11-29];
- Contaminated Land: Applications in real environments (CL:AIRE). SP1010, 'Development of category 4 screening levels for assessment of land affected by contamination' [Ref. 11-30];
- Construction Industry Research and Information Association (CIRIA) report: Contaminated Land Risk Assessment (A guide to good practice) C552 (2001) [Ref. 11-31]; and
- CIRIA C532 Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (2001) [Ref. 11-32].

11.3. Stakeholder engagement

- 11.3.1. **Table 11.1** provides a summary of the stakeholder engagement activities undertaken separate from the Environmental Impact Assessment (EIA) scoping, Phase One Consultation, Phase Two Consultation and Targeted Consultation process. This table also details the matters raised, how such matters have been addressed, and where they have been addressed within the Development Consent Order (DCO) Application documentation.
- 11.3.2. **ES Volume 4, Appendix 5.3: EIA Scoping Opinion Response Matrix [EN010158/APP/6.4]** presents the responses received in the EIA Scoping Opinion and the Applicant’s response to each matter that has been raised.

- 11.3.3. **Appendices A4, J1, J2 and K3 of the Consultation Report Appendices [EN010158/APP/5.2]**, which is submitted in support of the DCO Application, sets out the feedback received during Phase One Consultation, Phase Two Consultation and Targeted Consultation and how regard has been afforded by the Applicant to each matter raised.

Table 11.1: Summary of stakeholder engagement

Consultee	Date of engagement	Summary of matters raised	Outcome of engagement	Where this matter is addressed in the DCO Application documentation
Geology				
Buckinghamshire Council	25 November 2024	<p>Email sent to Buckinghamshire Council to indicate intention to assess geological hazards by reviewing the findings of site investigation work undertaken for the purposes of providing geotechnical data for the Proposed Development (secured as a requirement to the DCO).</p> <p>Response received from Buckinghamshire Council 21 March 2025.</p>	<p>Buckinghamshire Council noted that geological hazards relate to compressible deposits including soft clays and peat layers, silt rich soils, made ground, shallow groundwater, and some localised areas of potential shallow soil movement. Buckinghamshire Council also noted that there is no mining identified on or in close proximity to the Site and only limited mineral extraction associated with Calvert Brickworks in the local area.</p> <p>Buckinghamshire Council therefore agreed that the sensitivity of these geological hazards was low and would not expect significant effects to arise from those geological hazards identified.</p>	<p>Buckinghamshire Council has agreed that geological hazards can be scoped out of the assessment, with commentary provided in Table 11.3 to explain this approach.</p> <p>The ground investigation is secured by the Outline Construction Environmental Management Plan (Outline CEMP) [EN010158/APP/7.2].</p>

Consultee	Date of engagement	Summary of matters raised	Outcome of engagement	Where this matter is addressed in the DCO Application documentation
			Buckinghamshire Council therefore agreed that there was sufficient information provided in the PEIR to scope out this matter out of further assessment in the ES.	

Mineral resources

Buckinghamshire Council (Atkins Réalis)	15 January 2025 (meeting), with subsequent emails	Email sent to Buckinghamshire Council providing intended approach to assessing mineral safeguarding in order to be able to scope this out of the assessment presented in the ES.	A meeting was held on 15 January 2025 to discuss the Applicant’s intended approach. It was agreed that a Minerals Safeguarding Assessment would be provided in advance of the DCO Application submission, which would allow Buckinghamshire Council to determine if they were satisfied that enough information had been provided to allow mineral safeguarding to be scoped out of the assessment presented in the ES. Response received from Buckinghamshire Council on 14	Appendix 2 – Mineral Safeguarding Assessment of the Planning Statement [EN010158/APP/5.7]
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Consultee	Date of engagement	Summary of matters raised	Outcome of engagement	Where this matter is addressed in the DCO Application documentation
			March 2025 providing comments on the proposed structure of the Minerals Safeguarding Assessment.	
Buckinghamshire Council (Atkins Réalis)	19 June 2025	Draft Mineral Safeguarding Assessment issued to Buckinghamshire Council, requesting that Buckinghamshire Council reviews the document to confirm whether Buckinghamshire Council considers the inclusion of this assessment within the DCO Application would give Buckinghamshire Council the confidence to scope mineral extraction and mineral safeguarding out of the ES.	Holding response received from Buckinghamshire Council on 02 July 2025 confirming that they will formally respond by the end of July 2025.	Appendix 2 – Mineral Safeguarding Assessment of the Planning Statement [EN010158/APP/5.7]

Consultee	Date of engagement	Summary of matters raised	Outcome of engagement	Where this matter is addressed in the DCO Application documentation
Buckinghamshire Council	09 September 2025	Email sent by Buckinghamshire Council confirming agreement to scope out mineral extraction and mineral safeguarding from the assessment.	<p>Buckinghamshire Council confirmed that it agrees that an assessment of mineral extraction and mineral safeguarding can be scoped out of the ES.</p> <p>Buckinghamshire Council requested in its response that the Mineral Safeguarding Assessment is to be updated once results of the completed ground investigation (which is secured by the Outline CEMP [EN010158/APP/7.2]) have been received. This is detailed in and secured by the Outline CEMP [EN010158/APP/7.2].</p>	<p>Appendix 2 – Mineral Safeguarding Assessment of the Planning Statement [EN010158/APP/5.7].</p> <p>The commitment to update the Mineral Safeguarding Assessment once the results of the completed ground investigation have been received is secured by the Outline CEMP [EN010158/APP/7.2].</p>

Contamination

Buckinghamshire Council	25 November 2024, 12 March 2025	Email sent by Applicant relating to assessment of potential contamination, providing methodology that had been updated	The assessment methodology was updated by the Applicant after submission of the PEIR, and a response to this methodology was requested.	An explanation of the reasons for the update to the methodology is provided in Paragraph 11.6.6 . The methodology is provided in Tables 11.5, 11.7 and 11.9 .
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Consultee	Date of engagement	Summary of matters raised	Outcome of engagement	Where this matter is addressed in the DCO Application documentation
		since submission of the PEIR.	Buckinghamshire Council responded on 12 March 2025 requesting amendments to the methodology. In addition, it was noted that ground investigation work would need to be agreed in terms of scope and methodology with the relevant consultation bodies.	

Groundwater

Buckinghamshire Council	25 November 2024, 02 March 2025	<p>Email sent by Applicant relating to assessment of groundwater, providing updated methodology, with further information submitted on 02 March 2025.</p> <p>Response received from Buckinghamshire Council on 21 March 2025.</p>	<p>The assessment methodology has been updated since submission of the PEIR, and a response to this methodology was requested.</p> <p>The updated methodology addresses issues that were raised in the Phase Two Consultation response.</p> <p>Agreement that the methodology for assessing groundwater was acceptable was received from Buckinghamshire Council on 21 March 2025. This requested</p>	An explanation of the reasons for the update to the methodology is provided in Paragraph 11.6.6 . The methodology is provided in Tables 11.6, 11.8 and 11.10 .
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Consultee	Date of engagement	Summary of matters raised	Outcome of engagement	Where this matter is addressed in the DCO Application documentation
			that consistency be maintained between the approaches to assessing groundwater and surface water, and that there is a clear discussion on the risks to groundwater from contamination, not just routine runoff.	

11.4. Approach to identifying the scope of the assessment

Study area

- 11.4.1. The study area for land and groundwater is the area within the Order Limits and up to 1km from the Order Limits. The study area is shown on **ES Volume 3, Figure 11.1: Order Limits and study area for land and groundwater [EN010158/APP/6.3]**.
- 11.4.2. The study area is based on professional judgement and has been drawn to identify receptors that may be impacted by the construction, operation (including maintenance) and decommissioning phases, as well as those matters that may impact the Proposed Development. The extent of the study area allows for consideration of features that could require assessment if mobile groundwater conditions are evident.
- 11.4.3. Given that the topography of the land within the Order Limits, and land up to 1km from the Order Limits, is gently undulating (Parcels 1 and 1a), on a low ridge crest (Parcel 2) and or located on relatively flat ground (Parcel 3), there is not expected to be a noticeable effect on issues such as migration of contamination (either over the surface, or within groundwater) due to slopes or groundwater gradients, that would result in a requirement for an irregularly-shaped study area to be assigned for this assessment. On determining the study area, it has therefore been concluded that a regular 1km buffer around the Order Limits provides a wide enough study area to consider any receptors/features that would require consideration in the assessment, without incorporating irrelevant receptors/features. The area of land within the Order Limits at Snake Lane/Fidlers Field was considered within **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4]**, but due to the minimal nature of works required in this location, significant effects on land and groundwater receptors in these locations were not anticipated due to the nature of these works being minimal. Therefore, this section of the Site was not considered to require further assessment within this chapter. All additional mitigation relevant to land and groundwater receptors for other areas within the Order Limits will still apply to this area and will prevent any potential significant effects from occurring as a result of any activities associated with the construction, operation (including maintenance) or decommissioning phases.

Scope of the assessment

- 11.4.4. The scope of this assessment has been established throughout the EIA process and design of the Proposed Development. Further information can be found in **ES Volume 1, Chapter 5: Approach to the EIA [EN010158/APP/6.1]**.

11.4.5. This section provides an update to the scope of the assessment from that presented in **ES Volume 4, Appendix 5.1: EIA Scoping Report [EN010158/APP/6.4]** and re-iterates/updates the evidence base for scoping receptors/matters in or out following further iterative assessment.

Receptors/matters scoped into the assessment

11.4.6. **Table 11.2** presents the receptors/matters that are scoped into the assessment reported within this ES, together with appropriate justification.

Table 11.2: Receptors/matters scoped into the assessment

Receptor/matter	Phase	Justification
Geology	Construction, operation (including maintenance) and decommissioning	<p>This receptor was proposed to be scoped out of the assessment, as detailed within ES Volume 4, Appendix 5.1: EIA Scoping Report [EN010158/APP/6.4]. However, as set out in ES Volume 4, Appendix 5.2: EIA Scoping Opinion [EN010158/APP/6.4], the Planning Inspectorate stated that the ES should include an assessment of impacts to geological units or demonstrate an absence of likely significant effects, together with evidence of agreement with relevant consultation bodies.</p> <p>This receptor is therefore scoped into the assessment.</p> <p>This chapter also provides clarification of the definition of sensitive geological units (see Table 11.5).</p>
Potential land contamination in Parcel 3	Construction	<p>This matter is scoped into the assessment, as detailed within ES Volume 4, Appendix 5.1: EIA Scoping Report [EN010158/APP/6.4] and confirmed within ES Volume 4, Appendix 5.2: EIA Scoping Opinion [EN010158/APP/6.4].</p> <p>Furthermore, the United Kingdom Health Security Agency (UKHSA) requested that contamination associated with former agricultural activities within the Order Limits should be scoped in for the construction phase. UKHSA also</p>

Receptor/matter	Phase	Justification
		<p>requested that mitigation measures be included to ensure that risks from former agricultural activities such as foot and mouth burial pits, waste pits, pesticides and asbestos containing material can be managed. Therefore, these matters are also scoped into the assessment.</p>
<p>Potential land contamination in all areas except Parcel 3</p>	<p>Construction</p>	<p>This matter was proposed to be scoped out of the assessment, as detailed within ES Volume 4, Appendix 5.1: Scoping Report [EN010158/APP/6.4]. However, as set out in ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4], the Planning Inspectorate advocated its inclusion, on the basis that Parcel 1 is located adjacent to a landfill site/infilled land (Calvert Pit) and Parcel 1 formed an extensive area of quarrying associated with brickworks and historic landfills. Furthermore, ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4] stated that until the results and recommendations of a Preliminary Risk Assessment were known, there was insufficient evidence to support scoping this matter out. It was noted that the ES should be supported by the findings of a Preliminary Risk Assessment, which should include consideration of permitted landfill at Calvert Pit, and where land contamination was identified, the ES should assess significant effects where they are likely to occur.</p> <p>Furthermore, UKHSA requested that contamination associated with former agricultural activities within the Order Limits should be scoped in for the construction phase. UKHSA also requested that mitigation measures be included to ensure that risks from former agricultural activities such as foot and mouth burial pits, waste pits, pesticides</p>

Receptor/matter	Phase	Justification
		<p>and asbestos containing material can be managed.</p> <p>This matter is therefore scoped into the assessment.</p>
<p>Potential land contamination</p>	<p>Operation (including maintenance) and decommissioning</p>	<p>This matter was proposed to be scoped out of the assessment, as detailed within ES Volume 4, Appendix 5.1: EIA Scoping Report [EN010158/APP/6.4] and confirmed within ES Volume 4, Appendix 5.2: EIA Scoping Opinion [EN010158/APP/6.4].</p> <p>However, subsequent consultation with Buckinghamshire Council requested that this matter be scoped in for construction, operation (including maintenance) and decommissioning, with an updated assessment methodology.</p> <p>This matter is therefore scoped into the assessment.</p>
<p>Groundwater quality</p>	<p>Construction, operation (including maintenance) and decommissioning</p>	<p>This receptor was proposed to be scoped out of the assessment, as detailed within ES Volume 4, Appendix 5.1: Scoping Report [EN010158/APP/6.4]. However, as set out in ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4], the Planning Inspectorate advocated its inclusion, on the basis that the Planning Inspectorate does not have sufficient information about construction and decommissioning activities and whether these could lead to creation of contamination pathways, e.g. piling, trenching, borrow pits. Nor was detailed information about the mitigation proposed provided. ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4] stated that the ES should therefore assess impacts to groundwater during all phases of the Proposed Development where</p>

Receptor/matter	Phase	Justification
		<p>significant effects are likely to occur or demonstrate absence of likely significant effects, with evidence of agreement to the approach from Phase Two Consultation bodies. ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4] noted that any proposed mitigation should be described in the ES, together with confirmation of how measures would be secured through the DCO.</p> <p>This receptor is therefore scoped into the assessment.</p> <p>ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4] also requested that the ES should include consideration of the potential for escape of firewater/foam and contaminants that they may contain as an impact pathway to surface and groundwater receptors. Suitable protection measures should be identified for any likely significant effect identified. This assessment has been provided for groundwater receptors in Section 11.10 and for surface water receptors in ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]. Although likely significant effects have not been identified for groundwater receptors, protection measures are presented in the Outline Battery Safety Management Plan (Outline BSMP) [EN010158/APP/7.9].</p>

Receptors/matters scoped out of the assessment

11.4.7. **Table 11.3** presents the receptors/matters that are scoped out of the assessment that are therefore not considered as part of this ES, together with appropriate justification.

Table 11.3: Receptors/matters scoped out of the assessment

Receptor/matter	Phase	Justification
Geological conservation sites	Construction, operation (including maintenance) and decommissioning	<p>There are no geological Sites of Special Scientific Interest (SSSI) or geological conservation sites within the Order Limits or within a 1km buffer.</p> <p>This receptor is scoped out of the assessment, as detailed within ES Volume 4, Appendix 5.1: Scoping Report [EN010158/APP/6.4] and confirmed within ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4].</p>
Geological hazards	Construction, operation (including maintenance) and decommissioning	<p>This matter was proposed to be scoped out of the assessment, as detailed within ES Volume 4, Appendix 5.1: Scoping Report [EN010158/APP/6.4]. However, as set out in ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4], the Planning Inspectorate advocated its inclusion, on the basis that there was not sufficient information at that stage to exclude the possibility of significant effects arising from geological hazards. ES Volume 4, Appendix 5.2: Scoping Opinion [EN010158/APP/6.4] stated that the ES should therefore include an assessment where there is potential for likely significant effects to occur, unless evidence is provided in the ES demonstrating agreement with the relevant consultation bodies and the absence of a likely significant effect.</p> <p>The Applicant can confirm that agreement has been reached with Buckinghamshire Council that this matter can be scoped out of the assessment, based on the information that was presented in</p>

Receptor/matter	Phase	Justification
		<p>ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4] and the PEIR during Phase Two Consultation. This allowed the sensitivity of the geological hazards to be defined as low, and therefore it was agreed with Buckinghamshire Council that sufficient information had been provided to conclude that significant effects would not be expected to arise from the identified hazards.</p> <p>However, Buckinghamshire Council recommended that a section be provided in this chapter to explain this approach, which the Applicant has done above.</p> <p>This matter is therefore scoped out of the assessment.</p>
<p>Mineral resources</p>	<p>Construction, operation (including maintenance) and decommissioning</p>	<p>This receptor was proposed to be scoped out of the assessment, as detailed within ES Volume 4, Appendix 5.1: EIA Scoping Report [EN010158/APP/6.4]. Instead, mineral safeguarding issues were proposed to be assessed within the Planning Statement. As set out in ES Volume 4, Appendix 5.2: EIA Scoping Opinion [EN010158/APP/6.4], the Planning Inspectorate stated that it did not have sufficient information at that stage to exclude the possibility of significant effects to mineral resources. The ES should include an assessment of the potential impact of loss of access to mineral resources during the lifetime of the Proposed Development where there is potential for likely significant effects to occur, unless evidence is provided in the ES demonstrating agreement with the relevant</p>

Receptor/matter	Phase	Justification
		<p>consultation bodies and the absence of a likely significant effect.</p> <p>Further to the submission of Appendix 2 – Mineral Safeguarding Assessment of the Planning Statement [EN010158/APP/5.7], agreement was reached with Buckinghamshire Council that this matter could be scoped out of the ES (see Table 11.1). Buckinghamshire Council has indicated that there should be a requirement that Appendix 2 – Mineral Safeguarding Assessment of the Planning Statement [EN010158/APP/5.7] should be updated on receipt of the results of the completed ground investigation. The ground investigation is secured by the Outline CEMP [EN010158/APP/7.2]. The requirement to update Appendix 2 – Mineral Safeguarding Assessment of the Planning Statement [EN010158/APP/5.7] after the ground investigation is secured by the Outline CEMP [EN010158/APP/7.2].</p>

11.5. Environmental baseline

Establishing baseline conditions

Data sources to inform the EIA baseline characterisation

11.5.1. The following data sources have been used to understand the existing land and groundwater baseline conditions in this chapter and within **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4]**:

- Magic Map available online by Defra [**Ref. 11-33**];
- British Geological Survey (BGS) mapping [**Ref. 11-34**];
- Envirocheck reports [**Ref. 11-35**]; and

- Mineral resources information from the Buckinghamshire Minerals and Waste Local Plan [Ref. 11-20].

Desk-based assessment

- 11.5.2. In order to assess the potential for land contamination, a Preliminary Risk Assessment (**ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4]**) has been undertaken in accordance with Land Contamination Risk Management guidance [Ref. 11-22]. The assessment has comprised a desk-based review of information published online, the purchase of an environmental data base report, and a Site reconnaissance survey (see below).

Site visits/surveys

- 11.5.3. The following site visits were undertaken to understand the existing land and groundwater baseline conditions:
- Site walkover survey, 21 to 23 May 2024 (the majority of Site area was accessible at that time); and
 - Site walkover survey, 26 March 2025 (remaining Site areas that were not accessed in May 2024).
- 11.5.4. The findings from these surveys are detailed in **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4]**.

Existing baseline

- 11.5.5. The following section presents a summary of the baseline conditions for the receptors scoped into the assessment, as detailed within **Table 11.2**. The full details of the baseline conditions are presented in **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4]**.

Historical site usage

- 11.5.6. Parcel 1 was occupied by numerous small fields on the first edition of Ordnance Survey (OS) mapping from 1885, with some small buildings, wells, springs and small ponds also marked. No significant changes were observed to occur over time from the 1885 map to the present day. Land outside the Order Limits but within the study area was mainly agricultural, with some woodland, roads and farm buildings. A railway was located approximately 200m west of the Order Limits from the 1900 map edition (still operational). Just beyond the railway, a large brickworks was present from the 1952 map edition which was later filled, reinstated, and residential properties were constructed in the location by 2023.
- 11.5.7. In 1885, Parcel 1a was occupied by one large field and a number of smaller fields at the western end and in the south eastern corner. A stream

was present along the western and northern boundaries (still present) and there was a track crossing the centre of the Site from north to south. Land outside the Order Limits, but within the study area was occupied by fields and woodland, and the railway mentioned in relation to Parcel 1 is approximately 400m south west of Parcel 1a.

- 11.5.8. Parcel 2 was used for agricultural purposes by 1885, with field boundaries mainly present as they are currently located. Buildings on-site included those at Kitehill Farm, Coppice Lowhill Farm, Bernwood House (later Bernwood Farm) and Claydon Lawn. Other features included a stream, tracks, woodland and small ponds. Outside the Order Limits, but within the study area, the land was occupied by small fields and woodland, with Hogshaw Farm just outside the Order Limits to the east.
- 11.5.9. Parcel 3 and the adjacent area for the Grid Connection Cable Corridor and AIL Access Corridor were similarly occupied by small fields in 1885, with a railway line crossing this area from north to south (marked as disused by 1966), and a building present at Sion Hill Farm Crossing (absent by 1984). Also present were some tracks, ponds and a stream which follows the majority of the eastern Order Limits. East Claydon Substation is present by 1985, with associated overhead cables. Outside the Order Limits, but within the study area, land was mainly in agricultural use (as it remains). Buildings were present in 1885 that were labelled as Winslow Road Station (just outside the Order Limits to the north).
- 11.5.10. Historically, the Interconnecting Cable Corridors between Parcel 1 and Parcel 2, and between Parcel 1 and Parcel 1a, were also used for agricultural purposes, with small fields, tracks and small ponds present. A windpump was marked in the area between Parcels 1 and 2 in 1952, to the east of Home Wood (absent by 1984).
- 11.5.11. The Interconnecting Cable Corridor between Parcels 2 and 3 was also separated into small fields, with some buildings, tracks and ponds as well as a feature that could be a pit. In mapping from 1900, Granborough Road railway station was present adjacent to the railway line, north of the track that extends eastwards off the corner of Orchard Way and Claydon Road. Both the railway station buildings and the railway line were absent by the map edition of 1966.

Landfill sites and waste transfer sites

Parcel 1

- 11.5.12. No licensed active waste management facilities or landfill sites are recorded within the Order Limits for Parcel 1. There is one active landfill site outside the Order Limits but within the study area near Parcel 1, recorded as Calvert Landfill (Pits 4, 5 and 6).

11.5.13. There are no historical landfill sites within the Order Limits for Parcel 1. There are three historical landfill sites that are within the study area but outside the Order Limits. These are Calvert Landfill (Pit 1), 239m to the north east; Buckingham Council refuse tip, 487m north west of the Order Limits), and Brill Road Tip, 995m to the west. There are four waste management licences within the study area for Parcel 1, all of which related to operations at Calvert Landfill.

Parcel 1a

11.5.14. No licensed active waste management facilities or landfill sites are recorded within the Order Limits for Parcel 1a. There are two active landfill sites outside the Order Limits but within the study area near Parcel 1a, one recorded as Calvert Landfill (Pits 4 and 5) and the other as Calvert Landfill (Pit 6).

11.5.15. There are no historical landfill sites within the Order Limits for Parcel 1a. There is one historical landfill site that is outside the Order Limits but within the study area. This is Calvert Landfill (original site).

Parcel 2

11.5.16. No licensed active waste management facilities or landfill sites are recorded within the Order Limits or the study area near Parcel 2.

11.5.17. There are no historical landfill sites within the Order Limits for Parcel 2. There is one historical landfill site that is outside the Order Limits but within the study area. This is located in an old railway cutting, located 665m to the south east of the Order Limits.

Parcel 3

11.5.18. No licensed active waste management facilities or landfill sites are recorded within the Order Limits or the study area near Parcel 3.

11.5.19. There are no historical landfill sites within the Order Limits or study area near Parcel 3.

Cable Corridors and AIL Access Corridor

11.5.20. There are no active or historical waste sites located within the Order Limits or study area for the Interconnecting Cable Corridors, Grid Connection Cable Corridor or the AIL Access Corridor.

Land contamination

11.5.21. The Site history indicates that land use has been predominantly agricultural. Contamination may be present which is associated with agriculture, and in the locations of the recorded landfill sites that are

reported to be present within the study area, but outside the Order Limits (as described above). There is no information suggesting other potential contaminative site uses have occurred based on historical mapping. Made ground may be present in limited locations, associated with farm buildings, tracks or possible infilled pits or ponds. There is the potential for asbestos-containing materials to be present if made ground deposits are identified.

- 11.5.22. With respect to potential animal burial sites, the Animal and Plant Health Agency has confirmed that there is no official register of animal burial sites, therefore it has not been possible to obtain any baseline information relating to specific burial sites within the Order Limits or study area.
- 11.5.23. No significant pollution incidents affecting controlled waters have been recorded within or close to the Site in the last 20 years, based on the information provided in the Envirocheck report that covers the Order Limits and the study area (see **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4.2]**).
- 11.5.24. Features relating to historical site usage and waste sites are shown on **ES Volume 3, Figure 11.2: Sensitive receptors relating to land [EN010158/APP/6.3]**.

Summary of risks determined at Preliminary Risk Assessment stage

- 11.5.25. In summary, the overall risks determined at the Preliminary Risk Assessment stage risk assessment are as follows:
- Risks to current or future Site users from migration of hazardous ground gases, potentially followed by asphyxiation or explosion, due to the presence of off-site current and historical landfill sites at Calvert. These risks are defined as moderate to low based on available information; and
 - Risks to current or future buildings and services from migration of hazardous ground gases, potentially followed by explosion, due to the presence of off-site current and historical landfill sites at Calvert. These risks are defined as moderate to low based on available information.
- 11.5.26. **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4]** recommends that these potential contaminant linkages be assessed further through appropriate pre-construction ground investigation (which is secured by **Outline CEMP [EN010158/APP/7.2]**) to target the identified sources of potential contamination and assess the feasibility of identified pathways.

Geology

- 11.5.27. The geological sequence present beneath the Site and the study area outside the Order Limits comprises superficial units of alluvium (clay, silt,

sand and gravel), glacial deposits (clay, silt and sand), glaciofluvial deposits (sand and gravel) and till (clay, sand, gravel and boulders). Bedrock formations comprise the West Walton Formation (mudstone), Weymouth Mudstone Member (mudstone), Stewartby Member (mudstone) and Peterborough Member (mudstone). There is also the potential for made ground deposits, although none were significant enough to be shown on the geological mapping. The ground investigation that has been completed to date (as presented in **Appendix 11.3: Ground Investigation Report [EN010158/APP/6.4]**) confirms that the ground conditions were typically present as topsoil over sandy or gravelly clay, with occasional sandy layers. Made ground was present near the surface in some locations.

Groundwater

- 11.5.28. A summary of the groundwater regime within the Order Limits and the study area is provided in this section. Further details are provided in **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN/010158/APP/6.4]**. Features relating to groundwater are shown on **ES Volume 3, Figure 11.3: Sensitive receptors relating to groundwater [EN010158/APP/6.3]**.
- 11.5.29. The superficial geological units within the Order Limits and the study area are classified as secondary A aquifers and secondary undifferentiated aquifers. The bedrock geological units are classified as unproductive strata.
- 11.5.30. Finemere Wood is a SSSI which is also designated as a groundwater dependent terrestrial ecosystem. Finemere Wood is located adjacent to the southern section of Parcel 2. A groundwater dependent terrestrial ecosystem is defined as a wetland that is critically dependent on groundwater flows and /or chemistries. There are no other groundwater dependent terrestrial ecosystems within the Order Limits, or in the study area.
- 11.5.31. Detailed information about the current groundwater regime is not available at this stage; however, a shallow groundwater table would be expected close to surface watercourses, and it is possible that perched groundwater could be present if clay-rich horizons exist within the superficial units. The information available from the ground investigation that has been completed to date (see **ES Volume 4, Appendix 11.3: Ground Investigation Report [EN010158/APP/6.4]**) indicated that groundwater was not observed at the locations that were accessible at the time of the ground investigation.
- 11.5.32. There are no historical features evident that would suggest a complex hydrogeological regime is likely to be present within the Order Limits and the study area.

- 11.5.33. There are no recorded groundwater abstractions within the Order Limits, or within the study area.
- 11.5.34. There are three wells within the Order Limits that are labelled on the Ordnance Survey mapping, located close to Knowl Hill (approximate grid references 470128, 224432; 470536, 225292 and 470544, 224296). As none of these are associated with recorded licensed groundwater abstraction locations, and they are not located in proximity to farm buildings, it is presumed that the water is used for agricultural purposes (if the wells are still operational).
- 11.5.35. Groundwater source protection zones are defined to protect groundwater sources. There are no mapped groundwater source protection zones within the Order Limits or the study area.
- 11.5.36. There are no areas of drinking water safeguard zones (groundwater) within the Order Limits or the study area (these are areas that have been categorised as being at potential risk from effects on groundwater quality due to the use of nitrates in agricultural land use).

Discharge consents

- 11.5.37. There is one active discharge consent within the Order Limits. This is located within Parcel 3 and operates for discharge of sewage effluent (as shown as location DC9 in **ES Volume 3, Figure 11.3: Sensitive receptors relating to groundwater [EN010158/APP/6.3]**). There are eight current discharge consents outside the Order Limits but within the study area. These all relate to either domestic properties or discharge of final effluent (see locations DC1 to DC8, shown in **ES Volume 3, Figure 11.3: Sensitive receptors relating to groundwater [EN010158/APP/6.3]**).

Future baseline in the absence of the Proposed Development

- 11.5.38. If the Proposed Development is not progressed, the future baseline with respect to land and groundwater is not expected to change significantly. The geological and hydrogeological units would not be expected to change significantly.

11.6. Approach to the assessment

Approach to design flexibility

- 11.6.1. The parameters, as outlined in **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1]**, and the parameter plans presented in **ES Volume 3, Figure 3.1: Height Parameters [EN010158/APP/6.3]** and secured in **Appendix 1: Green and Blue Infrastructure Parameters** and **Appendix 3: Vegetation Removal**

Parameters of the Outline Landscape and Ecological Management Plan (Outline LEMP) [EN010158/APP/7.6], Design Commitments [EN010158/APP/5.9] and Works Plans [EN010158/APP/2.3], set out the reasonable ‘worst-case’ parameters for the Proposed Development.

11.6.2. **ES Volume 1, Chapter 5: Approach to the EIA [EN010158/APP/6.1]** sets out those elements of the Proposed Development for which optionality is present within the design. The reasonable ‘worst-case’ scenario that has been assessed in this land and groundwater chapter for each element of the Proposed Development where optionality is present within the design is outlined within **Table 11.4**.

Table 11.4: Reasonable worst-case scenario assessed for land and groundwater

Project element	Reasonable worst-case scenario that has been assessed
Solar PV modules	The mounting structure for the Solar PV modules will include foundations to a maximum depth of 3m below ground level (BGL), constructed of galvanised steel. This use of foundations to the maximum 3m BGL depth is taken as the worst-case scenario with respect to this assessment.
Balance of Solar System (BoSS)	BoSS equipment can be located as independent components within an outdoor compound (comprising the Inverters, Transformers, Switchgear, combiner boxes and Interconnecting Cabling), or as a containerised Inverter and Transformer Station (ITS). The worst-case scenario assessed for this chapter is the provision of BoSS equipment as independent components and the use of central inverters, as this presents a number of separate locations where incidents could potentially occur, rather than a single containerised unit, which would reduce the number of locations that could be affected by incidents. This assessment assumes that the BoSS would be located throughout the fields shown in light blue as outlined in ES Volume 3, Figure 3.5: Zonal Masterplan [EN010158/APP/6.3] , to ensure a worst-case has been assessed.
Satellite Collector Compounds	The Satellite Collector Compounds will be mounted on concrete pad foundations or plinths. The location options presented for this project element have no impact on the outcome of the assessment, regardless of which is chosen. The assessment has therefore considered all of the potential locations.

Project element	Reasonable worst-case scenario that has been assessed
Main Collector Compound	The maximum envelope of the Main Collector Compound is 25,000m ² in plan, with equipment and buildings expected to sit on shallow concrete pad foundations or (where loading and ground conditions allow) screw piles. The ‘worst-case’ associated with the Main Collector Compound is taken to be the use of screw piles, as these will extend to greater depth through the geological units, with the potential to affect groundwater.
Battery Energy Storage System (BESS)	This assessment assumes that the BESS would be located in Parcel 2 across both Fields D8 and D9, as outlined in ES Volume 3, Figure 3.5: Zonal Masterplan [EN010158/APP/6.3] , to ensure a worst-case has been assessed, as this is the maximum area that the facility could occupy.
Rosefield Substation	This assessment assumes that the Rosefield Substation would be located within Parcel 3 across Fields E11 and E20 as outlined in ES Volume 3, Figure 3.5: Zonal Masterplan [EN010158/APP/6.3] , with a maximum area occupied by Rosefield Substation being 60,000m ² , to ensure a worst-case has been assessed.
Primary Construction compounds	The specific locations presented for this project element have no impact on the outcome of the assessment, regardless of which location is chosen. Therefore, the assessment has considered all possible locations, with a maximum area to be occupied of 25,000m ² .
Secondary Construction compounds	The specific locations presented for this project element have no impact on the outcome of the assessment, regardless of which location is chosen. Therefore, the assessment has considered all possible locations, with a maximum area to be occupied of 1,250m ² .
Interconnecting Cable Corridor(s)	Below ground Interconnecting Cabling has been taken as the worst-case scenario, with a maximum trench width of 35m and expected depths of 1.5m BGL, except where utility, road or ditch crossings are required (when depths would be at least 1.5m below roads, 0.5m below utilities and 2m below the bed of watercourses and ditches). The worst-case scenario in terms of construction techniques is open-cut trenching, as an open excavation is potentially more likely to result in the introduction of new contamination, or the mobilisation of existing contamination, than the use of suspended ducts or fixed

Project element	Reasonable worst-case scenario that has been assessed
	trays. The maximum construction width between Parcels 1 and 2 is 25m, with a maximum construction width of 50m between Parcels 2 and 3.
Grid Connection Cable Corridor	The assessment takes consideration of the following as the worst-case scenario: maximum construction working width 25m, maximum trench width 3m, depth 1.5m BGL except where utility, road or ditch crossings are required (when depths would be at least 1.5m below roads, 0.5m below utilities and 2m below the bed of watercourses and ditches). Jointing bays (separated by 500m to 800m) will be 5.5m wide, 20m long and 2.5m BGL deep.

Assessment assumptions

- 11.6.3. The assessment of the land and groundwater impact has been based on the assumptions set out in **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1]** and the **Design Commitments [EN010158/APP/5.9]**.
- 11.6.4. No specific assumptions relating to land or groundwater are applicable to this assessment.

Assessment methodology and criteria

- 11.6.5. The assessment criteria for land and groundwater adopted for this assessment are detailed below. It should be noted that these criteria differ from the criteria proposed within **ES Volume 4, Appendix 5.1: EIA Scoping Report (see Appendix D) [EN010158/APP/6.4]** and the criteria presented in the PEIR, with an updated approach that provides additional robustness in terms of assessing the potential effects relating to land and groundwater. This update to the approach has been requested by and agreed with Buckinghamshire Council with respect to assessing both land and groundwater receptors. The main change has been the adoption of DMRB LA 109: Geology and Soils [**Ref. 11-24**], DMRB LA 113: Road Drainage and the Water Environment [**Ref. 11-25**] and DMRB LA 104: Environmental Assessment and Monitoring [**Ref. 11-26**] for assigning receptor sensitivity or importance relating to geology and groundwater, magnitude of impact (change) and significance of effect.
- 11.6.6. It is acknowledged that the main use of DMRB is for projects that relate to projects promoted by National Highways. However, in the absence of specific guidance relating to the assessment of geology, contamination and groundwater with respect to solar projects, the use of these documents is considered to result in a robust and appropriate assessment. This is also the methodology that Buckinghamshire Council indicated

should be adhered to for the assessment of impacts for these receptors for the Proposed Development. In addition to applying this methodology, Buckinghamshire Council requested that the DMRB assessment criteria should be adjusted to reflect the non-road nature of the majority of the Proposed Development and to provide a clear discussion on the risks to groundwater from contamination, not just routine runoff, as is provided in the table of typical DMRB examples of magnitude of impact (change). This has been addressed by updating the examples in **Table 11.8** to include other situations beyond routine runoff.

- 11.6.7. Buckinghamshire Council also requested that a clear definition be provided of what aspects have been covered within **ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]** and **ES Volume 2, Chapter 11: Land and Groundwater [EN010158/APP/6.2]** (this chapter). There should be consistency between **ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]** and the groundwater aspects in **ES Volume 2, Chapter 11: Land and Groundwater [EN010158/APP/6.2]** (this chapter), with all relevant aspects covered and assessed. The Applicant considers that this has been achieved.

Preliminary risk assessment

- 11.6.8. For **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4]**, a desk-based assessment was completed in accordance with relevant British Standards and authoritative technical guidance. The assessment of the contamination status of land within the Order Limits is in line with the technical approach presented in Land Contamination Risk Management [**Ref. 11-22**]. The scope of works comprised:
- Review of the history of development on the Site and surroundings;
 - Assessment of local geology, hydrogeology and hydrology;
 - Review of relevant information held by appropriate statutory authorities;
 - Review of any previous site investigation reports made available;
 - Completion of a reconnaissance survey (May 2024 and March 2025) to assess the visual condition of the Site;
 - Development of an initial Conceptual Site Model;
 - Preliminary consideration of geotechnical constraints and hazards; and
 - Identification of the need for further action, e.g. intrusive investigations.
- 11.6.9. The assessment of contaminated land is based on the development of a Conceptual Site Model. This approach identifies sources, pathways and receptors at a site and assesses the potential for a link to exist between a source of contamination and a receptor which may then constitute a risk:

- **Source:** this is the identification of a specific source of contamination that is located on- or off-site.
- **Pathway:** this is the means by which the contaminant could migrate through the environment to reach a receptor.
- **Receptor:** can be property, humans, and the environment (e.g., controlled waters/ecology) which could be affected by contamination.

Sensitivity of the receptor for geology and contamination

- 11.6.10. Sensitivity criteria for geology and contamination, derived from DMRB LA 109: Geology and Soils [Ref. 11-24], are defined in **Table 11.5**.
- 11.6.11. It should be noted that when considering the potential for contamination to affect other receptors (human health or groundwater), the receptor importance criteria for human health are taken from **Table 11.5** and criteria for groundwater are provided in **Table 11.6**.

Table 11.5: Environmental value (sensitivity) and descriptions for geology and contamination

Receptor value (sensitivity)	Description
Very high	<p>Geology: very rare and of international importance with no potential for replacement (e.g. UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSIs and Geological Conservation Review sites (GCRs) where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such.</p> <p>Contamination:</p> <p>1) Human health: very high sensitivity land use such as residential or allotments;</p> <p>2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and</p> <p>3) Groundwater: use sensitivity criteria from Table 11.6 (as taken from Table 3.70 in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25]).</p>
High	<p>Geology: rare and of national importance, with little potential for replacement (e.g. geological SSSI, Area of Special Scientific Interest (ASSI), National Nature Reserves (NNR)). Geology meeting national designation citation criteria which is not designated as such.</p>

Receptor value (sensitivity)	Description
	<p>Contamination:</p> <p>1) Human health: high sensitivity land use such as public open space;</p> <p>2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and</p> <p>3) Groundwater: use sensitivity criteria from Table 11.6 (as taken from Table 3.70 in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25]).</p>
<p>Medium</p>	<p>Geology: of regional importance with limited potential for replacement (e.g. regionally important geological or geomorphological sites (RIGS)). Geology meeting regional designation citation criteria which is not designated as such.</p> <p>Contamination:</p> <p>1) Human health: medium sensitivity land use such as commercial or industrial;</p> <p>2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and</p> <p>3) Groundwater: use sensitivity criteria from Table 11.6 (as taken from Table 3.70 in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25]).</p>
<p>Low</p>	<p>Geology: geological units of local importance or interest, with potential for replacement (e.g. non-designated geological exposures, former quarries, mining sites).</p> <p>Contamination:</p> <p>1) Human health: low sensitivity land use such as highways and rail;</p> <p>2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and</p> <p>3) Groundwater: use sensitivity criteria from Table 11.6 (as taken from Table 3.70 in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25]).</p>

Receptor value (sensitivity)	Description
Negligible	<p>Geology: no geological exposures or little or no local interest.</p> <p>Contamination:</p> <p>1) Human health: undeveloped surplus land or no sensitive land use proposed;</p> <p>2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and</p> <p>3) Groundwater: use sensitivity criteria from Table 11.6 (as taken from Table 3.70 in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25]).</p>

Notes: Main source of table contents is DMRB LA 109: Geology and Soils [Ref. 11-24].

Importance of the receptor for groundwater

- 11.6.12. The importance criteria presented in **Table 11.6** are derived from DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25].
- 11.6.13. It should be noted that when considering the potential for contamination to affect other receptors (human health or groundwater), the receptor importance criteria for groundwater are taken from **Table 11.6** and criteria for human health are provided in **Table 11.5**.

Table 11.6: Receptor importance for groundwater

Importance	Typical criteria	Typical examples
Very high	Nationally significant attribute of high importance	<p>Principal aquifer providing a regionally important resource, and/or supporting a site protected under EC and UK legislation;</p> <p>Groundwater that locally supports a groundwater dependent terrestrial ecosystem;</p> <p>Source Protection Zone 1</p>
High	Locally significant attribute of high importance	<p>Principal aquifer providing locally important resource or supporting a river ecosystem;</p> <p>Groundwater that supports a groundwater dependent terrestrial ecosystem;</p>

Importance	Typical criteria	Typical examples
		Source Protection Zone 2
Medium	Of moderate quality and rarity	Aquifer providing water for agriculture or industrial use with limited connection to surface water; Source Protection Zone 3
Low	Lower quality	Unproductive strata

Magnitude of impact (change) for geology and contamination

11.6.14. The magnitude of impact (change) is classified using the criteria presented in **Table 11.7**, which are derived from DMRB LA 109: Geology and Soils [Ref. 11-24].

11.6.15. It should be noted that when considering the potential for contamination to affect receptors (human health or groundwater), the magnitude of impact (change) criteria for human health are taken from **Table 11.7** and criteria for groundwater are provided in **Table 11.8**.

Table 11.7: Magnitude of impact (change) criteria for geology and contamination

Magnitude of impact (change)	Typical description
Major	<p>Geology: loss of geological feature/designation and/or quality and integrity, severe damage to key characteristics, features or elements.</p> <p>Contamination:</p> <p>1) Human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. category 4 screening levels) [Ref. 11-30] with potential for significant harm to human health. Contamination heavily restricts future use of land;</p> <p>2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and</p> <p>3) Groundwater: use sensitivity criteria from Table 11.8.</p>

Magnitude of impact (change)	Typical description
Moderate	<p>Geology: partial loss of geological feature/designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.</p> <p>Contamination:</p> <ol style="list-style-type: none"> 1) Human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g. category 4 screening levels) [Ref. 11-30]. Significant contamination can be present. Control/remediation measures are required to reduce risks to human health/make land suitable for intended use; 2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and 3) Groundwater: use sensitivity criteria from Table 11.8.
Minor	<p>Geology: minor measurable change in geological feature/designation attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.</p> <p>Contamination:</p> <ol style="list-style-type: none"> 1) Human health: contaminant concentrations are below relevant screening criteria (e.g. category 4 screening levels) [Ref. 11-30]. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health; 2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and 3) Groundwater: use sensitivity criteria from Table 11.8.
Negligible	<p>Geology: very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature/designation. Overall integrity of resource not affected.</p> <p>Contamination:</p> <ol style="list-style-type: none"> 1) Human health: contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g. category 4 screening levels) [Ref. 11-30]. No requirement for control

Magnitude of impact (change)	Typical description
	<p>measures to reduce risks to human health/make land suitable for intended use;</p> <p>2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and</p> <p>3) Groundwater: use sensitivity criteria from Table 11.8.</p>
No change	<p>Geology: no temporary or permanent loss/disturbance of characteristics features or elements.</p> <p>Contamination:</p> <p>1) Human health: reported contaminant concentrations below background levels;</p> <p>2) Surface water: this receptor is included in DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25] and is assessed within ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]; and</p> <p>3) Groundwater: use sensitivity criteria from Table 11.8.</p>
<p>Notes: Main source of table is DMRB LA 109: Geology and Soils [Ref. 11-24].</p>	

Magnitude of impact for groundwater

- 11.6.16. The magnitude of impact has been classified using the criteria presented in **Table 11.8** below, which are adapted from DMRB LA 113: Road Drainage and the Water Environment [Ref. 11-25]. It should be noted that in response to consultation comments from Buckinghamshire Council, this table has been adjusted to include reference to the potential risks from contamination introduced by the Proposed Development and contamination mobilised by the Proposed Development, as well as impacts due to routine runoff, which was already included.
- 11.6.17. With respect to Buckinghamshire Council’s comments that the assessment is sufficiently applicable to a non-road development, this table has been reviewed. It was considered that no further adjustments were necessary beyond the addition of alternative methods by which contamination could be introduced, as the examples are sufficiently broad to apply in the scenario of a solar farm with associated infrastructure.
- 11.6.18. It should be noted that when considering the potential for contamination to affect receptors (human health or groundwater), the magnitude of impact

criteria for groundwater are taken from **Table 11.8** and criteria for human health are provided in **Table 11.7** above.

Table 11.8: Magnitude of impact criteria for groundwater

Magnitude of impact	Criteria	Typical example
Major adverse	Results in loss of attribute and/or quality and integrity of the attribute	<p>Loss of, or extensive change to, an aquifer.</p> <p>Loss of regionally important water supply.</p> <p>Potential high risk of pollution to groundwater from contamination introduced as a result of the Proposed Development, as a result of mobilisation of existing contamination, or as a result of routine runoff</p> <p>Loss of, or extensive change to groundwater dependent terrestrial ecosystem or baseflow contribution to protected surface water bodies.</p> <p>Reduction in water body Water Framework Directive classification. Loss, or significant damage, to major structures through subsidence or similar effects.</p>
Moderate adverse	Results in effect on integrity of attribute, or loss of part of attribute	<p>Partial loss or change to an aquifer.</p> <p>Degradation of regionally important public water supply or loss of significant commercial/industrial/agricultural supplies.</p> <p>Potential medium risk of pollution to groundwater from contamination introduced as a result of the Proposed Development, as a result of mobilisation of existing contamination, or as a result of routine runoff.</p> <p>Partial loss of the integrity of groundwater dependent terrestrial ecosystem.</p> <p>Contribution to reduction in water body Water Framework Directive classification.</p> <p>Damage to major structures through subsidence or similar effects, or loss of minor structures.</p>
Minor adverse	Results in some measurable change	<p>Potential low risk of pollution to groundwater from contamination introduced as a result of the Proposed Development, as a result of</p>

Magnitude of impact	Criteria	Typical example
	in attributes, quality or vulnerability	<p>mobilisation of existing contamination, or as a result of routine runoff.</p> <p>Minor effects on an aquifer, groundwater dependent terrestrial ecosystems, abstractions and structures.</p>
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	No measurable impact upon an aquifer and/or groundwater receptors.
Minor beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	<p>Reduction of groundwater hazards to existing structures.</p> <p>Reductions in waterlogging and groundwater flooding.</p>
Moderate beneficial	Results in moderate improvement of attribute quality	<p>Contribution to improvement in water body Water Framework Directive classification.</p> <p>Improvement in water body catchment abstraction management strategy (or equivalent) classification.</p> <p>Support to significant improvements in damaged groundwater dependent terrestrial ecosystem.</p>
Major beneficial	Results in major improvement of attribute quality	<p>Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring.</p> <p>Recharge of an aquifer.</p> <p>Improvement in water body Water Framework Directive classification.</p>
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of effect for geology, contamination and groundwater

11.6.19. The significance of effect for geology and contamination is based on the sensitivity of the receptor and the magnitude of impact (change), as

outlined in **Table 11.9** and derived from DMRB LA 104: Environmental Assessment and Monitoring [Ref. 11-26]. The significance of effect for groundwater is based on the importance of the receptor and the magnitude of impact, as outlined in **Table 11.10** and adapted from DMRB LA 104: Environmental Assessment and Monitoring [Ref. 11-26]. The significance of effect can be adverse or beneficial.

- 11.6.20. The significance of an effect is reported as either ‘**significant**’ or ‘**not significant**’. Any effects determined as ‘moderate’ or above are considered to be significant. Any effects determined as ‘slight’ or below are considered not significant.
- 11.6.21. Where the significance matrix indicates a range for the effect significance (e.g. ‘slight or moderate’), professional judgement can be applied to select one option (which would be justified by evidence, as appropriate), or an effect significance range can be applied. Where a range for the significance of effect means that the effect could be either significant or not significant, professional judgement has been applied to define the significance (for example with the range ‘slight to moderate’, where slight would be not significant, but moderate would be significant). Where both categories within the range fall within either ‘significant’ or ‘not significant’, the range has not been adjusted to a single descriptor (for example if the range is ‘neutral or slight’, as both effects are considered to be not significant; or if the range is ‘large or very large’, as both effects are considered to be significant).
- 11.6.22. Descriptive terms are applied to the significance criteria within **Section 11.10** to provide further clarification of the extent of the effect, and as summarised in **Table 11.13**. The effect can be characterised as positive (beneficial) or negative (adverse); direct or indirect; short-term, medium term or long-term; and permanent or temporary.

Table 11.9: Significance of effect criteria for geology, contamination and groundwater

Sensitivity/ Importance	Magnitude of impact (change)				
	No change	Negligible	Minor	Moderate	Major
Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large

Sensitivity/ Importance	Magnitude of impact (change)				
	No change	Negligible	Minor	Moderate	Major
Very high	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large

Note: the importance criteria for groundwater do not include a category of negligible

11.7. Mitigation embedded into the design

11.7.1. This assessment has been based on the principle that measures have been ‘embedded’ into the design of the Proposed Development to avoid or reduce potential significant effects as far as practicable, for example by the considered placement of infrastructure. The embedded mitigation relevant to this assessment is detailed in **Table 11.10** below.

Table 11.10: Embedded mitigation relevant to land and groundwater

Embedded mitigation measures relevant to land and groundwater	Function	Securing mechanism
Internal access tracks and cable routes will use existing agricultural gateways/tracks, crossings and/or gaps in the hedgerows where practicable.	Reduce the impact on the identified land and groundwater receptors as far as reasonably practicable by reducing locations where construction works are required.	Design Commitments [EN010158/APP/5.9]
Perimeter fencing surrounding the Solar PV development will be offset at least 10m either side from all existing ditches and ordinary watercourses except where access tracks and/or cable routes are required to cross an existing feature. Rosefield Substation, BESS, ITS, Independent Outdoor Equipment	The primary reason for avoiding locations in proximity to surface watercourses would be protection of water quality within these features. This would also have the benefit of minimising the presence of areas of infrastructure in locations where groundwater is expected to be closer to the ground surface, and in avoiding temporarily restricting access to	Design Commitments [EN010158/APP/5.9]

Embedded mitigation measures relevant to land and groundwater	Function	Securing mechanism
(transformer, switchgear and central inverters), Collector Compounds and Construction Compounds will be located outside of Flood Zone 2 and 3 areas.	Mineral Safeguarding Areas, as these are mainly present along watercourses.	
Interconnecting Cable Corridors and Grid Connection Cabling Corridors will run alongside access tracks where practicable, avoiding wider excavations.	Minimise impacts on land and groundwater from trenching and excavations.	Design Commitments [EN010158/APP/5.9]
Minimise the use of concrete, trenches and foundations	Minimise impacts on land and groundwater from these features.	Outline CEMP [EN010158/APP/7.2]
Drainage strategy to prevent release of fire-fighting water from the BESS	Reduce/prevent release of fire-fighting water to the ground surface or surface water or groundwater.	Outline Drainage Strategy [EN010158/APP/7.11]

11.8. Assessment of likely effects (without additional mitigation)

Construction

Geology

- 11.8.1. In relation to the potential for contamination to occur, likely effects relating to geological units would be as detailed in **Paragraph 11.8.2**. In terms of likely effects relating to the physical characteristics of geological units, these could occur during work such as excavations, construction of foundations and piling. Bedrock geological units would be permanently altered by these activities, whereas granular superficial deposits could be reinstated after works were completed.

Contamination

- 11.8.2. Construction activities could lead to localised contamination of soils from potential spills from the operation of construction plant or refuelling activities. If contaminated soils associated with past developments are identified, these could form a localised source of contamination if they are not managed correctly. There is the potential for contamination to affect human health and groundwater quality.

Groundwater

- 11.8.3. Construction activities (including Horizontal Directional Drilling (HDD) works, piling activities, earthworks, formation of access tracks and excavations) could lead to minor damage to field drains, which may affect the localised drainage of the land and the groundwater quality of the underlying aquifer. Spillages or leaks of fuels, oils and chemicals during construction works may lead to effects on groundwater, which could result in potential pollution to any underlying aquifers, with potential subsequent effects on groundwater dependent terrestrial ecosystems. These effects may also arise from runoff associated with construction activities (e.g., silt run-off during earthworks and accidental spills and leaks from construction plant). Where piling is required, there may be the potential for preferential pathways to the underlying aquifer, particularly where spills or leaks have occurred as noted above.

Operation (including maintenance)

Geology

- 11.8.4. In relation to the potential for contamination to occur, effects relating to geological units would be as detailed in **Paragraph 11.8.5**. Physical effects relating to geological units would not be expected to occur during operation (including maintenance).

Contamination

- 11.8.5. Operation (including maintenance) works could result in spillages and leaks of fuels, oils and chemicals, which could affect the near-surface soil and shallow geological units. Large numbers of vehicle movements are not anticipated within the Site during the operation (including maintenance) phase, so occurrences of accidental spillages are less likely during this phase than the construction phase. There is the potential for contamination to affect human health and groundwater quality if these receptors come into contact with spillages or leaks of fuels, oils or chemicals.

Groundwater

- 11.8.6. Operation (including maintenance) works (including vehicle movements necessary for these works) could result in spillages and leaks of fuels, oils and chemicals, which could lead to effects on groundwater resulting in potential pollution to any underlying aquifers, with potential subsequent effects on groundwater dependent terrestrial ecosystems. The presence of piled foundations and increase in impermeable areas due to the presence of the BESS and Rosefield Substation may locally affect the groundwater infiltration rates across the Site.

Decommissioning

Geology

- 11.8.7. In relation to the potential for contamination to occur, effects relating to geological units would be as detailed in **Paragraph 11.8.8**. In terms of likely physical effects relating to geological units, these would not be expected to occur during the decommissioning phase.

Contamination

- 11.8.8. During decommissioning works, activities that could result in localised contamination include spills and leaks of fuels, oils and chemicals. There is the potential for contamination to affect human health quality and groundwater quality.

Groundwater

- 11.8.9. Decommissioning activities (including earthworks and excavation) could lead to minor damage to field drains, which may affect the localised drainage of the land and the groundwater quality of the underlying aquifer. As a result of the decommissioning works, spillages and leaks of fuels, oils and chemicals may lead to effects on groundwater, which could result in potential pollution to any underlying aquifers, with potential subsequent effects on groundwater dependent terrestrial ecosystems. This may arise from runoff associated with activities (e.g. silt run-off during earthworks and accidental spills and leaks from machinery).
- 11.8.10. In the event of fire associated with the BESS, water used in cooling infrastructure in proximity to the fire would be present, which could result in potential pollution to the groundwater and any underlying aquifers, if cross-contamination from any fire-fighting chemicals occurs. Although the BESS will be one of the elements that is to be decommissioned, there may be a period of the decommissioning phase during which it is still operational, when this issue would remain a potential effect.

11.9. Additional mitigation

Construction

- 11.9.1. A ground investigation and accompanying interpretative report is required (initial phases of work have been undertaken, as access allowed, as presented in **ES Volume 4, Appendix 11.3: Ground Investigation Report [EN010158/APP/6.4]**, but this did not include any interpretative work elements, as these will follow when all phases of ground investigation have been completed, as secured by the **Outline CEMP [EN010158/APP/7.2]**). As detailed in and secured by the **Outline CEMP [EN010158/APP/7.2]**, this work will be completed prior to construction works commencing and the report will be issued to the Local Planning Authority. This will provide further information relating to potential pollutant linkages that were identified by **ES Volume 4, Appendix 11.1: Preliminary Risk Assessment [EN010158/APP/6.4]**. The scope of remediation work and associated monitoring of ground gas or groundwater (if required) would be agreed by Buckinghamshire Council and the Environment Agency, as defined by measures set out in the **Outline CEMP [EN010158/APP/7.2.2]**.
- 11.9.2. The **Outline CEMP [EN010158/APP/7.2]** sets out measures to avoid damage to human health due to contamination, and to avoid, minimise or mitigate effects on the environment during construction works. This includes managing risks from former agricultural activities such as foot and mouth burial pits, waste pits, pesticides and asbestos containing material, ensuring that land and groundwater receptors (including wells) are protected from effects of contamination associated with historical usage of the land. Examples of the measures presented in the **Outline CEMP [EN010158/APP/7.2]** include:
- Good housekeeping and site maintenance, including management of materials and waste;
 - Maintain records relating to routine inspections, investigations, corrective actions and action schedules;
 - Procedures to mitigate against erosion;
 - Procedures to prevent disturbance of contamination;
 - Emergency procedures to manage accidental spillages and leaks in order to minimise any risk to the land and groundwater during the construction phase; and
 - Management plans to cover the use of HDD, including the use of drilling muds.
- 11.9.3. Along with preventing damage to the quality of groundwater, any potential impacts on the existing groundwater levels and flow directions during construction will also be minimised. The **Outline CEMP**

[EN010158/APP/7.2] should be referred to for a full list of the measures that would be adopted. These measures will also protect adjacent groundwater dependent terrestrial ecosystems.

- 11.9.4. A piling risk assessment will be undertaken before the start of construction, as detailed in and secured by the **Outline CEMP [EN010158/APP/7.2]**. This will minimise impacts on groundwater as a result of piling activities.

Operation (including maintenance)

- 11.9.5. The **Outline Operational Environmental Management Plan (Outline OEMP) [EN010158/APP/7.3]** sets out measures to avoid damage to human health due to contamination, and to avoid, minimise or mitigate effects on the environment during operation (including maintenance). This includes managing any remaining risks (if present) from former agricultural activities such as foot and mouth burial pits, waste pits, pesticides and asbestos containing material, ensuring that land and groundwater receptors (including wells) are protected from effects of contamination associated with historical usage of the land. Examples of the measures presented in the **Outline OEMP [EN010158/APP/7.3]** include:

- Good housekeeping and site maintenance, including management of materials and waste;
- Maintain records relating to routine inspections, investigations, corrective actions and action schedules; and
- Emergency procedures to manage accidental spillages and leaks in order to minimise any risk to the land and groundwater during the operation (including maintenance) phase.

- 11.9.6. Along with preventing damage to the quality of groundwater, any potential impacts on the existing groundwater levels and flow directions during the operation (including maintenance) phase will also be minimised. The **Outline OEMP [EN010158/APP/7.3]** should be referred to for a full list of the measures that would be adopted. These measures will also protect adjacent groundwater dependent terrestrial ecosystems.

- 11.9.7. To manage the potential impact of firewater associated with the operational BESS, the procedures for managing the firewater and mitigating any impact to the environment are detailed in and secured by the **Outline OEMP [EN010158/APP/7.3]** and requirements for the control and safety of the BESS are detailed in and secured by the **Outline BSMP [EN010158/APP/7.9]** and the **Outline Drainage Strategy [EN010158/APP/7.11]** which ensures that any firewater is collected, preventing release to land or groundwater.

- 11.9.8. With respect to the potential for release of any contamination from the Solar PV panels, the majority of newer ground mounted Solar PV projects are based on glass/glass panels, due to their reliability and lifespan. As these types of panels have no backsheet, they are not expected to contain PFAS in the laminate.
- 11.9.9. Any damaged panels would be removed and replaced in accordance with the **Outline OEMP [EN010158/APP/7.3.2]**. Panels that are correctly maintained are not expected to result in the release of chemicals or heavy metals to the environment. Faulty, damaged, or end-of-life assets will be removed from Site and disposed of responsibly, which is a key method to reduce the risk of chemical impacts.

Decommissioning

- 11.9.10. The **Outline Decommissioning Environmental Management Plan (Outline DEMP) [EN010158/APP/7.4]** sets out measures to avoid, minimise or mitigate effects on human health (from contamination) or on the environment during decommissioning works. Such measures include:
- Good housekeeping and site maintenance, including management of materials and waste;
 - Maintain records relating to routine inspections, investigations, corrective actions and action schedules;
 - Procedures to mitigate against erosion;
 - Procedures to prevent disturbance of contamination; and
 - Emergency procedures to manage accidental spillages and leaks in order to minimise any risk to the land and groundwater during the decommissioning phase.
- 11.9.11. Along with preventing damage to the quality of groundwater, any potential impacts on the existing groundwater levels and flow directions during the decommissioning phase will also be minimised. The **Outline DEMP [EN010158/APP/7.4]** should be referred to for a full list of the measures that would be adopted. These measures will also protect adjacent groundwater dependent terrestrial ecosystems.
- 11.9.12. Requirements to manage the potential impact of firewater associated with the BESS will remain in place during the decommissioning phase, until no longer necessary, as detailed for the operation (including maintenance) phase. The procedures for managing the firewater and mitigating any impact to the environment are detailed in and secured by the **Outline DEMP [EN010158/APP/7.4]** and requirements for the control and safety of the BESS are detailed in and secured by the **Outline BSMP [EN010158/APP/7.9]**.

11.9.13. With respect to the potential for release of any contamination from the Solar PV panels during decommissioning, end-of-life assets will be removed and disposed of responsibly to reduce the risk of chemical impacts.

11.10. Assessment of residual effects (with additional mitigation)

Construction

Geology

11.10.1. Contamination of geological units could occur as a result of construction activities (including spills or refuelling activities). There is also the potential for contaminated material to be encountered that is associated with past developments. The sensitivity of geological units is assessed to be **low** and the magnitude of impact (change), following additional mitigation (detailed in and secured by the **Outline CEMP [EN010158/APP/7.2]**), is **negligible**. Therefore, any effects that do occur relating to geological units would be assessed to be **neutral** or direct, short term or long term, temporary or permanent **slight adverse**, which is considered to be **not significant**.

Contamination

11.10.2. Contamination could be introduced as a result of construction activities (including spills or refuelling activities) and existing contamination associated with past developments could be encountered. With respect to contamination issues affecting human health, the receptor sensitivity is categorised as **medium**, in line with the intended land use (see **Table 11.5**). The magnitude of impact (change), following additional mitigation, if required (this may include remediation and validation work, to ensure that contamination will not be present at harmful levels, following the procedures detailed in and secured by the **Outline CEMP [EN010158/APP/7.2]**), is categorised as **negligible** (with contaminant concentrations expected to be substantially below any screening levels, due to a lack of the presence of pollutants (subsequent to remediation work, if necessary), and no requirement for further control measures to reduce the risks to human health or make the land suitable for its intended use). Therefore, there is assessed to be either a **neutral** residual effect, or an indirect, temporary, short-term **slight adverse** residual effect on human health following the implementation of additional mitigation measures, which is considered to be **not significant**.

11.10.3. With respect to contamination issues affecting groundwater, this is assessed in **Paragraph 11.10.4** below.

Groundwater

11.10.4. The quality of groundwater, and the current groundwater regime with respect to groundwater levels and groundwater flow, have the potential to be affected by the Proposed Development by the introduction of contamination (for example due to spills or refuelling activities), or by affecting the groundwater regime by changing existing drainage. Activities such as piling, foundation excavation and earthworks could result in adverse effects on the groundwater receptor. The importance of groundwater is **medium** (see **Table 11.5**), as it comprises an aquifer providing water for agricultural use with a limited connection to surface water. The magnitude of impact, following additional mitigation (detailed in and secured by the **Outline CEMP [EN010158/APP/7.2]**), is categorised as **minor** (with the potential low risk of pollution to groundwater, and potential minor effects on an aquifer). Therefore, there is assessed to be a direct, temporary, short-term **slight adverse** residual effect on the quality of groundwater following the implementation of additional mitigation measures, which is considered to be **not significant**.

Groundwater dependent terrestrial ecosystems

11.10.5. The groundwater dependent terrestrial ecosystem in Finemere Wood has the potential to be affected by the Proposed Development by the introduction of contamination (for example due to spills or refuelling activities), or by affecting the groundwater regime by changing existing drainage. Activities such as piling, foundation excavation and earthworks could result in adverse effects on the groundwater receptor, with subsequent effects on Finemere Wood groundwater dependent terrestrial ecosystem. The importance of the groundwater dependent terrestrial ecosystem is **high** (see **Table 11.6**), as it is a locally significant attribute of high importance. The magnitude of impact, following additional mitigation (detailed in and secured by the **Outline CEMP [EN010158/APP/7.2.2]**), is categorised as **minor** (with the potential risk of minor effects on a groundwater dependent terrestrial ecosystem). **Table 11.9** indicates that the significance of effect would be slight to moderate. This significance range has been adjusted to a significance criteria of slight, based on professional judgement (as detailed in **Paragraph 11.6.21**). The justification for this selection of the significance criteria is that any effects on the groundwater receptor would be expected to be limited to the lower end of the 'minor' category, with potential effects being managed by adhering to procedures that are secured by the **Outline CEMP [EN010158/APP/7.2.2]**. Measures to protect groundwater and the associated groundwater dependent terrestrial ecosystem that are secured in the **Outline CEMP [EN010158/APP/7.2.2]** include the completion of a site investigation (and any associated remediation of contamination, if identified) prior to works commencing; procedures for the storage and use of fuel and hazardous materials/substances; procedures for managing spillages and leaks; and procedures for the discovery of unexpected

contamination, alongside other measures that are set out with the **Outline CEMP [EN010158/APP/7.2.2]**, specifically **Table 3.6** relating to Land and Groundwater.

- 11.10.6. Therefore, there is assessed to be the potential for an indirect, temporary, short-term **slight adverse** residual effect on the groundwater dependent terrestrial ecosystem, following the implementation of additional mitigation measures, which is considered to be **not significant**.

Operation (including maintenance)

Geology

- 11.10.7. Contamination of geological units could occur as a result of activities undertaken during the operation (including maintenance) phase, including spills or refuelling activities. The sensitivity of geological units is assessed to be **low** and the magnitude of impact (change), following additional mitigation (detailed in and secured by the **Outline OEMP [EN010158/APP/7.3]**), is **negligible**. Therefore, any effects that do occur relating to geological units would be assessed to be **neutral** or **slight adverse**, which is considered to be **not significant**.

Contamination

- 11.10.8. Contamination could be introduced as a result of activities undertaken during the operation (including maintenance) phase, including spills or refuelling activities. Contamination could also occur as a result of accidental release of firewater from the BESS compound. With respect to contamination issues affecting human health, the receptor sensitivity is categorised as **medium**, in line with the intended land use (see **Table 11.5**). The magnitude of impact (change), following additional mitigation (including remediation, if required, as detailed in and secured by the **Outline OEMP [EN010158/APP/7.3]**), is categorised as **negligible** (with contaminant concentrations expected to be substantially below any screening levels, and no requirement for further control measures to reduce the risks to human health or make the land suitable for its intended use). Therefore, there is assessed to be either a **neutral** residual effect, or an indirect, temporary, short-term **slight adverse** residual effect on human health following the implementation of additional mitigation measures, which is considered to be **not significant**.
- 11.10.9. With respect to contamination issues affecting groundwater, this is assessed in **Paragraph 11.10.8** below.

Groundwater

- 11.10.10. The quality of groundwater, and the current groundwater regime with respect to groundwater levels and groundwater flow, have the potential to be affected during the operation (including maintenance) phase by the

introduction of contamination (for example due to spills or refuelling activities), or by affecting the groundwater regime by changing existing drainage. However, it should be noted that these effects are less likely to occur during operation (including maintenance) than during the construction phase. There is also the potential for groundwater quality to be affected if any accidental release of firewater from the BESS occurs. The importance of groundwater is **medium** (see **Table 11.5**), as it comprises an aquifer providing water for agricultural use with a limited connection to surface water. The magnitude of impact (change), following additional mitigation (with measures detailed in and secured by the **Outline OEMP [EN010158/APP/7.3]**, **Outline BSMP [EN010158/APP/7.9]** and **Outline Drainage Strategy [EN010158/APP/7.11]**), is categorised as **negligible** (with no measurable impact on the aquifer or groundwater receptors). Therefore, there is assessed to be either a **neutral** residual effect or a direct, temporary, short-term **slight adverse** residual effect on the quality of groundwater following the implementation of additional mitigation measures, which is considered to be **not significant**.

Groundwater dependent terrestrial ecosystems

- 11.10.11. The groundwater dependent terrestrial ecosystem in Finemere Wood has the potential to be affected by the Proposed Development during operation by the introduction of contamination (for example due to spills or refuelling activities). The importance of the groundwater dependent terrestrial ecosystem is high (see **Table 11.6**), as it is a locally significant attribute of **high** importance. The magnitude of impact, following additional mitigation (detailed in and secured by the **Outline OEMP [EN010158/APP/7.3.2]**), is categorised as **negligible** (with a potential effect on the attribute, but of insufficient magnitude to affect the use or integrity). Therefore, there is assessed to be the potential for an indirect, temporary, short-term **slight adverse** residual effect on the groundwater dependent terrestrial ecosystem, following the implementation of additional mitigation measures, which is considered to be **not significant**.

Decommissioning

Geology

- 11.10.12. Contamination of geological units could occur as a result of decommissioning activities (including spills or refuelling activities). The sensitivity of geological units is assessed to be **low** and the magnitude of impact (change), following additional mitigation (detailed in and secured by the **Outline DEMP [EN010158/APP/7.4]**), is **negligible**. Therefore, any effects that do occur relating to geological units would be assessed to be **neutral** or **slight adverse**, which is considered to be **not significant**.

Contamination

- 11.10.13. Contamination could be introduced as a result of decommissioning activities (including spills or refuelling activities). With respect to contamination issues affecting human health, the receptor sensitivity is categorised as **medium**, in line with the intended land use (see **Table 11.5**). The magnitude of impact (change), following additional mitigation (including remediation, if required, as detailed in and secured by the **Outline DEMP [EN010158/APP/7.4]**), is categorised as **negligible** for the decommissioning phase (with contaminant concentrations expected to be substantially below any screening levels, and no requirement for further control measures to reduce the risks to human health or make the land suitable for its intended use). Therefore, there is assessed to be either a **neutral** residual effect, or an indirect, temporary, short-term **slight adverse** residual effect on human health following the implementation of additional mitigation measures, which is considered to be **not significant**.
- 11.10.14. With respect to contamination issues affecting groundwater, this is assessed in **Paragraph 11.10.12** below.

Groundwater

- 11.10.15. The quality of groundwater, and the current groundwater regime with respect to groundwater levels and groundwater flow, have the potential to be affected during the decommissioning phase by the introduction of contamination (for example due to spills or refuelling activities), or by affecting the groundwater regime by changing existing drainage. However, it should be noted that these potential effects are less likely to occur during the decommissioning phase than during the construction phase. There is also the potential for groundwater quality to be affected if any accidental release of firewater from the BESS occurs, while that facility remains operational. The importance of groundwater is **medium** (see **Table 11.5**), as it comprises an aquifer providing water for agricultural use with a limited connection to surface water. The magnitude of impact (change), following additional mitigation (detailed in and secured by the **Outline DEMP [EN010158/APP/7.4]** and **Outline BSMP [EN010158/APP/7.9]**), is categorised as **negligible** for the decommissioning phase (with no measurable impact on the aquifer or groundwater receptors). Therefore, there is assessed to be either a **neutral** residual effect or a direct, temporary, short-term **slight adverse** residual effect on the quality of groundwater following the implementation of additional mitigation measures, which is considered to be **not significant**.

Groundwater dependent terrestrial ecosystems

- 11.10.16. The groundwater dependent terrestrial ecosystem in Finemere Wood has the potential to be affected by the Proposed Development during decommissioning by the introduction of contamination (for example due to

spills or refuelling activities). The importance of the groundwater dependent terrestrial ecosystem is high (see **Table 11.6**), as it is a locally significant attribute of **high** importance. The magnitude of impact, following additional mitigation (detailed in and secured by the **Outline DEMP [EN010158/APP/7.4.2]**), is categorised as **negligible** (with a potential effect on the attribute, but of insufficient magnitude to affect the use or integrity). Therefore, there is assessed to be the potential for an indirect, temporary, short-term **slight adverse** residual effect on the groundwater dependent terrestrial ecosystem, following the implementation of additional mitigation measures, which is considered to be **not significant**.

11.11. Opportunities for enhancement

- 11.11.1. The existing agricultural land use carries a contamination risk, for example from the application of herbicides, pesticides or fertilisers or due to leaks or spillages from agricultural machinery. The change in land use from agricultural producer to solar farm will result in a reduction in risks from these potential pollutants.

11.12. Monitoring requirements

- 11.12.1. If any monitoring relating to potential contamination of land or groundwater is considered necessary further to completion of the ground investigation, the scope of this would be agreed with Buckinghamshire Council. It is noted that any such work must ensure that it does not adversely affect the existing monitoring infrastructure associated with the active landfill site located at Calvert.

11.13. Difficulties and uncertainties

- 11.13.1. The following difficulties and uncertainties have been encountered in undertaking the land and groundwater assessment:
- Data on Site history have been obtained from historical maps. On some occasions there may be developments that occurred between map editions that are not evident. However, for the Site, there are few changes to field boundaries or building locations between the map editions, and it is considered unlikely that significant features have been missed;
 - There is currently no interpretative report available for the ground investigations that have been undertaken at the Site to date; therefore, there is no specific information on concentrations of potential contaminants in soil and groundwater. It would be standard for this information to be collected during later stages of the Proposed Development, when ground investigations can be appropriately designed for the Proposed Development based on both the available desk-based information and the detailed design; and

- Details of groundwater depth and flow direction are unknown. Although this means that the exact details of the groundwater regime are unknown, the assessment has been completed in a robust manner based on assumptions made from the available data. If necessary, relevant information could be obtained during the ground investigation work, secured by the **Outline CEMP [EN010158/APP/7.2]**.

11.14. Summary

- 11.14.1. A summary of this assessment is presented in **Table 11.11**. The importance/sensitivity of each receptor is identified alongside any relevant embedded mitigation and the likely effects that could arise on those receptors. Any proposed additional mitigation measures are stated and the residual effects then assessed. Finally, any monitoring requirements are stated where applicable.
- 11.14.2. There are no significant residual effects during the construction, operation (including maintenance) and/or decommissioning phases.

Table 11.11: Summary of the land and groundwater assessment

Receptor/matter	Phase	Importance/sensitivity of the receptor	Embedded mitigation	Likely effect (without additional mitigation)	Additional mitigation	Magnitude of impact (change)	Residual effect (with additional mitigation)	Monitoring requirement
Geology (due to excavations, foundations or piling)	Construction, operation (including maintenance) and decommissioning.	Low	Using existing tracks for access routes, minimise use of trenches and foundations.	Potential for effects from spills, refuelling or mobilisation of contamination adversely impacting on geological units	Outline CEMP (including the Piling Risk Assessment that is secured by it) [EN010158/APP/7.2] Outline OEMP [EN010158/APP/7.3] Outline DEMP [EN010158/APP/7.4]	Negligible risk for all activities.	For low sensitivity geological units, with a negligible magnitude of impact (change), there is a neutral or slight adverse effect. D; ST/LT; T/P Not significant	None.
Contamination (human health)	Construction, operation (including maintenance) and decommissioning	Medium	Using existing tracks for access routes, cables located adjacent to tracks where possible, minimise use of concrete, trenches and foundations.	Potential for effects from spills, refuelling or mobilisation of contamination during construction, operation (including maintenance) and decommissioning activities.	Outline CEMP (including the Piling Risk Assessment that is secured by it) [EN010158/APP/7.2] Outline OEMP [EN010158/APP/7.3] Outline DEMP [EN010158/APP/7.4]	Negligible risk for all activities.	For medium sensitivity receptors, with a negligible magnitude of impact (change), there is a slight adverse or neutral effect on human health relating to contamination. I; ST; T Not significant	To be confirmed if required.
Groundwater	Construction	Medium	The Proposed Development incorporates a 10m offset from Main Rivers and ordinary watercourses, which means areas of shallower groundwater are likely to be avoided. Use of concrete, trenches and foundations will be minimised.	Potential for effects from spills, refuelling, mobilisation of contamination, HDD, piling, earthworks, excavations, construction of access tracks and fire events associated with the BESS.	Outline CEMP (including the Piling Risk Assessment that is secured by it) [EN010158/APP/7.2] Outline OEMP [EN010158/APP/7.3] Outline DEMP [EN010158/APP/7.4] Outline BSMP [EN010158/APP/7.9]	Minor risk for all activities.	For medium importance groundwater, with a minor magnitude of impact, there is a slight adverse effect from spills, refuelling, mobilisation of contamination, HDD, piling, earthworks, excavations, construction of access tracks and fire events. D; ST; T Not significant	To be confirmed if required.

Receptor/matter	Phase	Importance/sensitivity of the receptor	Embedded mitigation	Likely effect (without additional mitigation)	Additional mitigation	Magnitude of impact (change)	Residual effect (with additional mitigation)	Monitoring requirement
Groundwater dependent terrestrial ecosystems	Construction	High	None.	Potential for effects from spills, refuelling and mobilisation of contamination.	Outline CEMP (including the Piling Risk Assessment that is secured by it) [EN010158/APP/7.2.2]	Minor risk for all activities.	For high sensitivity receptors with a minor magnitude of impact (change), there is a slight adverse effect on the groundwater dependent terrestrial ecosystem. I; ST; T Not significant	To be confirmed if required.
Groundwater	Operation (including maintenance) and decommissioning	Medium	None.	Potential for effects from spills, refuelling or mobilisation of contamination adversely impacting on groundwater quality.	Outline CEMP (including the Piling Risk Assessment that is secured by it) [EN010158/APP/7.2] Outline OEMP [EN010158/APP/7.3] Outline DEMP [EN010158/APP/7.4]	Negligible risk for all activities.	For medium sensitivity receptors with a negligible magnitude of impact (change), there is a neutral or slight adverse effect from contamination. D; ST; T Not significant	To be confirmed if required.
Groundwater dependent terrestrial ecosystems	Operation (including maintenance) and decommissioning	High	None.	Potential for effects from spills or refuelling adversely impacting groundwater quality.	Outline OEMP [EN010158/APP/7.3.2] Outline DEMP [EN010158/APP/7.4.2]	Negligible risk for all activities.	For high sensitivity receptors with a negligible magnitude of impact (change), there is a slight adverse effect on the groundwater dependent terrestrial ecosystem. I; ST; T Not significant	To be confirmed if required.

Key:

+ = positive or - = negative; D = direct or I = indirect; ST = short-term, MT = medium-term or LT = long-term; P = permanent or T = temporary

11.15. References

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