STATERA
BALANCING THE GRID

East Claydon Battery Energy Storage System (BESS)

Environmental Statement

Ground Conditions

December 2023

Contents

1 GROUND CONDITIONS

1.1 Introduction

1.1.1 This chapter has been prepared by Geo-Environmental Services Limited and considers ground conditions; geology, hydrogeology, agricultural land classification and the potential for contamination on the Site where the East Claydon Battery Energy Storage System (BESS) Project will be located.

1.1.2 The information for this chapter has been compiled from the Landmark Sitecheck, report reference: 307024616[1] and publicly available sources. At this stage a comprehensive Phase 1 Desk Study and Phase 2 Ground Investigation have not yet been undertaken. An Agricultural Land Assessment has been undertaken and is reported within Volume 11 of the ES.

1.2 Legislative and Policy Framework

1.2.1 National planning policy guidance is provided by the National Planning Policy Framework (NPPF)[2]. The NPPF includes a number of policy statements that relate to contamination and ground instability.

1.2.2 In paragraph 174 (a), (e) and (f) the NPPF states that:

- *"Planning policies and decisions should contribute to and enhance the natural and local environment by……*
  - *protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
  - *preventing 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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
  - *Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."*

1.2.3 In paragraph 183 the NPPF states the following:

- *"Planning policies and decisions should ensure that:*
  - *a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);*

[1] Landmark (February 2023) Sitecheck Combined, Reference: 307024616

[2] Ministry of Housing, Communities and Local Government (September 2023) National Planning Policy Framework

b) *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*

c) *adequate site investigation information, prepared by a competent person, is available to inform these assessments."*

1.2.4 In paragraph 184 the NPPF states:

- *"Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner."*

1.2.5 In paragraph 185 the NPPF states:

- *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."*

1.2.6 In terms of development of agricultural land, the NPPF places a greater emphasis on sustainable development than previous policy documents, but at the expense of some detail. However, in its core planning principles it states the following; where planning policies and decisions should contribute to and enhance the natural and local environment, by stating in paragraph 174 b):

- *"recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services - including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland."*

1.2.7 In describing what it means by "best and most versatile agricultural land" the NPPF states in Annex 2:

- *"Best and most versatile agricultural land: Land in grades 1, 2 and 3a of the Agricultural Land Classification.;"*

1.2.8 In addition, NPPF paragraph 175 states that:

- *"Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework (Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality); take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries."*

1.2.9 The Vale of Aylesbury Local Plan (VALP)[3], dated September 2021, is currently the adopted local plan for the area where the Site is located.

1.2.10 In section 9.32 of the VALP it states that:

- "9.32 *The council will ensure that no development creates or triggers unacceptable levels of pollution and land instability that could impact on human health, property and the wider environment, including environmental designations. Consideration must be given to adopting environmental best practice measures in all cases.*"

1.2.11 Sections 9.40 to 9.45 of the VALP state:

[3] Buckinghamshire Council (September 2021) Vale of Aylesbury Local Plan (VALP) 2013-2033

- *"9.40 The presence of contamination may affect or restrict the use of land, but equally development may address the issue for the benefit of the wider community, and bring the land back into beneficial use. In determining whether land contamination is an issue when assessing a planning application, the council will consider a range of information sources including its database of past industrial and commercial land uses, information provided by developers and third parties, statutory guidance, historic maps, and the council's contaminated land strategy."*
- *"9.41 In April 2000, Part IIA of the Environmental Protection Act (EPA) 1990 came into force, introducing a new regime for the regulation of contaminated land in England. The main purpose of Part IIA is to provide a system for the identification of land that is posing unacceptable risks to health or the environment, and for securing remediation where unacceptable risks cannot be controlled by other means."*
- *"9.42 Although most developments are rural in nature, there is development built on previously developed land, some of which may formerly have been employment land of an industrial or commercial nature, and may therefore be affected by contamination and require further investigation. The term 'contaminated land' describes land polluted by, for example heavy metals and hydrocarbons, all of which may harm soils, fauna, flora, water resources and construction components."*
- *"9.43 Redeveloping such land provides an opportunity to remediate the site of any contamination, so that any threat to health, the environment and the structure itself is removed. The assessment and remediation of contaminated land is complex, with each site being judged specifically to make it fit for end use. When carrying out an assessment, interested parties should take into account guidance set out in the council's Technical Guide for Planning Applicants and Developers. This document provides a guide for developers on how to deal with land contamination and what information should accompany a planning application for the development of affected sites. It should also be read in conjunction with DEFRA and the Environment Agency's Model Procedures for the Management of Land Contamination (CLR11) and the National Planning Policy Framework (NPPF) (2012)."*
- *"9.44 It is essential that a contaminated land assessment is carried out by a competent person and in accordance with BS10175 (2011) Code of Practice for the Investigation of Potentially Contaminated Sites. Where there is evidence of contamination, remedial measures will need to be specified to ensure the development will not pose a risk to human health, and where appropriate, improve the wider environment."*
- *"9.45 Consideration should also be given to the protection of groundwater from areas of contamination, in particular where source protection zones (SPZs) are present. Reference should be made to the Environment Agency's Groundwater Protection: Principals and Practice (GP3) document."*

1.2.12 Policy NE5 in the VALP states that:

- *"Development on or near land that is or may be affected by contamination will only be permitted where:*
  - *g. an appropriate Contaminated Land Assessment has been carried out as part of the application to identify any risks to human health, the natural environment or water quality.*
  - *h. where contamination is found which would pose an unacceptable risk to people's health, the natural environment or water quality, the council will impose a condition, if appropriate, to ensure the applicant undertakes a desktop study, and if required, an intrusive site investigation, remedial measures and a validation report to ensure*

that the site is suitable for the proposed use and that the development can safely proceed.

- *Remediation works will usually be carried out prior to first occupation or use of any part of the development. Required remediation methods will be secured through a planning condition."*

1.2.13 Specifically with respect to Agricultural Land the VALP states:

- *"9.50 The National Planning Policy Framework (NPPF) (2012) encourages Local Planning authorities to support economic development in rural areas. The NPPF (2012) sets out that poorer quality agricultural land should be prioritised for development over higher grades. The council's approach to site allocations as advised by the Housing and Economic Development Land Availability Assessment (2016) follows this advice. However a Local Plan policy approach is needed to safeguard any other agricultural land sites that come forward over the VALP period that could affect the best and most versatile agricultural land."*
- *"9.51 Agriculture still forms a significant economic sector in Aylesbury Vale in terms of land use, and a significant proportion of farmland in Aylesbury Vale is classified as the 'best and most versatile' (i.e. grades 1, 2 and 3a). Large areas of highest quality land will be afforded greatest protection. Conversely, a lot of the farmland that does not fall into these categories is sensitive for other reasons – in areas of flood risk, important landscapes and in and adjoining areas of biodiversity importance.*"

1.2.14 Policy NE7 in the VALP states:

- *"Subject to the development allocations set out in the VALP, the council will seek to protect the best and most versatile farmland for the longer term. Proposals involving development of agricultural land shall be accompanied by an assessment identifying the Grades (1 to 5) Agricultural Land Classification. Where development involving best and more versatile agricultural land (Grades 1, 2 and 3a) is proposed, those areas on site should be preferentially used as green open space and built structures avoided. Where significant development would result in the loss of best and more versatile agricultural land, planning consent will not be granted unless:*

  a) There are no otherwise suitable sites of poorer agricultural quality that can accommodate the development, and

  b) The benefits of the proposed development outweighs the harm resulting from the significant loss of agricultural land."

1.2.15 The Buckinghamshire Minerals and Waste Local Plan (MWLP) forms the land use planning strategy for minerals and waste development within the administrative area of Buckinghamshire County. With reference to the Buckinghamshire Minerals and Waste Local Plan 2016-2036[4], paragraph 4.15:

- *"The most significant primary resources in Buckinghamshire that warrant protection are the sand and gravel deposits situated in the southern half of the county, as these are the most economically viable and essential minerals. In addition the resources in the Great Ouse Valley east of Buckingham should also be safeguarded."*

1.2.16 The Site is located outside of the above areas of Buckinghamshire but is identified as being within a Minerals Safeguarding Area on the MWLP proposals map.

[4] Buckinghamshire Council (July 2019) Buckinghamshire Minerals and Waste Local Plan 2016-2036

1.2.17 In addition with reference to Map 2 in the MWLP indicates the proposed routes for HS2 and additional rail capacity:

Figure 10.1: Proximity of the Site to proposed rail routes

1.2.18 With reference to the Emerging Local Plan for Buckinghamshire[5], there are no details currently available which would have a bearing on this chapter of the Environmental Impact Assessment.

1.3 Assessment Methodology

1.3.1 The Preliminary Risk Assessment ('PRA') and Conceptual Site Model ('CSM') in this report was prepared in accordance with CLR11[6] (this has subsequently been replaced by Land contamination risk management (LCRM)[7] on the 8th of October 2020) based on information obtained as part of the desk study. Possible risks associated with potential sources of contamination and sensitive receptors identified have been qualitatively assessed following a source-pathway-receptor ('Pollutant Linkage') approach in accordance with current UK protocols.

1.3.2 A risk of harm may only exist where a plausible pollutant linkage is present, and where the quantity or concentration of a contaminant is sufficient to pose harm. Under the statutory definition in section 2.3 of the Construction Industry Research and Information Association (CIRIA) C552 (Rudland et al., 2001)[8] that sets out the risk-based approach to assessing contaminated land, a risk of contamination may only strictly exist where contaminants pose

[5] Buckinghamshire Council (2023) available on-line: https://www.buckinghamshire.gov.uk/planning-and-building-control/local-development-plans-info/buckinghamshire-local-plan/ [Accessed September 2023]

[6] Environment Agency (September 2004 withdrawn October 2020) Model Procedures for the management of land contamination (CLR11)

[7] Environment Agency (October 2020 updated April 2021) Land Contamination risk Management (LCRM)

a risk of harm to a receptor. The risk classification has been assessed in accordance with CIRIA C552 (Rudland et al., 2001)[8]. A summary of how the risks are derived and their definitions are presented in Tables 10.4 and 10.5.

1.3.3 The preliminary risks have been assessed and classified in accordance with the procedures in CIRIA C552 "Contaminated Land Risk Assessment, A Guide to Good Practice" and will form the baseline conditions. This document uses the following factors within the framework to determine the risk:

- Magnitude of potential consequence (severity) from exposure to contamination; and
- Magnitude of probability (likelihood) of exposure to contamination.

1.3.4 Tables 10.1 and 10.2 provide the definitions in accordance with CIRIA 552 for the various consequence and probability classifications.

Table 10.1: Classification of Consequences (CIRIA 552, 2001)

CLASSIFICATION	DEFINITION
Severe	Short term (acute) risk to human health likely to result in "significant harm" as defined in the Environmental Protection Act, Part IIA[9]. Short term risk of pollution of sensitive water resource (note: Water Resources Act contains no scope for considering significance of pollution). Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem (note: the definition of ecological systems within the Draft Circular on Contaminated Land DETR, 2000)[10]
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem, or organism forming part of such ecosystem. (Note: the definition of ecological systems within Draft Circular on Contaminated Land, DETR 2000)
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures, and services ("significant harm" as defined in the Draft Circular on Contaminated Land, DETR 2000). Damage to sensitive buildings, services, or the environment.
Minor	Harm, although not necessarily significant, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means of such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures, services.

Table 10.2: Classification of Probability (CIRIA 552, 2001)

CLASSIFICATION	DEFINITION

[8] Rudland et al (2001) CIRIA C552

[9] Her Majesty's Government (1990), Part IIA of the Environmental Protection Act 1990

[10] Department of the Environment, Transport and the Regions (DETR) (2000) Draft Circular on contaminated land.

High Likelihood	There is a pollution linkage and an event that either appears very likely in the short-term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution risk, and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place and is less likely in the shorter term.
Unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

1.3.5 The classifications for consequence and probability can be combined to produce a risk category ranging from "very low risk" to "very high risk", detailed in Table 10.3 below:

Table 10.3: Comparison of Consequence against Probability

		CONSEQUENCE			
PROBABILITY		**Severe**	**Medium**	**Mild**	**Minor**
	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate to Low Risk
	Likely	High Risk	Moderate Risk	Moderate to Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate to Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate to Low Risk	Low Risk	Very Low Risk	Very Low Risk

1.3.6 The possible actions for the various risk descriptors are given in Table 10.4 below:

Table 10.4: Description of the Classified Risks and Likely Action Required

RISK DESCRIPTOR	DEFINITION
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR there is evidence that severe harm to the designated receptor is currently happening. The risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.

High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) and remediation works may be necessary in the short term and are likely over longer term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk, and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	It is possible that harm could arise to a designated receptor for an identified hazard, but it is likely that this harm, if realised, would at worst be normally mild.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

1.3.7 Table 10.5 below provides a comparison between the risk descriptors derived using the C552 framework and the significance criteria used in this Environmental Statement:

Table 10.5: Description of the Classified Risks and Likely Action Required

RISK DESCRIPTOR	SIGNIFICANCE CRITERIA FOR ENVIRONMENTAL STATEMENT
Very high or high risks remaining on site	Major Adverse
Moderate risks remaining on site	Moderate Adverse
Low risks remaining on site	Minor Adverse
Very low risks remaining on site / removal of very low risks	Negligible
Removal of low risks	Minor Beneficial
Removal of moderate risks	Moderate Beneficial
Removal of very high or high risks	Major Beneficial

1.4 Baseline Conditions

1.4.1 This assessment of baseline conditions has been undertaken with reference to a Landmark Sitecheck, Reference: 307024616, dated 10th February 2023 and publicly available data and information.

1.4.2 The site can be accessed from Hogshaw Road, which runs in a south-western direction from the village of Granborough and is located on the south-eastern boundary of the Site.

1.4.3 Claydon Brook runs along the majority of the western border of the Site.

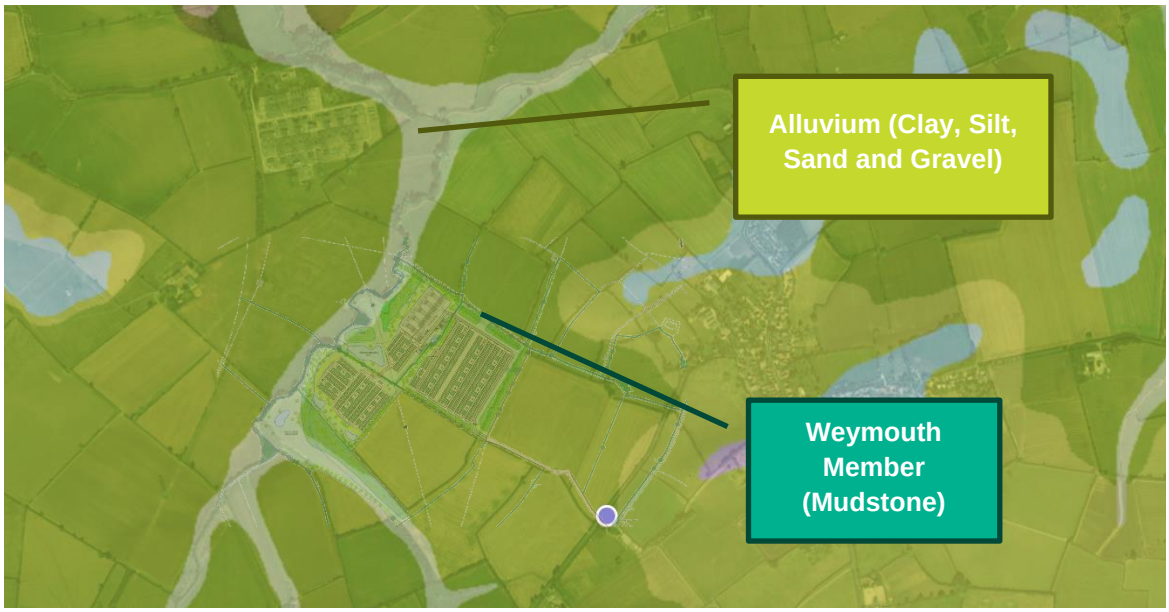
1.4.4 The majority of the Site was covered by a patchwork of agricultural fields, bordered by hedge rows. Numerous semi-mature and mature trees are present on-site, particularly bordering Claydon Brook.

1.4.5 Claydon Sub-Station is located to the northwest of the Site.

1.4.6 Powerlines run across the far northern part of the Site in an east-west direction and in a northwest-southeast direction through the centre of the Site.

1.4.7 The bedrock geology across the majority of the Site is anticipated to consist of the Mudstone of the Weymouth Member according to the BGS 1:50,000 maps (source BGS GeoIndex[11]). Superficial Deposits of Alluvium (Clay, Silt, Sand and Gravel) are anticipated to overlie the Weymouth Member along the line of the Claydon Brook, as detailed in the BGS 1:50,000 maps – see Figure 10.2 below.

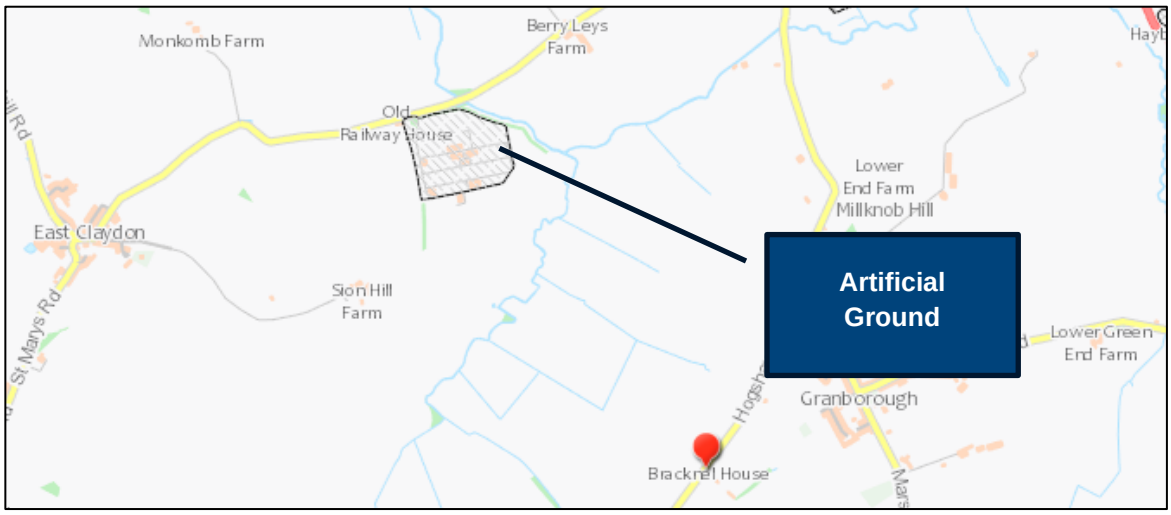
Figure 10.2: BGS 1:50,000 map extract of superficial and bedrock geology layers



1.4.8 As detailed in the BGS 1:50,000 maps, no artificial ground is located on the Site, although Claydon Sub-Station, on the north-western border of the Site, is underlain by artificial ground – see Figure 10.3 below.

[11] British Geological Society (2023) BGS GeoIndex Onshore https://mapapps2.bgs.ac.uk/geoindex/home.html [Accessed September 2023]

Figure 10.3: BGS 1:50,000 map extract of artificial ground layers



1.4.9 The Weymouth Member, which covers the majority of the Site, is considered to be unproductive strata (source BGS GeoIndex). Unproductive strata are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.

1.4.10 The Alluvium overlying the Weymouth Member is classified as a Secondary A aquifer (source BGS GeoIndex). Secondary A aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers.

1.4.11 No part of the Site is in a Source Protection Zone.

1.4.12 There are no publicly available historic borehole records (source BGS GeoIndex) to confirm the geology across the Site.

1.4.13 The Site has no Post 1988 Agricultural Land Classification, but the Pre-1988 Provisional Agricultural Land Classification grades the majority of the Site as Grade 4 (source DEFRA Magic Maps)[12]. This is considered as poor-quality agricultural land and land included within this grade suffers severe limitations that significantly restrict the range and/or yield of crops to be grown.

1.4.14 The LANDIS Soilscape classification[13] for the Site is 18, described as slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.

1.4.15 A review of publicly available historic maps (source Old Maps[14] and Google Earth[15]) reveals that the land use on the Site itself and the surrounding area more widely, has remained as agricultural fields since 1898, with the exception of the building of Claydon Sub-Station on the north-western boundary of the Site which was built after 1945.

[12] DEFRA (2023) Magic Maps Web viewer https://magic.defra.gov.uk/magicmap.aspx [Accessed September 2023]

[13] LANDIS (2023) LANDIS Website http://www.landis.org.uk/soilscapes/ [Accessed September 2023]

[14] Old Maps Online (2023) Old Maps Website https://www.oldmapsonline.org/ [Accessed September 2023]

[15] Google Earth (2023) Google Earth Application [Accessed September 2023]

1.5 Assessment of Impacts

1.5.1 Possible sources of contamination have been identified in Table 10.6, through an assessment of publicly available information and taking into account the likely contaminants produced by the nearby land-uses.

Table 10.6: Description of the Possible Classified Risks

Source	Description	Contaminants
Made Ground, shallow soils	The general quality of Made Ground and shallow soils could be impacted by the presence of contamination. Made Ground is considered to be most likely around East Claydon substation, but areas of Made Ground elsewhere on the Site cannot be totally ruled out until a more detailed Desk Study or Ground Investigation is undertaken. Any contaminants impacting shallow soils are likely to originate from the agricultural/farming use of the site.	Until the extent of the Made Ground is identified, there is a possibility that elevated concentrations of metals, metalloids, PCB's, TPH and PAH compounds, and ACMs could be present around East Claydon Substation. Herbicides, pesticides, and fertilisers (Nitrates) could be found in shallow soils across the majority of the Site.
Naturally Occurring Aggressive Ground Conditions	Naturally occurring compounds in the Weymouth Member could occur which could damage buried concrete.	Possible elevated sulphate, pyrite, and gypsum concentrations.
Ground Gases/Vapours	Deeper areas of Made Ground around East Claydon Substation may be present. A risk is only considered to be present if highly organic or volatile contaminants within Made Ground of fill materials are present.	Possible presence of ground gases such as methane and carbon dioxide together with depleted oxygen, trace gases and elevated volatile organic compounds, most likely to be localised in the area near East Claydon Substation.

1.5.2 The plausible pathways are summarised in Table 10.7 below. These pathways are based on the proposed end use.

Table 10.7: Possible Contamination Pathways

Pathway	Description
Direct Contact	Ingestion of soil particles, ingestion and bioaccumulation in vegetables/fruit and inhalation of soil derived dust (including tracked back dust), dermal contact.
Inhalation	Inhalation of soil dust both inside and outside of buildings.
Vertical & Lateral Migration	Contaminant movement both vertically through leaching/gravity and horizontally along preferential pathways, e.g., services trenches, or with groundwater.

Root Uptake	Uptake of soil and waterborne contaminants by plants.
Chemical Attack	Attack of buried plastics and concrete by aggressive ground conditions.

1.5.3 Potential receptors associated with the Site and its development are summarised in Table 10.8 below:

Table 10.8: Possible Receptors of Contamination

Receptor	Description	Comments
Site Workers	Persons involved in construction and future maintenance of the proposed development.	Ground Workers/Maintenance Staff could become exposed during site clearance, construction, future operations and maintenance.
Built Environment	Buried concrete for foundations and plastics for pipes and cables may be laid in contact with contaminated soils.	Aggressive ground conditions[16] and depths of Made Ground may be present beneath the Site.
Adjacent Land Users	Sensitive land uses[17] identified within the immediate vicinity.	Adjacent land uses surrounding the Site are mostly comprised of agricultural land and agricultural workers are most likely adjacent users to be affected by any contamination. However, contamination could also be tracked onto roads passing through residential developments impacting local residents.
Groundwater	Controlled Waters contained within the aquifer(s) beneath the Site.	The part of the Site near the Claydon Brook overlies a Secondary 'A' Aquifer. The Site is not situated within an SPZ.
Surface Water	Controlled Waters within rivers and drainage channels.	The Claydon Brook runs along the western border of the Site and drainage channels may be present across the Site.

1.5.4 Whilst the above sources and receptors have been identified, Table 10.9 summarises the identified plausible pollution linkages and a qualitative assessment of the risks for each receptor based on the desk study research.

[16] "Aggressive ground conditions" is a term that refers to the chemicals that may be present that could impact on concrete and other buried services. These could include higher levels of sulphates, magnesium and/or more acidic pH levels contained in the soil.

[17] Sensitive Land Use can refer to buildings, amenity areas, or outdoor spaces (such as agricultural land) where routine or normal activities occurring at reasonably expected times would experience one or more adverse effects from contaminant discharges from the construction or operation of a new development. Sensitive land uses may be both part of the natural or built environment.

Table 10.9: Classification of Risk for Impact on Each Receptor

Potential Source/ media	Potential Receptors	Potential Pathways	Likelihood	Severity	Risk and Justification
Made Ground and shallow soils	End users	Direct Contact, Inhalation	Low	Mild	**Low** Future users are likely to come into contact with soils via direct contact or tracked back into any Site buildings. Suitable topsoil may or may not be currently present on-site, any imported soils must be of suitable chemical and physical quality for the proposed end use.
	Adjacent land users	Direct Contact, Inhalation	Low	Minor	**Very Low** Adjacent site users are at a very low risk of coming into contact with affected soils on-site. Additionally, natural soils are not anticipated to represent a risk of harm to human health.
	Pipes and Cables	Chemical Attack	Low	Mild	**Low** Pipes and Cables are likely to be placed in natural soils, however, there is a risk of aggressive soils being present in the Weymouth Member.
	Buildings and infrastructure	Chemical Attack	Low	Mild	**Low** Foundations and utilities will be placed within natural soils. however, locally deeper areas of Made Ground cannot be wholly ruled out and may be present. There is a risk of aggressive soils

					being present in the Weymouth Member.
	Groundwater	Vertical & Lateral Migration	Unlikely	Minor	**Very Low** The Weymouth Member beneath the Site is classified as Unproductive Strata and shallow groundwater is unlikely to be present. However, the Alluvium overlying the Weymouth Member along the route of the Claydon Brook is classified as a Secondary 'A' Aquifer and groundwater is likely to be present.
	Surface Water	Lateral Migration	Unlikely	Minor	**Very Low** The Claydon Brook runs along the western border of the Site and drainage channels may be present across the Site.
Naturally occurring aggressive ground conditions	Pipes and Cables	Chemical Attack	Low	Mild	**Low** Pipes and Cables are likely to be placed in natural soils, however, there is a risk of aggressive soils being present in the Weymouth Member.

	Buildings and infra-structure	Chemical Attack	Low	Mild	**Low** The Weymouth Member may contain elevated concentrations of sulphate, pyrite, and gypsum. The concrete class for subsurface concrete may need to be sulphate resisting.
Ground gases/ Vapours	End Users	Inhalation	Unlikely	Mild	**Very Low** Extensive putrescible material would be necessary in any Made Ground for significant ground gas production, and this is not anticipated.
	Adjacent land users	Inhalation	Unlikely	Minor	**Very Low** Adjacent site users are unlikely to be adversely affected by ground gases originating on the Site.
	Buildings and infrastructure	Gas Accumulation and Potential Explosion of Flammable Gases	Unlikely	Mild	**Very Low** Extensive putrescible material would be necessary in any Made Ground for significant ground gas production, and this is not anticipated. Flow paths within the Weymouth Member are also likely to be limited.

1.5.5 In addition to contamination risks, the following factors that might impact the geotechnical condition of the Site have been considered. Hazards identified as being potentially present on Site could have implications for foundation design and construction and a summary of commonly occurring geotechnical hazards is given in the following table:

Table 10.10: Possible Geotechnical Hazard

Geotechnical Hazard	Probability	Engineering Implications
Lateral changes in ground conditions	Likely	Variable ground conditions posed by the Alluvium along the route of the Claydon Brook may affect foundation design, construction, and zoning.
Shrinkable soils	High	The Weymouth Member has predominately high plasticity.
Significant depths of Made Ground	Low	Made Ground may be present in the area around East Claydon Substation and cannot be ruled out in pockets across the Site until a more detailed Desk Study and Ground Investigation has been undertaken.
Aggressive chemical ground conditions	Likely	The possible presence of sulphate, pyrite and gypsum within the underlying Weymouth Member may cause aggressive ground conditions impacting foundation design and construction.
Shallow Groundwater	Likely	Due to the Secondary 'A' aquifer designation of the Alluvium, overlying the Weymouth Member along the route of the Claydon Brook, the presence of shallow groundwater is considered to be likely.
Potential for dissolution features	Negligible	Soluble or prone to dissolution rocks are not thought to be present beneath the Site

1.5.6 An agricultural land assessment has been undertaken and the land has been graded as 3b.

1.6 Mitigation

1.6.1 Further mitigation may be possible for the Site, the applicant will include provision for the following scope of works:

- Pre-construction intrusive investigation works to confirm predicted geotechnical and geo-environmental conditions onsite. Should these investigations justify, the following will be undertaken:
  - Soil and groundwater (if encountered) sampling and analysis to inform subsequent geotechnical and geo-environmental risk assessment.
  - Ground gas monitoring and assessment to characterise the Site's ground gas regime in areas where buildings are to be located
  - Laboratory analysis, on soil samples recovered from the exploratory holes for a range of geotechnical parameters to support foundation design and the like.
  - Laboratory analysis, on shallow soil samples and groundwater samples recovered from the exploratory holes, for an analytical suite to include the potential contaminants identified within the desk study and encountered during any intrusive investigation. The suite should include commonly occurring metals, non-metals, asbestos, PCB's TPH, and PAH in the areas near East Claydon

Substation, as well as pesticides which may have been used in an agricultural setting across the rest of the Site.

- Waste Acceptance Criteria testing may be required if there is any surplus spoil to be disposed of from the development (noted that this is not currently planned).
- Geotechnical testing to determine the level of volume change potential in the Weymouth Member in order to provide data for the design of foundations for any buildings and infrastructure on the Site, as well as to ascertain whether aggressive chemical ground conditions are present so that appropriate protection can be designed for cables, ducting and pipes.

1.6.2 There is a low risk that it may be necessary to undertake remediation/risk mitigation measures on this Site to break pollutant linkages and thus protect key receptors such as human health, controlled waters, built environment, soft landscaping, and the like. The requirement and extent of any such remediation cannot be determined until such time as an intrusive investigation and associated testing has been completed.

1.7 Residual Impacts and Conclusions

1.7.1 The potential effects, additional mitigation, residual effects and monitoring has been split between the Construction and Operational phases of the project:

Construction Phase

1.7.2 During the construction phase it is considered that the overall risk to receptors from potential contamination across the whole of the Site is 'low'.

Table 10.11: Assessment of potential effects, additional mitigation, residual effects and monitoring during construction – Site Workers

Sensitive receptor	Site Workers
Potential effects	**Low** During the construction phase of the proposed development construction workers may be exposed through dermal contact, ingestion and inhalation pathways. This effect is considered to be **Minor Adverse**.
Additional mitigation	Construction workers on-site will require adequate Personal Protective Equipment (PPE). This is likely to comprise standard PPE as a minimum, which will include hand protection and safety footwear to mitigate the effects of ground contamination. However, the Main Contractor will undertake further risk assessments and provide additional PPE such as dust masks and eye protection and/or respiratory protective equipment (RPE) which may be required for certain tasks. In addition, the risk assessments should be used to develop and formalise safe systems of work. Whilst this is considered a very low risk on this Site, caution will be taken during construction with regards to asbestos within any pockets of Made Ground and an 'Asbestos Management Plan' will be written by an accredited asbestos specialist, to mitigate the risks to construction and maintenance workers. Hand scavenging of asbestos fragments is unlikely to be feasible due to its sporadic and dispersed nature.

	A Construction Environmental Management Plan (CEMP) will be drawn up to cover the construction stage. The CEMP will consider all relevant areas of environmental management during the construction phase.
Residual effects and monitoring	A Discovery Strategy will be employed during construction. Should previously undiscovered contamination or unforeseen ground conditions be encountered during construction by the ground worker's, this should be reported to the Site manager immediately in order that the consultant is notified. Where deemed necessary, the consultant shall attend the Site to inspect the unexpected soil conditions and provide recommendations on the further actions required, if any. Where necessary the regulatory authority should be informed. Post any additional investigation or laboratory testing the results and any proposed remedial measures should be reported to the regulatory authority for consent, before proceeding or implementing the remedial measures. Implementation of proposed mitigation measures reduce the risk to be **Negligible**.

Table 10.12: Assessment of potential effects, additional mitigation, residual effects and monitoring during construction – Adjacent Land Users

Sensitive receptor	**Adjacent Land Users**
Potential effects	**Very Low** Dust and soils generated, particularly during the early phases of the construction works could potentially migrate off-site. Such dust and soils, without any mitigation measures, could potentially include substances deleterious to human health. The effect is considered to be of **Negligible** significance.
Additional mitigation	A Construction Environmental Management Plan (CEMP) will be drawn up to cover the construction stage. The CEMP will consider all relevant areas of environmental management during the construction phase. As part of this, measures will be employed to mitigate the generation of dust such as damping down on-site and wheel wash or road sweepers to limit the tracking of dust onto neighbouring roads. The height of soil stockpiles will be controlled to minimise wind erosion. Contaminated material and any other material to be removed off-site to be disposed of in accordance with the Environmental Protection Act section 34 and the Environmental Protection (Duty of Care) Regulations 1991. All off-site material movements should be undertaken in self-sheeting wagons with sheeting completed prior to leaving the Site.
Residual effects and monitoring	There is likely to be no change to the effects after additional mitigation. Implementation of these measures would maintain the risk as **Negligible**.

Table 10.13: Assessment of potential effects, additional mitigation, residual effects and monitoring during construction – Groundwater

Sensitive receptor	Groundwater
Potential effects	**Very Low** Spillages on-site could migrate to groundwater - this would only impact the parts of the Site where the Alluvium is present along the route of the Claydon Brook. The Alluvium is classified as Secondary A aquifer, however, the Weymouth Member which is beneath the majority of the Site is classified as unproductive strata and groundwater would not be present. This effect is considered to be **Minor Adverse**.
Additional mitigation	A Construction Environmental Management Plan (CEMP) will be drawn up to cover the construction stage. The CEMP will consider all relevant areas of environmental management during the construction phase, which would include bunding of fuel storage areas. As part of the CEMP a borehole management scheme, to manage the potential pathways that would be created, will be required.
Residual effects and monitoring	There is a small risk of spillages on-site impacting groundwater during the construction phase. As part of any further investigation strategy, ground water monitoring wells should be installed in the Alluvium on the Site. These should be undertaken in the pre-construction phase, and chemical samples obtained to assess and provide a baseline of the water quality, and these should be monitored periodically throughout the construction phase and on completion of the Development. Implementation of these measures would reduce the risk to be **Negligible**.

Table 10.14: Assessment of potential effects, additional mitigation, residual effects and monitoring during construction – Surface Water

Sensitive receptor	Surface Water
Potential effects	**Very Low** Spillages on-site and the production of silt during ground works could migrate to the surface water that was identified on-site, in the form of the Claydon Brook and any drainage ditches running across the Site. This effect is considered to be **Minor Adverse**.
Additional mitigation	A Construction Environmental Management Plan (CEMP) will be drawn up to cover the construction stage. The CEMP will consider all relevant areas of environmental management during the construction phase, which would include bunding of fuel storage areas, and could include silt protection barriers. As part of this, a surface water management strategy will be created to manage Site run-off.
Residual effects and monitoring	There is a small risk of spillages on-site impacting surface water during the construction phase. As part of any further investigation strategy, samples from surface water should be obtained from Site. These should be undertaken in the pre-construction phase, and chemical samples obtained to assess and provide a baseline of the water quality, and these should be monitored periodically throughout the construction phase and on

	completion of the Development. Implementation of these mitigation measures would reduce the risk to be **Negligible**.

1.7.3 In conclusion, during the construction phase, subject to mitigation measures being adopted, any risks to Site Workers, Adjacent Land Users, Groundwater and Surface Water are anticipated to be "Negligible" - only very low risks will remain on site / very low risks will have been removed.

Operational Phase

1.7.4 During the operational phase, it is considered that the overall risk to receptors from potential contamination across the whole of the Site is low.

Table 10.15: Assessment of potential effects, additional mitigation, residual effects and monitoring during operation – End Users

Sensitive receptor	End Users
Potential effects	**Low/Very Low** Future users are likely to come into contact with soils via direct contact during maintenance of the Battery Energy Storage System or tracked back into the building. Suitable topsoil may or may not be currently present at certain locations and any imported soils must be of suitable chemical and physical quality for the proposed end use. There is a potential for end-users to be impacted by ground gases if these are present on the Site. This effect is considered to be **Minor Adverse**.
Additional mitigation	Additional ground investigation will be undertaken to assess the ground conditions on the Site and ground gas monitoring undertaken to fully characterise the risk from ground gases those areas where buildings are to be located. Following this investigation, remediation may be required, which could include removal of made ground soils, ground gas protection measures or the appropriate selection of cables, ducting and pipes.
Residual effects and monitoring	Additional ground gas monitoring could be required for some parts of the Site and ground gas protection measures installed. The implementation of these measure and the removal of any potential hotspots of contamination would reduce the risk to be **Minor Beneficial.**

Table 10.16: Assessment of potential effects, additional mitigation, residual effects and monitoring during construction – Built Environment

Sensitive receptor	Built Environment
Potential effects	**Low/Very Low** There could be a risk of damage to foundations and infrastructure as the Weymouth Member may contain elevated concentrations of sulphate, pyrite, and gypsum. This effect is considered to be **Minor Adverse**.

Additional mitigation	Additional ground investigation will be undertaken to provide a more comprehensive coverage of the Site to allow designers to assess whether the concrete class for foundations may need to be sulphate resisting, barrier pipe required for water utilities etc.
Residual effects and monitoring	Assessing the appropriate concrete class for foundations and assessing whether barrier pipe is required for water utilities etc would lower the effect on the built environment. Implementation of these measures would reduce the risk to be **Minor Beneficial**.

1.7.5 In conclusion, during the Operational phase, subject to mitigation measures being adopted, any risks to End Users and the Built Environment are anticipated to be “Minor Beneficial” - low risks will have been removed.

1.8 Cumulative Impacts

1.8.1 With reference to Figure 10.1, the proposed rail schemes are located so far away from the Site location that any impact on ground conditions from these schemes can be entirely ruled out.

1.8.2 The proposed Tuckey Solar Farm[18] (application ref: 19/00983/APP) is located circa 360m to the north of the northernmost boundary of the Site and the proposed Rosefield Solar Farm[19] is circa 2.6 km to the southwest of the Site.

Figure 10.4: Location of other developments to the Site

[18] Scottish Power (2023) Scottish Power Renewables website https://www.scottishpowerrenewables.com/pages/tuckey_farm_solar_pv_scheme.aspx [Accessed September 2023]

[19] Rosefield Solar Farm (2023) Rosefield Solar Farm website https://rosefieldsolarfarm.co.uk/Rosefield-Consultation-Booklet.pdf [Accessed November 2023]

1.8.3 It is unlikely that these developments would have any impact on the ground conditions on this Site, with a Very Low risk of dust and soils generated, particularly during the early phases of the construction works, could potentially migrate off the adjacent Tuckey Solar Farm and Rosefield Solar Farm sites. This could be mitigated if the measures outlined in Table 10.12 above are implemented on the Tuckey Solar Farm and Rosefield Solar Farm sites.

1.8.4 It is understood that the East Claydon National Grid Substation is to be expanded to facilitate the installation and commissioning of a new Grid Supply Point and to refurbish parts of the existing station. It is not known at this stage whether the footprint of the existing substation will be expanded. East Claydon National Grid Substation is built on artificial ground, as detailed in the BGS 1:50,000 maps and there is a Low Risk of dust and soils generated, particularly during the early phases of any construction works, could potentially migrate off the Tuckey Solar Farm and Rosefield Solar Farm sites. This could be mitigated if the measures outlined in Table 10.12 above are implemented on the East Claydon National Grid Substation site. At present there is no detail on the scale or form of the extension of the National Grid Substation currently available.

1.9 Summary

1.9.1 It is considered that the overall risk to receptors from potential contamination across the whole of the Site is 'Low' to ‘Very Low’ and that no widespread contamination is likely on the Site. The residual risk is anticipated to be “Negligible”, only very low risks will remain on site / very low risks will have been removed.

1.9.2 As data has been gathered from publicly available sources and no ground investigation has as yet been undertaken, it cannot be wholly ruled out that there may be hotspots of contamination and areas with elevated levels of ground gas, especially in the area of the Site adjacent to East Claydon Substation.

1.9.3 There is a risk of contamination being introduced/impacting adjacent site users during the construction phase. The risk of this is considered to be 'Low' to ‘Very Low’ and can be avoided with adherence to the recommended mitigation measures. The residual risk is anticipated to be “Negligible”, only very low risks will remain on site / very low risks will have been removed.

1.9.4 As the majority of the Site is on unproductive strata, there is a ‘Very Low’ risk to groundwater, but only the area of the Site adjacent to the Claydon Brook which could be avoided with adherence to the recommended mitigation measures. The residual risk is anticipated to be “Negligible”, only very low risks will remain on site / very low risks will have been removed.

1.9.5 The only sources of surface water are the Claydon Brook and drainage ditches on the Site. There is a ‘Very Low’ risk to these receptors which could be avoided with adherence to the recommended mitigation measures. The residual risk is anticipated to be “Negligible”, only very low risks will remain on site / very low risks will have been removed.

1.9.6 Once development has been completed, no significant residual effects should remain, if contamination issues are identified these will need to be remediated in the construction phase. The residual risk is anticipated to be “Minor Beneficial”, low risks will have been removed from the site.

1.9.7 The greatest geotechnical risk on the Site is likely to come from the anticipated high shrinkability of the Weymouth Member. Geotechnical testing should be undertaking to determine the level of volume change potential in the Weymouth Member in order to provide data for the design of foundations for any buildings and infrastructure on the Site.

1.9.8 Geotechnical testing should also be undertaken to ascertain whether aggressive chemical ground conditions are present so that appropriate protection can be designed for cables, ducting and pipes. The residual risk is anticipated to be “Minor Beneficial”, low risks will have been removed from the site.

1.9.9 The cumulative impacts to the ground conditions on the Site from nearby development are “Low” to “Very Low”. The residual risk is anticipated to be “Negligible”, only very low risks will remain on site / very low risks will have been removed.

Table 10.17 – Summary of Effects

Receptor	Potential Effects	Significance of Effects Prior to Mitigation/ Enhancement	Additional Mitigation	Residual Effects	Monitoring
Construction Phase					
Site Workers	During the construction phase of the proposed development construction workers may be exposed through dermal contact, ingestion and inhalation pathways.	**Minor Adverse** T / D / MT	Construction workers on-site will require adequate Personal Protective Equipment (PPE). The Main Contractor should undertake further risk assessments and additional PPE may be required for certain tasks. Risk assessments should be used to develop and formalise safe systems of work. A Construction Environmental Management Plan (CEMP) will be drawn up to cover the construction stage.	There may be some isolated hotspots of contamination on the site, that could be discovered during the construction phase. **Negligible** **[Not Significant]** T / D / MT	A Discovery Strategy should be employed during construction.
Adjacent Land Users	Dust and soils generated, particularly during the early phases of the construction works could potentially migrate off-site. Such dust and soils, without any mitigation measures, could potentially include substances deleterious to human health.	**Negligible** T / D / MT	A Construction Environmental Management Plan (CEMP) will be drawn up to cover the construction stage. Damping down on-site and wheel wash or road sweepers to limit the tracking of dust onto neighbouring roads should be employed The height of soil stockpiles should be controlled to minimise wind erosion. All off-site material movements should be undertaken in self-sheeting wagons with sheeting completed prior to leaving the Site	**Negligible** **[Not Significant]** T / D / MT	There is likely to be no change to the effects after additional mitigation.

Groundwater	Spillages on-site could migrate to groundwater - this would only impact the parts of the Site where the Alluvium is present along the route of the Claydon Brook. The Alluvium is classified as Secondary A aquifer, however, the Weymouth Member which is beneath the majority of the Site is classified as unproductive strata and groundwater would not be present.	**Minor Adverse** T / D / MT	A Construction Environmental Management Plan (CEMP) will be drawn up to cover the construction stage. As part of this a borehole management scheme, to manage the potential pathways that would be created, should be produced.	Spillages on-site could migrate to groundwater during the construction phase. **Negligible** **[Not Significant]** T / D / MT	As part of any further investigation strategy, ground water monitoring wells should be installed in the Alluvium across the Site and samples taken to provide a baseline of the water quality.
Surface Water	Spillages on-site could migrate to the surface water was identified on-site in the form of Claydon Brook, drainage ditches and streams.	**Minor Adverse** T / D / MT	A Construction Environmental Management Plan (CEMP) will be drawn up to cover the construction stage. As part of this a surface water management strategy will be created to manage Site run-off.	Spillages on-site could migrate to surface water during the construction phase.. **Negligible** **[Not Significant]** T / D / MT	As part of any further investigation strategy, samples from surface water should be obtained from Site to provide a baseline of the water quality.
Operational Phase					
End Users	Future users are likely to come into contact with soils via direct contact	**Minor Adverse** P / D / LT	Additional ground investigation should be undertaken to provide a more comprehensive coverage of the Site. Following this investigation, remediation maybe required.	There may be a small risk of ground gas in	Additional ground gas monitoring could be required for some parts of the site and ground gas protection measures installed.

	during maintenance of the Battery Energy Storage System or tracked back into the building. There is a potential for end-users to be impacted by ground gases if these are present on the Site.			some parts of the site. **Minor Beneficial** **[Not Significant]** P / D / LT	
Built Environment	There could be a risk of damage to foundations and infrastructure as the Weymouth Member may contain elevated concentrations of sulphate, pyrite, and gypsum.	**Minor Adverse** P / D / LT	Additional ground investigation should be undertaken to provide a more comprehensive coverage of the Site to allow designers to assess whether the concrete mix for foundations may need to be sulphate resisting, barrier pipe required for water utilities etc.	**Minor Beneficial** **[Not Significant]** P / D / LT	There is likely to be no change to the effects after additional mitigation.

Key to table:

P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable