BESS and Substation – Preliminary Geotechnical Risk Register (Tracked)

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Schedule of Changes

Revision	Section Reference	Description of Changes	Reason for Revision
2	Section 1.3	Updated in relation to the BESS piling foundations.	Updated in response to EA comment on submissions at Deadline 2 of Examination.
	Table 4.2	Updates to the consequence section of the preliminary geotechnical risk register.	Updated in response to EA comment on submissions at Deadline 2 of Examination.

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BESS and Substation - Preliminary Geotechnical Risk Register

Lime Down Solar Farm

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LIMITATION

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Unless otherwise stated in this report, the assessments made assume that the site and facilities will continue to be used for their current purpose without significant change. The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested. Information obtained from third parties has not been independently verified by Geosyntec, unless otherwise stated in the report. Geosyntec do not claim responsibility for inaccuracies presented by third party data.

The report refers to the conditions present at the Site at the time of the study and no liability can be accepted by Geosyntec for any future changes of Site conditions whether by natural processes or human intervention. It should be noted that exploratory points such as trial pits and boreholes only provide information on a relatively limited volume of soil Superficial Deposits, Bedrock Geology or groundwater. In general, the ground conditions encountered may be considered representative, but the possibility exists for variations in ground conditions between exploratory points that have not been disclosed by the investigation and could not therefore be taken into account in this report.

Where assessments of works or costs required to reduce or mitigate any environmental liability identified in this report are made, such assessments are based upon the information available at the time and may be subject to further investigations or information which may become available. It is therefore possible that cost estimates, where provided, may vary outside stated ranges. Where assessments of works or costs necessary to achieve compliance have been made these are based upon measures which, in Geosyntec's experience could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a pro-active and reasonable approach by site management.

The geotechnical risk register presented is preliminary and high level only. Additional refinement of the risk register including mitigation will be required as the project progresses. Interpretations and conclusions determined from this report are subject to final design, loads, settlement tolerances, depth and construction method of the project infrastructure. The ground conditions and limiting hazards should be reviewed once design information is finalised.

TABLE OF CONTENTS

TABLES

APPENDICES

Drawing Number	Description
26008710-GEOS-LDSF-HDD-D-G-3001	Exploratory Hole Location Plan
26008710-GEOS-LDSF-HDD-D-G-3002	BESS & Substations Section A-A′
26008710-GEOS-LDSF-HDD-D-G-3003	BESS & Substations Section B-B′
26008710-GEOS-LDSF-HDD-D-G-3004	BESS & Substations Section C-C′
26008710-GEOS-LDSF-HDD-D-G-3005	BESS & Substations Section D-D′
26008710-GEOS-LDSF-HDD-D-G-3006	BGS 1:50,000 Superficial and Bedrock Geology

1 INTRODUCTION

1.1 General

Geosyntec have been commissioned by Lime Down Solar Park Ltd (the "Client") to prepare a Preliminary Geotechnical Risk Register (PGRR) for the Battery Energy Storage System (BESS) and Substation (the Site) which connect the 'Cable Route Corridor' from the Lime Down solar farm to the Existing National Grid Melksham Substation. The purpose of the PGRR is to inform the Client of areas of potential concern with respect to geotechnical hazards beneath or within influencing distance of the Site or hazards influenced by the proposed works. The PGRR will seek to provide an assessment of the impact of geotechnical hazards at the proposed development. The Site location can be found on drawing 26008710-GEOS-LDSF-HDD-D-G-3001 within Appendix A.

1.2 Scheme Description

The proposed scope of works is the development of a new solar farm with ancillary infrastructure and associated cable route to feed into the existing National Grid Melksham Substation. The cable is anticipated to be trenched at shallow depths (understood to be up to 2m of excavation as per **ES Volume 1, Chapter 3: The Scheme [APP-055])** apart from key crossings at the Avoidance Areas, which are locations where trenchless technologies rather than open cut trenches will be used to avoid environmental receptors or engineering constraints within the Cable Route Corridor.

1.3 BESS and Substation

The PGRR has been produced for the Battery Energy Storage System (BESS) and Substation located northeast of Hullavington and centred approximately on National Grid Reference (NGR) 388440,183362. It is understood the BESS facility will be piled to a maximum of 4m and substations will be piled to a maximum of 12m. No loads have been provided.

Driven piles should be suitable through the weathered mudstone however may refuse on hard beds. The skin friction supplied from the mudstone is unknown at this stage however it is possible the end bearing resistance will be suitable. Alternates to deep driven piles include shallow micro-piles and ground improvement such as vibro-stone columns. Bored piles would be preferred if founding on the Principal Aquifer. Shallow foundations should be considered once loads of the proposed development are known and ground strength data is available.

2 SOURCES OF INFORMATION

Geosyntec have consulted with the sources of information presented within Section 6. The interpretation and conclusions drawn by Geosyntec are based on the acceptance of accurate information provided by third parties. Geosyntec do not accept liability for any inaccurate information supplied by third parties.

3 GROUND MODEL

A high-level ground model is provided as Table 3.1 and is based on the information supplied in the data listed in Section 6 and the desk study reports. Soil and engineering descriptions were developed using British Geological Survey (BGS) data and borehole logs, these descriptions/depths/thicknesses are indicative only and will require updating after intrusive investigations.

Depth ranges were derived using BGS boreholes. Where strata's are not encountered on available boreholes, depths were established using publicly available geological maps. Note that mapped superficial deposits are absent from the majority of the Site. It is anticipated that the upper stratum will be completely weathered to a clay, becoming rock strength at relatively shallow depths.

The cross sections are presented as Appendix B; the depths are limited to a maximum depth extent of 20m BGL to support the pile risk assessment. The cross sections include boreholes within a 1500m buffer of the BESS and Substation sites on account of poorly available information. Four sections have been produced which encompass the four main areas of development.

Table 3.1, Ground Model

Group	Formation	Description	Engineering Description	Depth Range (m BGL)
Superficial	Alluvium	Slightly gravelly sandy clay/ silt. With varying proportions of gravel and sand. Soft to firm heterogeneous consolidated and compressible and possibly prone to shrink swell behaviour. Confined locally to the existing river system.	Slightly gravelly sandy clay/ silt.	0.3-2.5
Superficial	Head	A poorly sorted mixture of angular gravel, sand, clay and silt. Formed due to solifluction (i.e. viscous flow downhill) or gelifluction (ground movements caused by melting ice within soil) processes. Heterogeneous compressible soil with anisotropic strength conditions. Possibility of relict shear surfaces and shallow perched water. Up to 3m in thickness.	Undifferentiated gravel, sand, clay and silt.	Unknown
Ancholme Group	Oxford Clay Formation (OXC)	The formation comprises slightly silty silicate mudstone with beds of limestone nodules, present locally in the east of Site. It is typically recovered as, or weathers to, a stiff, low-permeability clay—very stiff clay to very weak mudstone in less weathered zones—with hard limestone nodules and a variable weathering profile that can induce anisotropic strength conditions. The material generally contains low smectite content and may include very weak siltstone and calcareous types. Permeability is generally very low to low, with groundwater flow predominantly occurring through discontinuities or fissures. Up to 185m in thickness.	Very stiff clay to very weak mudstone. Weathers to fissured soft to stiff clay, typically with low smectite content. Permeability is generally very low to low with flow most commonly occurring through discontinuities / fissures. Includes very weak siltstone and calcareous types. Considered to be over-consolidated.	0-20 occurs in one hole to the east of the site (ST98SW2).

Group	Formation	Description	Engineering Description	Depth Range (m BGL)
Ancholme Group	Kellaways Clay Member (KLC)	Mid to dark grey mudstone weathering to a smooth pale grey clay. Commonly silty or sandy with lenticular beds of calcareous siltstone and sandstone. Localised to the eastern extent of the site. 21 to 25m thick. Not identified in the historical boreholes and therefore omitted from the cross sections however present within the Site area. High clay content which could be prone to shrink swell behaviour. Silty and sandy lenses within the unit could contain perched water. Heterogeneous strata producing anisotropic strength conditions.	Very stiff clay to very weak mudstone. Weathers to fissured soft to stiff clay. Stratum is susceptible to shrink-swell clay minerals. Permeability is generally very low to low with flow most commonly occurring through discontinuities / fissures. Includes very weak siltstone and calcareous types. Considered to be over-consolidated.	0.8-2.0
Great Oolite Group	Cornbrash Formation (CB)	'Rubbly and Shelly' fine grained poorly bedded limestone with a small proportion of peloids and grey beds of bioclastic mudstone with slight iron content. Beneath the central area of Site. Approximately 2-4m in thickness. Possibility of perched water table. Anisotropic strength conditions as layers of stiff clay and relatively hard rock interbedded.	Very weak to strong thickly to thinly bedded shelly fine to medium-grained oolitic limestone may contain sandstone or very stiff clay/very weak mudstone beds. Weathers to gravelly, calcareous sand. Low to very high permeability flow mainly through discontinuities but also through matrix.	0.0-4.15
Great Oolite Group	Forest Marble Formation - Mudstone (FMB)	Can be divided into two distinct parts. The basal unit is composed of lenticular flaggy bioclastic limestone and subordinate ooidal grainstone beds, generally not more than 10m thick. The upper part is dominated by mudstone with lenticular or impersistent limestone beds and is up to 21m thick (BGS, 2011) Present beneath the entirety of the Site. Ranging from stiff clay to hard rock (limestone) locally recrystallised. Interbedded layers and infilled burrows of mudstone clay and a variable weathering profile induce anisotropic strength conditions. More competent limestone and Oolitic layers dominate with increased depth.	**Mudstones:** Very stiff clay to very weak mudstone. Weathers to fissured soft to stiff clay. Stratum is susceptible to shrink-swell clay minerals. Permeability is generally very low to low with flow most commonly occurring through discontinuities / fissures. Includes very weak siltstone and calcareous types. Considered to be over-consolidated. **Limestones:** Very weak to strong thickly to thinly bedded shelly medium to coarse grained oolitic limestone may contain sandstone or very stiff clay/very weak mudstone beds. Weathers to gravelly, calcareous sand. Low to very high permeability flow mainly through discontinuities but also through matrix.	0.0-20.00

Group	Formation	Description	Engineering Description	Depth Range (m BGL)
Great Oolite Group	Chalfield Oolite Formation (CFDO)	Present at depth. Comprises Bath Oolite Member, Twinhoe Member and Coombe Down Oolite Member. Ranging from stiff clay (~mudstone) to hard rock (limestone) locally crystallised (~high unconfined compressive strength). Thick beds of highly fractured Oolite and limestone (~high transmissivity). Gull caves (caves formed by mass movement and solution induced expansion of joints) are common within the Great Oolite group.	Very weak to strong thickly to thinly bedded shelly medium to coarse grained oolitic limestone may contain sandstone or very stiff clay/very weak mudstone beds. Weathers to gravelly, calcareous sand. Low to very high permeability flow mainly through discontinuities but also through matrix.	3.0-20.00

3.1 Structural Geology

There are three (3) geological faults intersecting the cross sections as presented in Table 3.2 below and the specified cross sections. Whilst faults are present on the cross sections and within the wider Site area, their surface expressions do not appear to intersect the proposed BESS and Substation areas. Faulting and fissures may exist within the bedrock which is not recorded on publicly available geological mapping.

BGS 1:50,000 Sheet 265 indicates the Site has an unspecified dip to the southeast.

Table 3.2, Geological Faults

Fault Number	Grid Reference	Orientation	Throw Direction	Comment
1 (Corston fault)	391085, 182941	NE/SW	NW	Observed. Runs east of Hullavington to Malmesbury. Crosses section A-A′ see appendix B.
2	388863, 181807	ENE/WSW	SSE	Observed, Southwest of Hullavington crosses C-C′ see appendix B.
3	393144, 181570	ENE/WSW	NNW	Inferred, East of Lower Stanton St Quintin. Crosses section D-D′ see appendix B. (BGS, 2011).

3.2 Hydrogeology

Localised Alluvium deposits across the site are designated as a Secondary A reflecting their ability to yield groundwater locally and support surface watercourses. The Ancholme Group including the Oxford Clay Formation and Kellaways Formation are classified as unproductive strata, comprising predominantly low-permeability mudstones and clays that do not typically yield significant groundwater resources.

The Great Oolite Group (the Corsham Limestone Formation, Chalfield Oolite Formation and Combe Down Oolite Formation) forms the Principal Aquifer, consisting of fractured and locally karstified oolitic limestones. Groundwater within the Great Oolite is typically unconfined at outcrop and becomes confined beneath lower-permeability units, with well-developed spring lines commonly occurring at lithological boundaries, particularly where permeable limestones overlie mudstone formations. As a result, perched groundwater conditions may be present.

The Forest Marble Formation and Cornbrash Formation comprise interbedded limestones and mudstones, these are classified as Secondary A Aquifers, reflecting a reduced hydraulic productivity. The basal limestone unit of the Forest Marble Formation is inferred to be part of the Principal Aquifer of the Great Oolite Group, or at least within hydraulic conductivity.

Flush was recorded to be lost in ST88SE1 at 19m BGL which could be void or fracture within the bedrock.

The shallowest limestone was identified at 7.5m BGL at ST88NE20 (albeit this is c.1500m south of the Site). The proposed piles will penetrate the Principal Aquifer if the Chalfield Oolite Formation is found at depths shallower than 12m BGL.

3.3 Summary of BGS Boreholes

Geosyntec have reviewed the publicly available boreholes available on BGS GeoIndex Viewer beneath and within 1.5kmm of the BESS and Substations. Pertinent boreholes are summarised within Table 3.3 and copies of Borehole logs are available online at BGS GeoIndex Viewer. Selected boreholes taken from the available BGS mapping listed above have been included where appropriate. It should be noted that engineering rockhead has been inferred from the logs and is not an accurate representation of the sitewide rockhead. The boreholes used to inform the cross sections are presented on the relevant drawings in Appendix A.

Table 3.3, BGS Boreholes

Borehole ID	Source	Total Depth (m BGL)	Depth to Engineering Rockhead (m BGL)	Groundwater Strike (m BGL)	Comments
ST88NE20	BGS GeoIndex	105	(7.5 although hard to determine due to the nature of BH)	26m	Borehole was commenced for pumping, no in-depth geological log provided.
ST88SE1	BGS GeoIndex	58.9	3.10 (Limestone FMB)	N/A	Log displays variable weathering profile within Great Oolite members. Forest Marble recrystallized at 10.33m. Hard Oolite at 3.10m. Postulates that the depth to top of aquifer in Great Oolite is 48.9m. Flush is lost at 19m (possible void).
ST88SE14	BGS GeoIndex	50	0.6 (Limestone FMB)	36.6	Borehole was commenced for pumping, no in-depth geological log provided.
ST88SE16	BGS GeoIndex	94.20	7.94 (Limestone FMB)	N/A	Borehole was commenced for pumping, transmissivity and storativity values of Bath Oolite provided. Hard Limestone at 10.28m in FM
ST88SE27	BGS GeoIndex	35	13 (Limestone BHO)	N/A	Borehole was commenced for pumping, no in-depth geological log provided.
ST88SE34	BGS GeoIndex	29.3	9 (Limestone FMB)	N/A	In depth pumping test data with hydrogeological parameters of inferior oolite.
ST88SE36	BGS GeoIndex	54	Very stiff clays/ mudstones at 0.6m (FMB)	34	Driller's log completed and installed 2018 by Jackson drilling
ST88SE37	BGS GeoIndex	50	6 (Limestone FMB)	6	Driller's log provided borehole completed and installed 2018 by Jackson drilling
ST88SW22	BGS GeoIndex	66.6	3.00 (Limestone FMB)	33	Borehole was commenced for pumping, no in-depth geological log provided.
ST98NW14/A	BGS GeoIndex	115.5	3.65 (Sandstone FMB)	N/A	Well cemented sandstone with interbedded clays at 3.65m. Limestone at 18.67m in FM.
ST98SW15	BGS GeoIndex	70	3 (very hard limestone)	N/A	Borehole was commenced for pumping, no in-depth geological log provided.

Borehole ID	Source	Total Depth (m BGL)	Depth to Engineering Rockhead (m BGL)	Groundwater Strike (m BGL)	Comments
ST98SW5	BGS GeoIndex	33.3	4.15 (Stratum undefined, clays of FMB)	4.15	Borehole was commenced for pumping, no in-depth geological log provided.
ST88SE12	BGS GeoIndex	37.6	11.3 (Limestone (inferred) FMB)	N/A	Borehole was commenced for pumping, no in-depth geological log provided.
ST98SW13/B	BGS GeoIndex	98	6 (Limestone)	N/A	Borehole was commenced for pumping, no in-depth geological log provided.
ST88SE9	BGS GeoIndex	49.1	13.1 (Limestone (inferred) FMB)	N/A	Borehole was commenced for pumping, no in-depth geological log provided.
ST88SE17	BGS GeoIndex	37	Unclear due to quality of log	N/A	Borehole was commenced for pumping, no in-depth geological log provided.
ST98SW2	BGS GeoIndex	50	Unclear due to quality of log	32	Borehole was commenced for pumping, no in-depth geological log provided.
ST88SE38	BGS GeoIndex	60	Unclear due to quality of log	N/A	Borehole was commenced for pumping, no in-depth geological log provided.

3.4 Desk Study Identified Geohazards

Geosyntec has completed a desk study review of **ES Volume 3, Appendices 19-1 to 19-5 [APP-247 to APP-251].** Based on this review a range of geohazards have been summarised in Table 3.4. It should be noted that the increase in probability of encountering compressible ground occurs where alluvium is present (i.e. surrounding the rivers east of Foxley and northeast of the proposed site). The probability of landsliding increases south of the trainline where head deposits are located (i.e. southwest of Norton).

Table 3.4, Desk-Study Identified Geohazards

Hazard Type	Hazard potential	Comment
Collapsable Ground	No hazard to very low hazard	No geology identified on the Site is strongly associated with collapsible ground.
Compressible Ground	No hazard to moderate hazard	Locally associated with Alluvium.
Ground dissolution	No hazard to very low hazard	Associated with limestone and calcareous deposits.
Landslide	No hazard to moderate	Associated with existing railway cuttings and localised water features.
Running Sands	No hazard to low hazard	Associated with Alluvium.
Shrinking or swelling clays	No hazard to moderate hazard	Associated with Alluvium, the Kellaway’s Mudstone Member and weathered mudstones of the Great Oolite Group.

4 PRELIMINARY GEOTECHNICAL RISK REGISTER

From undertaking the geotechnical interpretation of the data presented in Section 3, the main risks identified for the proposed works are listed below. The probability and impact of a hazard have been judged on a qualitative scale as set out in Table 4.1 below. The degree of risk (R) is determined by combining the assessment of the probability (P) of the hazard occurring with an assessment of the consequences (C) of the hazard and associated mitigation it will require if it occurs (R = P x C). The risks calculated and presented below should be viewed in the context that no mitigation has been applied and much of the risk is founded in uncertainty. Applying basic, pre-planned mitigation such as undertaking ground investigation and a Foundation Works Risk Assessment, will likely reduce the risk scores significantly prior to the start if the construction phase.

This preliminary risk register, Table 4.2, should be reviewed and updated throughout the project life cycle.

Table 4.1, Qualitative Assessment of Hazards and Risks

P = Probability	
1	Very unlikely
2	Unlikely
3	Plausible
4	Likely
5	Very Likely

C = Consequence	
1	Very Low
2	Low
3	Medium
4	High
5	Very High

R = Risk Rating (P x I)	
1 – 4	None / negligible
5 – 9	Minor
10 – 14	Moderate
15 – 19	Substantial
20 - 25	Severe

Table 4.2, Preliminary Geotechnical Risk Register

Hazard	**Location**	**Who is at Risk**	**Consequence**	**Risk Before Mitigation**		
				P	**C**	**R**
Lack of historical ground investigation data	Site-wide	Contractor, infrastructure	No geotechnical information for the Site to inform upon detailed foundation design. Poor understanding of the geotechnical characteristics of the load bearing stratum. Poor understanding of made ground and superficial deposits.	3	4	12
Heterogeneous soils	Sitewide	Contractor, infrastructure	Difficult and unforeseen foundation conditions such as artesian head variable rock head. It should be noted that site-specific ground investigation will likely significantly reduce the potential risk associated with this hazard	4	4	16
Anisotropic strength conditions	Sitewide	Contractor, infrastructure	Variable end-bearing capacity. Variable depth of load bearing stratum. Piling refusal on potential hard bands. Differential settlement.	4	4	16
Shallow groundwater and groundwater flooding	Sitewide	Contractor, construction workers.	Collapse of excavations. Inability to place and compact material, delays to programme.	4	3	12
Contaminants of potential concern	Sitewide	Contractor, construction workers, infrastructure, aquifers.	Contamination of Secondary A and Principal Aquifers Faulting between the Principal Aquifer and the underlying bedrock could provide a contamination pathway. Pathways could exist through swallow holes if present. Piles will require a piling risk assessment if penetrating into the Chalfield Oolite Formation, the shallowest encounter is 7.5m BGL. Pre-bored piles are not recommended if having to found within the Principal Aquifer.	2	4	8
Possible high sulphur content in soils and geology	Sitewide	Contractor.	Iron rich and lignite rich strata may cause sulphate attack on concrete. Sitewide	3	4	12

Hazard	Location	Who is at Risk	Consequence	Risk Before Mitigation		
				P	C	R
Excavation collapse for foundations	Sitewide	Contractor, construction workers	Unknown condition of made ground and unknown extent of superficial geology. Risk of undefined granular collapsable material. It should be noted that site-specific ground investigation will likely significantly reduce the potential risk associated with this hazard. Employing basic excavation management procedures will manage residual risks.	4	5	20
Compressible ground	Sitewide	Infrastructure, contractors	Ground conditions are undefined therefore, the presence of compressible ground such as weathered clays may result in the bearing capacity for piling matt (or shallow foundations) and other equipment may be insufficient, resulting in toppling. Soft compressible deposits may result in unsuitable haul road strength, leading to health and safety risks such as tipping of equipment or slip/trips and falls. It should be noted that site-specific ground investigation will likely significantly reduce the potential risk associated with this hazard.	4	5	20
Possible contamination in undefined Made Ground.	Sitewide	Infrastructure, contractors	Area previously utilised for farming, possibility of contamination produced by previous landowners in made ground which is yet to be defined.	3	4	12
Deep granular layers and lenses	Sitewide	Contractor, proposed infrastructure	Pile refusals depending on density of weathered materials or reduction in shear strength. It should be noted that site-specific ground investigation will likely significantly reduce the potential risk associated with this hazard	3	5	15

Hazard	Location	Who is at Risk	Consequence	Risk Before Mitigation		
				P	C	R
Weak founding strata	Sitewide	Client, contractor infrastructure	Foundation failure caused by undefined strength of bedrock. Insufficient pile capacity. Pavement failure of permanent roads and differential settlements. It should be noted that site-specific ground investigation will likely significantly reduce the potential risk associated with this hazard	5	5	25
Possible perched shallow groundwater table	Sitewide	Contractor, construction workers.	Collapse of excavations. Inability to place and compact material. It should be noted that site-specific ground investigation will likely significantly reduce the potential risk associated with this hazard	4	4	16
Shrink swell properties of Kellaways Clay Formation and Great Oolite group derived clays	Sitewide	Infrastructure	Ground heave and settlements causing foundation failure and cracking in buildings.	3	4	12
Dissolution Features and voiding in limestone	Sitewide	Contractor, proposed infrastructure	Reduction in pile strength through skin friction and end bearing capacity. Potential for collapse of voids which could propagate to the surface through loading, internal erosion and groundwater movement. Possibility of propagation of voids to the surface due to stream sink features (BGS, 2023)	3	4	12
Excavations	Sitewide	Contractor, proposed infrastructure	Hard digging. Excavations often stable in short to medium term but where fissured or prone to rapid softening may be unstable and require immediate support. May heave on the removal of overburden, particularly in wet conditions.	2	4	8
Slope instability	South of railway embankment localised to head deposits	Contractor, proposed infrastructure	Possibility of creep and slope movement in areas of loose soils or steep slopes.	3	4	12

Hazard	Location	Who is at Risk	Consequence	Risk Before Mitigation		
				P	C	R
Groundwater	Sitewide	Infrastructure design	Groundwater levels are unknown and therefore cannot be accounted for within foundation design leading to over conservatism. Where groundwater is encountered, consideration of nearby receptors should be made in relation to the risks posed by the creation of pathways through foundations into groundwater bodies.	3	4	12

5 SUMMARY OF PRELIMINARY GEOTECHNICAL RISKS

Geosyntec have prepared this preliminary geotechnical risk register to support the BESS and Substation sites in the north of the Cable Route Corridor, part of the Lime Down Solar Park development. This document has been prepared by reviewing previously produced desk study information and publicly available borehole records and geological maps. Limited available data results in reduced certainty regarding the ground model and associated hazards at the BESS and Substations, with borehole data having to be used from up to 1500m from the proposed development. A targeted ground investigation is recommended to confirm the ground model, structure, groundwater regimes, and the presence of contaminants, obstructions, mining features, or fractures. Pre-construction utility surveys should be completed to locate and protect buried services and contaminant risks should be assessed during a ground investigation prior to commencement so appropriate PPE and method statements can be adopted.

Natural hazards exist within the soils and bedrock which may have implications on the proposed piled foundations such as variable rockhead, unknown strength profiles, unknown groundwater levels, aggressive ground chemistry, voiding and potential contamination. Conversely the piles could have an impact on the Principal Aquifer if the aquifer is found to be shallower than 12m BGL at the ~~BESS or~~ substation locations or at 4m BGL at the BESS locations, which is possible due to varying rockhead depths. Whilst it could be argued the piles may present a preferential pathway for contamination, this could be mitigated against through a detailed piling risk assessment. Moreover, the type of pile used could be altered to reduce the contamination risk such as using a higher number of shorter piles or using bored piles instead of driven, as the curing of the concrete creates a seal around the pile mitigating against the pathway risk.

At this stage in the project, it would be imprudent to ignore the use of shallow foundations or ground improvement options for the BESS and Substations which would remove the risk of penetrating the Principal Aquifer. Types of ground improvement could include vibro-stone columns or rigid inclusions. These methods do come with their own geotechnical challenges however shallow foundations are common practice for substations, albeit caveated by the proposed loading regime and soil strength. However, these options are incumbent on understanding the depth of the Principal Aquifer beneath the Site and the proposed loadings of the foundations.

6 REFERENCES

BGS, 1984. *Geology of the Bristol district: the Lower Jurassic rocks. Memoir British Geological Survey..* [Online]
Available at: https://webapps.bgs.ac.uk/memoirs/docs/B01778.html
[Accessed 16 March 2026].

BGS, 2010. *Geology of the Bedford district — brief explanation of the geological map Sheet 203 Bedford.* [Online]
[Accessed 16 March 2026].

BGS, 2011. *Geology of the Bath district — a brief explanation of the geological map sheet 265 Bath.* [Online]
Available at: https://webapps.bgs.ac.uk/memoirs/docs/B06907.html
[Accessed 12 March 2026].

BGS, 2023. BGS Karst Report Series: J3.. *Karst in the Jurassic Great and Inferior Oolite Groups of southern England.,* Open Report (OR/23/002), p. 67.

BGS, 2023. *Wiltshire (comprising Wiltshire and Swindon) mineral resources : mineral resource information in support of national, regional and local planning (Map).* s.l.:s.n.

BGS, 2026. *BGS GeoIndex Onshore Viewer.* [Online]
Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html

BGS, 2026. *BGS Maps Portal.* [Online]
Available at: https://www.bgs.ac.uk/information-hub/bgs-maps-portal/
[Accessed 16 March 2026].

DEFRA, 2026. *Magic Map.* [Online]
Available at: https://magic.defra.gov.uk/MagicMap.html
[Accessed 16 March 2026].

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-1 Desk Studies: Lime Down A,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-10 Desk Studies: Lime Down C East Corridor,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-11 Desk Studies: Lime Down C Rail Cable Link,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-14 Desk Studies: Lime Down Northwest Corridor,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-15 Desk Studies: Lime Down Centre Corridor,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-17 Desk Studies: Lime Down Southwest Corridor,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-2 Desk Studies: Lime Down B,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-3 Desk Studies: Lime Down C,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-4 Desk Studies: Lime Down D,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-5 Desk Studies: Lime Down E,* s.l.: Lime Down Solar Park.

Geosyntec Consultants, 2025. *Preliminary Environmental Information Report, Volume 3, Appendix 19-8 Desk Studies: Lime Down CL1,* s.l.: Lime Down Solar Park.

Lime Down Solar Park Data Viewer, 2025. s.l.: Lime Down.

NERC, 1985. *Environmental Geology Study: Parts of West Wiltshire and South-East Avon,* s.l.: BGS.

Ordnance Survey, 2026. *OS Maps.* [Online] Available at: https://explore.osmaps.com/ [Accessed 16 March 2026].