

Green Hill Solar Farm Preliminary Environmental Information Report

Chapter 11 Minerals

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11 Minerals

11.1 Introduction

11.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) undertaken to date concerning any likely significant effects of the Scheme on mineral resources during the construction, operation and maintenance and decommissioning phases. The following aspects will be considered within the mineral resources assessment process:

- The baseline geology, relying on proven geology and published information;
- National and local minerals planning policies;
- Potential impacts on identified mineral resources and permitted workings; and
- Potential impacts arising from the full extent of the Scheme plus a 500m buffer surrounding the Sites and Cable Route Search Area.

11.1.2 The EIA Scoping Report submitted to the Planning Inspectorate (PINS) in July 2024 referred to the assessment including the full extent of the area occupied by the Scheme, this includes the array site, the cable corridor and BESS, together with margin extending 250m from the boundary to ensure that all potential impacts on mineral resources including existing mineral extraction sites are identified. Although based on professional opinion this margin is considered justifiable and proportionate, on further consideration of the Northamptonshire and Milton Keynes Minerals Local Plans it is apparent both have adopted a 500m boundary for consultation requirements for proposals considered to be incompatible with safeguarded minerals and mineral related development. For consistency with the approach of the relevant minerals local plans the margin around the boundary of the Scheme has been extended to 500 metres in this assessment.

11.1.3 The impacts of traffic generation arising from the Scheme on existing mineral workings and future allocations are assessed in **Chapter 13: Transport and Access**.

11.1.4 For more details about the Scheme, refer to **Chapter 4: Scheme Description**.

Figures

11.1.5 This chapter is supported by the following figures in **PEIR Volume 2**:

- **Figure 11.1.1:** Mineral Resource Plans Green Hill A and A.2 Sheet 1 of 5;
- **Figure 11.1.2:** Mineral Resource Plans Green Hill B Sheet 2 of 5;
- **Figure 11.1.3:** Mineral Resource Plans Green Hill C, D and E Sheet 3 of 5;
- **Figure 11.1.4:** Mineral Resource Plans Green Hill F and BESS Sheet 4 of 5; and
- **Figure 11.1.5:** Mineral Resource Plans Green Hill G Sheet 5 of 5.

11.1.6 This chapter is supported by the following tables:

- **Table 11.1:** Summary of Consultation and Responses;
- **Table 11.2:** Criteria for Assessing Sensitivity of Receptor;
- **Table 11.3:** Criteria for Assessing Magnitude of Impacts (positive or negative); and
- **Table 11.4:** Magnitude of Impact.
- **Table 11.5:** Summary of Sensitivity

11.2 Consultation

11.2.1 An EIA Scoping Report was submitted to PINS in July 2024, with a formal request for a Scoping Opinion. PINS subsequently issued the Scoping Opinion on 30th August 2024. Consultation undertaken with the Mineral Planning Authorities throughout the pre-application and scoping



phase for the Scheme has informed the approach to the mineral resources assessment and the information provided within this chapter.

11.2.2 A summary of the responses to the Scoping Opinion are outlined below in **Table 11.1**.

Table 11.1: Summary of Consultation and Responses

Consultee and Date	Comment	Outcome and any further steps anticipated
The Planning Inspectorate 30 August 2024 Scoping Opinion	Section 11.4 The terms used in para 11.4.9 to describe the impact magnitude values differ to those set out in Table 11.2: 'Criteria for Assessing Magnitude of Impacts' (the heading of which incorrectly refers to sensitivity rather than magnitude). In addition, the impact magnitude terms used to determine the level of significance as set out in Table 11.3 differ again. As a result, the methodology proposed to be applied to the assessment is unclear. This should be clarified in the ES.	These sections have been reviewed and amended so that the identified terms are used consistently throughout this chapter. These amendments will also be reflected in the ES.
The Planning Inspectorate 30 August 2024 Scoping Opinion	Section 11.4 The Inspectorate notes that parts of the site lie within or in close proximity to Minerals Safeguarding Areas and Minerals Consultation Areas. The ES should demonstrate that the relevant Minerals Planning Authorities have been consulted in respect of the proposals and that the Proposed Development does not impact on future ambitions for minerals extraction within the region.	Meetings have been held with West Northamptonshire Council 3rd October and North Northamptonshire Council 7th October to discuss these issues. A meeting is being sought with Milton Keynes Council. The outcome of the meetings will be taken into account in the ES.
Natural England 20 August 2024 Scoping Opinion	Natural England submits that the ES should consider and, where appropriate, include guidance listed in its submission for minerals and waste development which primarily relate to soil handling, assessment, storage and placement and final site restoration.	Consideration to minerals and waste primarily relating to soil handling is addressed in Chapter 20: Agricultural Circumstances.
Bedford Borough Council 21 August 2024 Scoping Opinion	In general, BBC is in agreement regarding this aspect's approach as set out by the Applicant and makes no further comment in this regard.	Noted.
Bedford Borough Council 21 August 2024 Scoping Opinion	Without labouring on the matter of potential ground leaching and contamination from the BESS facility, it should be highlighted that the Applicant themselves has noted that the Site comprises 'fluvial sand and gravel deposits associated with the River Nene', a substrate that can facilitate the easy movement of contaminants in the soil and groundwater.	This is addressed in Chapter 22: Ground Conditions and Contamination.
North Northamptonshire Council 22 August 2024	The safeguarding of minerals is given local and national importance in Section 17 of the NPPF (Facilitating the sustainable use of minerals) and The Northamptonshire Minerals and Waste	Noted.



Consultee and Date	Comment	Outcome and any further steps anticipated
Scoping Opinion	Local Plan (Adopted July 2017). It is noted that the Scheme will affect areas of safeguarded mineral resource and has the potential to affect allocated and/or permitted mineral workings. It is welcomed by North Northamptonshire Council that a Minerals Assessment will be scoped in the Environmental Statement.	
West Northamptonshire Council 22 August 2024 Scoping Opinion	No comment.	Noted.
Milton Keynes Council 17th September 2024 Scoping Opinion	Establishing the significance of the impact on mineral resources needs to consider the extent, magnitude, duration and reversibility of the scheme as well as the extent, likely quality and situation of the mineral resource. While the scheme would be operational over approximately 60 years it would ultimately be a temporary land use, and any mineral resources present would not be permanently sterilised. Notwithstanding this, to enable a full assessment of the level of impact the scheme would have on mineral resources it would be appropriate for further details to be provided in the final Environmental Statement (ES) with respect to the presence of, extent, likely quality, and siting of any mineral resources within Site G. A Mineral Sterilisation Appraisal/Mineral Resource Assessment (MSA/MRA) should be carried out to inform the Mineral Assessment that is proposed to form part of the ES. It is recommended this follows best practice for MSA/MRA as set out in Mineral Safeguarding in England Good Practice Advice British Geological Survey 2011, Mineral Safeguarding Practice Guidance (Mineral Products Association & Planning Officers Society) April 2019, and the Minerals section of the Planning Practice Guidance	A Mineral Resource Assessment is being undertaken in accordance with best practice to inform the ES.

11.3 Legislation, Planning Policy and Guidance

- 11.3.1 This section provides an overview of the legislation, planning policy and guidance against which the Scheme will be considered for Mineral Resources.
- 11.3.2 Minerals are important national resources and adequate and steady supplies are vital for development and sustaining the economy and society. Minerals are a finite natural resource that can only be worked where they are found. A key aspect of sustainable development is the conservation and safeguarding of non-renewable resources for future generations. As such it is



important that other development does not needlessly prevent the future extraction of mineral resources.

UK Legislation

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

- 11.3.3 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regs) Ref.1) require consideration to be given to the use of natural resources, in particular land (including land take) and material assets. In this case the Scheme would occupy a large surface area and consideration needs to be given to any likely significant effects this may have on the existing geology and identified mineral resources.

Planning Policy

National Planning Policy

Overarching National Policy Statement for Energy (EN-1)

- 11.3.4 The Overarching National Policy Statement for Energy (EN-1) (Ref.2) was designated on the 17 January 2024.

- 11.3.5 Paragraph 5.11.19 EN-1 states:

‘Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place.’

- 11.3.6 Paragraph 5.11.28 states that

‘Where a proposed development has an impact upon a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources.’

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

- 11.3.7 National Policy Statement for Renewable Energy Infrastructure (EN-3) (Ref.3) was designated on the 17 January 2024. There are no specific references to mineral safeguarding within EN-3 however in paragraph 2.1.4 it states:

‘The policies set out in this NPS are additional to those on generic impacts set out in EN-1. Applicants should show how their application meets the requirements in EN-1 and this NPS, applying the mitigation hierarchy, as well as any other legal and regulatory requirements’.

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

- 11.3.8 National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref.4) was designated on 17 January 2024. There are no specific references to mineral safeguarding within EN-5 however in paragraph 1.3.2 it states:

‘This NPS does not seek to repeat the material set out in EN-1 or EN-3. EN-1 applies to all applications covered by this NPS unless stated otherwise...’

National Planning Policy Framework

- 11.3.9 The National Planning Policy Framework (NPPF) (Ref.5) 2023 together with the accompanying Planning Practice Guidance (PPG) set out the Government’s planning policies for England for the particular purpose of making development plans and deciding applications under the Town and Country Planning Act 1990. The NPPF is an important and relevant matter under the Planning Act 2008.

- 11.3.10 The need to safeguard mineral resources is reflected in NPPF, in paragraph 215 it states:

‘It is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs. Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation.’



- 11.3.11 Relevantly, it goes on in paragraph 216 to state that planning policies should:
'(a) provide for the extraction of mineral resources of local and national importance.....;'
and
'(c) safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked);'
- 11.3.12 In paragraph 218 it continues:
'Local planning authorities should not normally permit other development proposals in Mineral Safeguarding Areas if it might constrain potential future use for mineral working.'
National Planning Practice Guidance (PPG) Minerals (2014)
- 11.3.13 The Minerals PPG (Ref.6) (2014) confirms that minerals 'make an essential contribution to the Country's prosperity and quality of life'. Paragraph 007 of the Minerals PPG states that:
"Mineral planning authorities are encouraged to plan for minerals extraction using Ordnance Survey-based proposals maps and relevant evidence provided by the minerals industry and other appropriate bodies... This approach will allow mineral planning authorities to highlight areas where mineral extraction is expected to take place, as well as managing potentially conflicting objectives for use of land."
- 11.3.14 Designating Mineral Safeguarding Areas (MSA) is the means by which the planning system ensures that potential mineral resources are not needlessly sterilised. The presence of a MSA does not necessarily preclude other forms of development being permitted nor confer any presumption that the mineral will be worked. It is a policy tool to raise awareness that minerals may be sterilised by proposed development and that this should be taken into account in the decision-making process.
- 11.3.15 Paragraph 008 advises Minerals Planning Authorities (MPAs) that they should plan for the steady and adequate supply of minerals, including in the following way:
"1. Designating Specific Sites – where viable resources are known to exist, landowners are supportive of minerals development and the proposal is likely to be acceptable in planning terms. Such sites may also include essential operations associated with mineral extraction..."
- Local Planning Policy**
Northamptonshire Minerals and Waste Local Plan
- 11.3.16 The Northamptonshire Minerals and Waste Local Plan (July 2017) (Ref.7) (NM&WLP) sets out the key principles to guide the future winning and working of minerals in Northamptonshire up to 2031. Although prepared and adopted by the former County Council the Minerals Plan remains extant and applies to both West and North Northamptonshire Councils. It sets out the development management policies against which planning applications for minerals and waste development will be considered. It also seeks to ensure the protection of mineral resources from the risk of sterilisation by development which potentially prevents future extraction. The scheme potentially impacts on permitted/allocated mineral workings and extends into safeguarded mineral areas.
- 11.3.17 The NM&WLP, through Policy 1, makes provision for the extraction of 10 million tonnes of sand and gravel and 7.8 million tonnes of crushed rock over the Plan period 2011 to 2031. The Policy also makes provision for the maintenance of landbank of at least seven years for sand and gravel, and ten years for crushed rock. This is intended to be achieved from both extensions to existing sites and new sites. The NM&WLP makes allocations as required to meet this provision. Owing to the local geology the Scheme does not have any implications for crushed rock resources in Northamptonshire.
- 11.3.18 Policy 4 identifies sites for the provision of sand and gravel it states:



'A supply of sand and gravel to contribute to meeting the provision of sand and gravel will be provided for by: production since 1 January 2011, sites with planning permission as at 1 January 2016 and the following allocated sites.

Pre-glacial and glacial areas

M1: Milton Malsor 1.2 million tonnes (approximately)

M2: Strixton - Bozeat 1.5 million tonnes (approximately)

Central Nene Valley

M3: Heyford 1.4 million tonnes (approximately)

M4: Earls Barton West Extension 2.6 million tonnes (approximately)

Great Ouse Valley

M5: Passenham Extension South 0.2 million tonnes (approximately)

Other locations

M6: Elton Extension 0.85 million tonnes (approximately)'

11.3.19 The Scheme potentially impacts on sites M2 and M4 as well as two existing quarry areas and the mineral consultation areas (MSCs) associated with these existing quarries and allocations.

11.3.20 The Scheme also extends into safeguarded mineral areas. NM&WLP paragraphs 6.85 to 6.99 address the impact other forms of development may have for minerals development, through either surface development sterilising mineral resources or encroachment of incompatible development affecting the operational viability. The NM&WLP makes provision for to ensure mineral resources of economic importance are safeguarded using MSAs and MSCs.

11.3.21 Policy 28 states:

'Mineral resources of economic importance will be safeguarded from sterilisation by Incompatible non-mineral development through the designation of Minerals Safeguarding Areas.

Development of a significant nature within Minerals Safeguarding Areas will have to demonstrate that the sterilisation of proven mineral resources of economic importance will not occur as a result of the development, and that the development would not pose a serious hindrance to future extraction in the vicinity. If this cannot be demonstrated, prior extraction will be sought where practicable.

Development of a non-mineral related nature within the Mineral Safeguarding Areas which is incompatible with the safeguarding of minerals should not proceed unless:

- it can be clearly demonstrated to the satisfaction of the Mineral Planning Authority that the mineral concerned is no longer of any value, or potential value, or that substantial (economically viable) deposits of a similar quality exist elsewhere in the county, or*
- the mineral can be extracted, where practicable, prior to the development taking place, or*
- the incompatible development is of a temporary nature and can be completed with the site restored to a condition that does not inhibit extraction within the timescale that the mineral is likely to be needed, or*
- the development is of a minor nature which would not inhibit extraction of the mineral resource, or*
- there is an overriding need for the development.*

Milton Keynes Minerals Local Plan

11.3.22 The Milton Keynes Minerals Local Plan (July 2017) (Ref.9) (MKMLP) sets out the key principles to guide the future winning and working of minerals in Milton Keynes until 2032. It also sets out the development management policies against which planning applications for minerals and



waste development will be considered. It also seeks to ensure the protection of mineral resources from the risk of sterilisation by development which potentially prevents future extraction. The scheme does not impact on any permitted/allocated mineral workings in Milton Keynes however it does extend into several MSAs.

11.3.23 MKMLP Policy 18 Minerals Safeguarding and Consultation Areas Infrastructure, states:

'Mineral resources of local and national importance within Milton Keynes include sand and gravel and the White and Blisworth Limestone formations. These resources will be safeguarded from unnecessary sterilisation by other development through the designation of Mineral Safeguarding Areas.

Planning permission will not be granted for non-mineral development that would lead to the unnecessary sterilisation of mineral resources within a Minerals Safeguarding Area unless it can be demonstrated that:

- *the mineral concerned is not of economic value or evidence confirms the absence of mineral resources, the proposed development is temporary or of a nature that would not sterilise the mineral resource or hinder future extraction,*
- *the proposed development is temporary and would not sterilise the mineral resource or hinder future extraction,*
- *prior extraction can occur where practicable and environmentally feasible and within a reasonable timescale,*
- *there is an over-riding need for the development, or*
- *the development is exempt.*

In determining whether prior extraction is feasible an assessment of the mineral resource including detailed site investigations should be undertaken to identify the quality, quantity and extent of the resource, the economic viability of prior extraction and the proportion of the mineral to be used on-site and saleable aggregate. The assessment should also take account of the size, nature and need for the (non-minerals) development as well as the proposed phasing of operations and construction of the non-mineral development.

In the event that the non-mineral development is delayed or not implemented the site must be restored to a stable landform and appropriate after-use.'

Guidance

Mineral Safeguarding in England Good Practice Advice 2011

11.3.24 Mineral Safeguarding in England Good Practice Advice British Geological Survey (BGS) 2011 (Ref.11) was designed to complement the introduction of national policies to prevent the unnecessary sterilisation of mineral resources through mineral safeguarding. Mineral safeguarding introduced an obligation on all mineral planning authorities to define MSAs and protect them with appropriate policies in their minerals local plans. The good practice note provided guidance on the methodology for delineating mineral safeguarding areas and appropriate policies to protect them. Mineral Safeguarding Practice Guidance (Mineral Products Association & Planning Officers Society) April 2019 (Ref.14) which provides practical advice on the implementation of policy for safeguarding mineral resources and infrastructure through plan-making and development management.

11.4 Assessment Methodology

11.4.1 The methodologies described in the following section have been developed in line with the relevant planning policy and BGS guidance for assessing any likely significant effects of the Scheme on Mineral resources.

Study Area

11.4.2 The Scheme comprises of nine sites (the Sites) described as Green Hill A, A.2, B, C, D, E, F, G and Green Hill BESS which accommodate the ground mounted solar photovoltaic generating



station and associated development. The Sites are connected by Cable Corridors connecting the solar array sites to the national grid at the Grendon Substation Point of Connection. Green Hill A, A2 and B lie within West Northamptonshire, Green Hill C, D, E, F and Green Hill BESS lie within North Northamptonshire whilst Green Hill G lies within Milton Keynes. The operational life of the Scheme is anticipated to be 60 years. **Chapter 4: Scheme Description** provides a full description of the proposed Scheme including the physical characteristics and key activities.

11.4.3 The final Cable Corridors have not yet been established thus the assessment is based on a Cable Route Search Area. This is a swathe of land within which the Cable Corridor will be located.

11.4.4 The assessment in this chapter has considered the full extent of the area occupied by the Scheme (being the Sites and Cable Route Search Area), together with a margin extending 500m from the edge of the Sites and Cable Route Search Area (Study Area). The 500m boundary is based on the consultation requirements for proposals considered to be incompatible with the affected minerals as set out in NM&WLP (paragraph 6.108). This approach is also consistent with the buffers which have been applied to all MSAs in the MKMLP (paragraph 6.5). Incompatible development close to MSAs and mineral consultation areas may lead to sterilisation of part of the resource. The BGS good practice advice suggests that it may therefore often be appropriate to extend the MSAs beyond the resource boundary to take account of such risks. Although the solar arrays are not considered to be particularly sensitive developments, adopting a 500m margin does ensure that all potential impacts on mineral resources including existing mineral extraction sites, are considered. The extent of the Study Area is shown in **Volume 2, Figures 11.1 to 11.5**.

Impact Assessment Methodology

11.4.5 The assessment of likely significant effects identifies how the Scheme is predicted to affect identified mineral resources and the significance of those effects. The assessment process takes account of published good practice guides such as the Mineral Safeguarding in England Good Practice Advice British Geological Survey 2011 and other relevant policies outlined above.

11.4.6 The predicted significance of the effect is determined through a standard method of assessment based on professional judgement which considers both sensitivity of identified receptor and magnitude of change as detailed in **Table 11.4** below.

11.4.7 The mineral resources that have been assessed have been identified by the BGS in their Mineral Resource Reports for Northamptonshire (Ref.11) and Buckinghamshire and Milton Keynes (Ref.12) and through allocations, areas of search and MSAs contained in the NM&WLP and the MKMLP.

11.4.8 The effect of the Scheme has been considered as a whole, there being no distinction in terms of effect on mineral resources between construction, operation and decommissioning phases on the basis that as soon as construction commences the impact on mineral resources effectively occurs and remains until such time as the Scheme is fully decommissioned.

11.4.9 Assessment of the likely significant effects of the Scheme on mineral resources considers several parameters including extent, magnitude, duration and reversibility of the development as well as the extent, likely quality and situation of the mineral reserve. The significance is assessed on the effects on identified mineral resources in relation to national and local planning policy.

Sensitivity of Receptors

11.4.10 The significance of the impact for mineral resources can be ranked using professional judgement in terms of the national and local policy objectives.

11.4.11 A high sensitivity receptor is an existing quarry or site-specific allocation for future mineral working, this is because these sites have already been through a selection process and are either contributing or will be making a contribution to sustaining the economy and society. A high sensitivity site would also include safeguarded nationally scarce mineral resources or mineral resources of exceptional quality.

11.4.12 A medium sensitivity receptor is an identified local or widespread mineral resource which is protected so other development does not needlessly prevent the future extraction of mineral



resources to ensure non-renewable resources are conserved and safeguarded for future generations.

11.4.13 A low sensitivity site does not contain any known mineral resources of economic interest.

11.4.14 **Table 11.2** outlines the significance of the effect taking into account the status of the receptor.

Table 11.2: Criteria for Assessing Sensitivity of Receptors

Sensitivity	Definition
High	Allocated or existing mineral working.
Medium	Safeguarded local or widespread mineral resource
Low	No identified mineral resource.
Negligible	As for low sensitivity, but with only indirect, tenuous, and unproven links between sources of impact and soil functions.

Magnitude of Impacts

11.4.15 In terms of the magnitude of impacts for mineral resources this can range from being a high to a neutral or negligible impact development.

11.4.16 A high impact development prevents the future exploitation of a known mineral resource. This can either be through direct destruction of the resource through ground disturbance or effectively physically preventing access to a mineral resource by way of surface development.

11.4.17 A medium impact development for a mineral resource would add further significant constraints for future exploitation. This could either be in the form of introducing sensitive land uses adjacent to the mineral resource or by bisecting the resource with for example a roadway, cable or pipeline. These add constraints to future mineral working which would inhibit the full exploitation of the resource.

11.4.18 A low impact development either does not inhibit future exploitation of the mineral resource or includes mitigation to ensure the mineral resource is not sterilised, for example, by winning and working the mineral reserve prior to the development taking place.

11.4.19 A negligible impact development has a slight or peripheral impact on a mineral resource but has no significant impact for current or future exploitation of that resource. This could include for example a development on the margin of an identified mineral resource where the quantity and quality of the resource is likely to be poorest.

11.4.20 A neutral impact development does not affect any identified or potential mineral resource in any way.

11.4.21 **Table 11.3** outlines the magnitude of the impact for this assessment.

Table 11.3: Criteria for Assessing Magnitude of Impacts (positive or negative)

Magnitude	Definition
High	The total loss or substantial alteration to key elements/features of the baseline (pre-development) conditions, such that the post development character/composition/attributes will be fundamentally changed, such as the permanent sterilisation of identified mineral resource.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions, such that post development character/composition/attributes of the baseline will be materially changed such as permanent constraint to future exploitation of identified mineral resource.
Low	A slight shift away from baseline conditions. As change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the



Magnitude	Definition
	pre-development circumstances/situation such as a temporary constraint to future exploitation of identified mineral resource.
Negligible	Very little change from baseline conditions. The change will be barely distinguishable and approximating to a non-change situation.
Neutral	No change from baseline conditions.

Assessment of Significance

11.4.22 Taking account of the nature of the mineral resource affected and the nature of the development proposed, **Table 11.4** sets out the significance rating categories. Those impacts being assessed as moderate and above are considered to be significant in the context of the assessment. Where an impact is moderate or minor professional judgment will be used to determine the appropriate level of significance.

Table 11.4 Criteria for Assessing the Significance of Effects.

Sensitivity	High	Medium	Low	Negligible
Magnitude				
High	Major	Major or Moderate	Moderate	Moderate or Minor
Medium	Major or Moderate	Moderate	Moderate or Minor	Minor
Low	Moderate	Moderate or Minor	Minor	Negligible
Negligible	Moderate or Minor	Minor	Negligible	Negligible
Neutral	Neutral	Neutral	Neutral	Neutral

11.5 Assessment Assumptions and Limitations

11.5.1 This preliminary assessment is based on baseline and Scheme design information available at the time of writing this chapter. A full assessment is being undertaken as part of the EIA, the assessment will be developed and refined following statutory consultation and as additional information becomes available, the final assessment presented within the ES.

11.5.2 Where the Scheme designs and details are either not yet known or incomplete at this stage, either assumptions have been made based on professional judgment, or, in the event that it is not possible to make any assumptions, no attempt at a full assessment has been made. This assessment is an iterative process and will be both expanded and made more specific as survey data is collected, analysed and reported on, and designs are further developed. This process will be carried out in conjunction with relevant consultees and third parties as necessary to achieve the most robust outcome.

11.5.3 The Scheme’s impact on any mineral resource in any one area within the Scheme is limited to the development taking place in that area. There are not considered to be any in combination effects in terms of mineral resources.

11.5.4 The methodology for the mineral resources assessment has considered the following assumption:

- This assessment is based on a desktop-based exercise only and relies wholly on published geological information. No mineral trial pit or boreholes have been sunk specifically in association with this Scheme. In addition, no mineral samples have been collected for analysis to determine whether any identified deposits are of economic value. This assessment assumes that all identified safeguarded mineral deposits are present and are of sufficient depth and quality to be of economic value. In view of the nature of the Scheme and the likely mineral resources affected it is considered that a desktop-based assessment using published information is an adequate basis to consider the impact on mineral resources. It is not proposed to undertake any intrusive surveys for the ES.



11.6 Baseline Conditions

11.6.1 This section describes the baseline environmental characteristics for the Study Area with specific reference to mineral resources.

Existing Baseline

11.6.2 The existing baseline conditions are derived from desk-based studies.

11.6.3 The likely mineral resources within the Study Area have been assessed using published geological information from the BGS and the MPAs together with relevant available borehole information and a review of current and historic mineral workings in the vicinity.

11.6.4 The BGS Mineral Resource Maps provide the best available geological and resource information on the broad extent of minerals resources in Northamptonshire and Milton Keynes and have been used to assist the identification of mineral resources in the NM&WLP and MKMLP. The Scheme has been considered in the context of the applicable mineral resource planning policies.

Geological Context

11.6.5 The mineral interest is determined by the underlying geology. Within the Study Area the surface bedrock is a series of sedimentary beds dating from the Jurassic period. The oldest occurring bedrock is ironstone but this is overlain in places by outliers of younger sandstones, siltstones and limestones. The strata is generally progressively younger moving from west to east across the Study Area. The bedrock is overlain in places by quaternary superficial deposits of alluvium, clays, silts, sand and gravels principally of fluvial or glacial origin.

11.6.6 Some of the superficial deposits have been identified as being of mineral interest by the BGS and are safeguarded mineral resources in either the NM&WLP or the MKMLP. Historically several other mineral deposits have been exploited within the Study Area including Ironstone (close to Green Hill A and B) and clay (close to Green Hill E) further described below.

Green Hill A

11.6.7 A review of BGS published geological information indicates that underlying bedrock is a series of Jurassic sedimentary deposits which broadly become progressively younger from the south and west to the north and east. The oldest being the Northampton Sand Formation. The Northampton Sand Formation is an ironstone deposit which historically was worked in large scale opencast quarries in Northamptonshire, particularly around Corby, Wellingborough and Kettering. Ironstone production ceased with the closure of the Corby Iron and Steel Plant in 1980. Since then, technological and economic changes within the UK Steel industry have led to the demise of the Northampton Sand Formation as an iron ore deposit and it is no longer considered as a mineral resource. However, there are numerous extant permissions for ironstone and overlying minerals within Northamptonshire. Some of these permitted areas are actively working the ironstone and the overlying Lincolnshire limestone for aggregate uses. BGS identify an historic consented ironstone area immediately north of Green Hill A on the west side of Broughton Road. It does not appear that this site has ever been worked.

11.6.8 Within Green Hill A east of Newland Road and progressing north and east the Northampton Sand Formation gives way to sandstones and siltstones belonging to Stamford Member and then the mudstones associated with Rutland Formation. Neither deposit is specifically identified as being of any mineral resource value.

11.6.9 Much of the bedrock particularly to the east of Green Hill A is hidden by the Oadby Member particularly north of Walgrave and east of Newland Road. The Oadby Member is a poorly sorted superficial sedimentary deposit from Quaternary period. It consists of a mix of weathered rock with lenses of sand and gravel, clay and silt. Around Old and on the higher land to the north of Green Hill A along Broughton Road towards the junction with Newland Road, BGS identify isolated Mid Pleistocene sedimentary superficial Glaciofluvial deposits of sand and gravel. Following the water courses feeding into the Pitsford Reservoir to the southwest of Green Hill A, BGS identify Quaternary sedimentary superficial deposits of Alluvium. The Alluvium is described



as a mix of clay, silt, sand and gravel. BGS identify the Glaciofluvial and Alluvium deposits as sand and gravel mineral resources.

- 11.6.10 These sand and gravel resources are safeguarded through the identification of MSAs shown in the NM&WLP. The majority of Green Hill A is situated within a sand and gravel MSA (see **Volume 2, Figure 11.1**).
- 11.6.11 The Cable Route Search Area connecting Green Hill A to Green Hill A.2 also passes through a sand and gravel MSA. The Scheme therefore has the potential to sterilise an identified mineral deposit at this location for the life of the Scheme.
- 11.6.12 Green Hill A and the Cable Route Search Area connecting Green Hill A to Green Hill A.2 have been assigned as medium sensitivity receptors.

Green Hill A.2

- 11.6.13 BGS published geological information indicates that underlying bedrock within Green Hill A.2 is a series of Jurassic sedimentary deposits which broadly become progressively younger from west to east. The oldest being sandstones and siltstones belonging to the Stamford Member which outcrop along the western side of the site. Approximately one third of the eastern side is underlain by limestone and mudstones associated with Wellingborough Limestone Member. These deposits are separated by a relatively narrow irregular shaped outcrop of mudstone belonging to the Rutland Formation. None of these deposits are specifically identified as being of any mineral resource value.
- 11.6.14 Over the majority of the Green Hill A.2, BGS mapping show the bedrock overlain the Oadby Member (referred to above in Section 11.6.9). Immediately west of the Green Hill A.2 and following the water course feeding into the Pitsford Reservoir, BGS maps identify Quaternary superficial deposits of Alluvium comprising of clay, silt, sand and gravel. BGS show the Alluvium deposits as sand and gravel mineral resources.
- 11.6.15 These sand and gravel resources are safeguarded through the identification of an MSA shown in the NM&WLP. The western two thirds of Green Hill A.2 are within a sand and gravel MSA (see **Volume 2, Figure 11.1**). The Scheme therefore has the potential to sterilise identified mineral deposits at this location for the life of the Scheme.
- 11.6.16 Green Hill A.2 as a receptor has been assigned a medium sensitivity.

Green Hill B

- 11.6.17 BGS published geological information indicates that the underlying bedrock within Green Hill B is predominantly the Rutland Formation with a small area of the Stamford Member occurring in the southwest corner. Both deposits are referred to above and neither are specifically identified as being of any mineral resource value.
- 11.6.18 Over the majority of Green Hill B, BGS mapping show the bedrock overlain the Oadby Member (referred to above in Section 11.6.9). Surrounding the site BGS map multiple isolated pockets of Mid Pleistocene sedimentary superficial Glaciofluvial deposits of sand and gravel. BGS identify the Glaciofluvial deposits as sand and gravel mineral resources.
- 11.6.19 The NM&WLP identifies a sand and gravel MSA to the north and west of Green Hill B and a further MSA to the south (see **Volume 2, Figure 11.2**). Green Hill B encroaches into these safeguarded areas therefore has the potential to sterilise an identified mineral deposit at this location for the life of the Scheme.
- 11.6.20 The first part of the Cable Route Search Area, to the northeast of Green Hill B, connecting this site to Green Hill C is also within a safeguarded area.
- 11.6.21 Pitsford Quarry lies 1.6 km to the southwest of Green Hill B, this is a permitted sand and ironstone quarry. The Minerals Consultation Area (MCA) for this site is 1.1 km from Green Hill B and outside the Study Area.
- 11.6.22 Green Hill B and the Cable Route Search Area connecting Green Hill B to Green Hill A.2 have been assigned as medium sensitivity receptors.

Green Hill C, D and E

- 11.6.23 Within Green Hill C, the bulk of underlying bedrock is sandstone and siltstone belonging to the Stamford Member. In the southwest this has been eroded away by a small water course to expose the Northampton Sand Formation. In the northwest of the site the Stamford Member is overlain by interbedded limestone and mudstone belonging to the Wellingborough Limestone Member. Except for a small area to the southwest the bedrock is covered by the Oadby member superficial deposit. None of these deposits are specifically identified as being of any mineral resource value.
- 11.6.24 Broadly the underlying bedrock in Green Hill D follows its north south orientation. In the southwest, the water course running south along the western boundary has exposed the Northampton Sand Formation, moving east the sandstones and siltstones belonging to Stamford Member outcrop in a narrow strip aligned north south, moving further east a narrow strip of limestone and mudstone belonging to the Wellingborough Limestone Member outcrops. Finally, in the northeastern corner mudstone belonging to the Rutland Formation occurs. The bedrock is largely covered on the eastern side by superficial deposits belonging to the Oadby Member and Bozeat Till. Bozeat Till is described as a poorly sorted superficial sedimentary deposit from Quaternary period consisting of a mix of weathered rock, clays and silts. None of these deposits are specifically identified as being of any mineral resource value.
- 11.6.25 Within Green Hill E, BGS mapping shows that within much of the central part of this site the bedrock is sandstone and siltstone belonging to the Stamford Member. In the south of the site and along the southeastern and southwestern sides the Northampton Sand Formation is exposed. Moving to the north of the site mudstone belong the Rutland Formation with a narrow band of limestone and mudstone of the Wellingborough Limestone Member outcrops. At the very most northern part of this site the Blisworth Limestone Formation occurs. Blisworth Limestone Formation is a Jurassic sedimentary deposit consisting of pale grey to off-white or yellowish limestones with thin marls and mudstones. Much of the bedrock within Green Hill E, particularly north of Wilby Road is overlain by the superficial deposits belonging to the Oadby Member. None of these deposits are specifically identified as being of any mineral resource value.
- 11.6.26 Immediately east of Green Hill E and on the north side of Mears Ashby Road is a small historic quarry now regenerated as an area of woodland. BGS identify this as a former clay pit however North Northamptonshire Council refer to is a former sand and gravel pit. There are two other historic quarry areas to the south of Green Hill E to the east of Earls Barton. The nearest is 350 metres from the site boundary. BGS identify both as former clay pits in view the of common geology it is considered all three were clay pits probably associated with local brick making.
- 11.6.27 Other than identifying the presence of the historic quarry areas the BGS data do not identify any mineral interest within Green Hill C, D or E.
- 11.6.28 None of Green Hill C, D and E are identified as lying within a MSA or MCA in the NM&WLP. The Cable Route Search Area connecting Green Hill C and D is also outside any MSA or MCA (see **Volume 2, Figure 11.3**).
- 11.6.29 Green Hill C, D and E and the interconnecting Cable Route Search Area connecting Green Hill A2 to Green Hill C, Green Hill C to Green Hill D and Green Hill D to Green Hill E have been assigned as low sensitivity receptors.
- 11.6.30 The Cable Route Search Area from Green Hill E to the BESS site (see **Volume 2, Figures 11.3 and 11.1.4**), crosses a sand and gravel MSA south of Earls Barton. These are fluvial sand and gravel deposits associated with the River Nene. These deposits are actively being worked and the Cable Route Search Area also passes through several MCAs, permitted quarries and associated processing areas. The Scheme therefore has the potential to affect future mineral supplies extraction within Northamptonshire and partially sterilise a permitted mineral deposit.
- 11.6.31 The Cable Route Search Area from Green Hill E to the BESS has been assigned as a high sensitivity receptor.

Green Hill Battery Energy Storage Systems (BESS)

- 11.6.32 The Green Hill BESS is underlain by the Mudstone belonging to the Whitby Mudstone Formation. The bedrock is overlain by superficial Sedimentary deposits consisting of Quaternary Alluvium deposit of clay, silt, sand and gravel in the north, Quaternary Ecton Member of sand and gravel deposits and Mid Pleistocene Glaciofluvial Deposits of sand and gravel to the south.
- 11.6.33 BGS identify the superficial deposits within the Green Hill BESS, together with a whole swathe of land either side of the River Nene as being a sand and gravel mineral resource. The Nene Valley has a long history of sand and gravel extraction evidenced by the many water bodies along the river, which are flooded former workings, and ongoing mineral extraction to the northwest of Green Hill BESS.
- 11.6.34 With the exception of the northeast corner of the Green Hill BESS, where the sand and gravel has already been worked and the site restored to a low level, Green Hill BESS is within a sand and gravel MSA shown in the NM&WLP (see **Volume 2, Figure 11.4**). The Scheme therefore has the potential to sterilise an identified mineral deposit at this location for the life of the Scheme.
- 11.6.35 Green Hill BESS as a receptor has been assigned a medium sensitivity.

Green Hill F

- 11.6.36 BGS published geological information indicates that exposed underlying bedrock within Green Hill F is a series of Jurassic sedimentary deposits which broadly become progressively younger from northwest to the south. The pattern of the surface bedrock being in part a reflection of the geomorphology of Green Hill F.
- 11.6.37 The oldest exposures are Mudstone belonging to the Whitby Mudstone Formation which occurs in the lowest lying parts of Green Hill F in the northwest corner. This deposit is progressively hidden beneath exposures of sandstone and siltstones belonging to the Stamford Member, limestone and mudstone belonging to the Wellingborough Limestone formation, mudstone belonging to the Rutland Formation and limestone belonging to the Blisworth Limestone Formation as the land rises away from the low point. Broadly the Blisworth Limestone Formation occurs within Green Hill F towards the A509 and either side of the Easton Lane between Bozeat and Easton Maudit.
- 11.6.38 Progressing south within Green Hill F, mudstone belonging to the Blisworth Clay Formation occurs in a band east west across Green Hill F, south of Low Farm. Further south and extending beyond the boundary of Green Hill F all the way to Green Hill G, see below, is an extensive area of limestone bedrock belonging to the Cornbrash Formation. None of these bedrock deposits are specifically identified as being of any mineral resource value with Northamptonshire.
- 11.6.39 The bedrock is overlain by a series of Quaternary superficial deposits, in the south, south of the Easton Lane and east, extending east from the A509 the deposits belonging to the Oadby Member occur. These are fringed by deposits of Bozeat Till. To the northeast of Bozeat, north of Easton Lane, several isolated pockets of superficial Milton Sand and gravel deposits are present. These are broadly orientated north south between 300 and 500m west of the A509. Milton Sand deposits are pre-glacial deposits probably associated with a river system that existed prior to glaciation. Associated with the various existing water courses that run through or alongside Green Hill F, superficial sedimentary deposit of Alluvium, clay silt, sand and gravel occur.
- 11.6.40 BGS identify the superficial deposits of Milton Sand as sand and gravel mineral resource. These deposits have already been partly exploited in the past, most recently by the now closed workings at Bozeat Quarry which Green Hill F abuts.
- 11.6.41 These sand and gravel resources are safeguarded through the identification of MSAs shown in the NM&WLP. The northern half of Green Hill F lies within a sand and gravel MSA, this is the area around the now exhausted Bozeat Quarry (see **Volume 2, Figure 11.4**). To the northeast of the worked area of Bozeat Quarry and north of Green Hill F is an allocation for future mineral extraction. The boundary of the Green Hill F includes the Bozeat Quarry haul road linking the quarry site to the A509 and providing vehicular access to the allocated mineral deposit. Green Hill F lies within the MCA associated with Bozeat Quarry and allocated extension.



- 11.6.42 The Cable Route Search Area connecting Green Hill F to the BESS passes through the sand and gravel MSA south of Green Hill BESS.
- 11.6.43 The Scheme therefore has the potential to affect future mineral extraction within Northamptonshire, by partially sterilising an allocated mineral deposit and sterilising other identified mineral deposits at this location for the life of the Scheme.
- 11.6.44 Green Hill F as a receptor has been assigned a high sensitivity. The Cable Route Search Area from Green Hill F to the BESS as a receptor has been assigned a medium sensitivity.

Green Hill G

- 11.6.45 BGS published geological information indicates that for most of Green Hill G, the underlying bedrock is limestone belonging to the Cornbrash Formation. In the southeastern corner sandstone and siltstone belonging to Kellaways Sand Member outcrops this bedrock is surrounded by a thin margin of mudstone belonging to the Kellaways Clay Member.
- 11.6.46 The BGS show much of the bedrock to the north and centre of the Green Hill G is overlain by superficial deposits belonging to the Oadby Member. In the south of Green Hill G, a superficial deposit of Alluvium occurs associated with the watercourse crossing the site.

The BGS minerals resource map identifies three mineral resources in the vicinity of Green Hill G. The northern half of Green Hill G is shown as containing a brick clay mineral resource. The resource is shown as extending east and west of Green Hill G and extending to the Milton Keynes administrative boundary. This same mineral resource is not shown extending into Northamptonshire on the BGS mineral resource mapping, possibly because there was no equivalent brick industry within Northamptonshire. The brick clay would be associated with Oxford Clay which underlies the Cornbrash Formation. The Peterborough Member of the Oxford Clay was an important resource for brickmaking in Buckinghamshire (including Milton Keynes). These clays were worked to provide the raw materials for brick manufacture at several locations within Buckinghamshire including near Bletchley. The Bletchley Brickworks closed in 1990. Following the closure of the brickworks this deposit is no longer exploited. The MKMLP states that '*Brick clay is not in demand in Milton Keynes and it is unlikely that this will change in the long term; as such these resources are not considered to be of local or national importance and are not included in the MSAs.*'

- 11.6.47 BGS map an area of Jurassic limestone associated with the Great Oolite Group extending south of Green Hill G (south of the A428) as a mineral resource. Within Great Oolite Group, the White Limestone Formation, Bilsworth Limestone Formation and the Cornbrash Formation have the most significant potential for crushed rock production for aggregate uses. The Great Oolite Group does not constitute a resource everywhere since some sequences contain more mudstones than others.
- 11.6.48 The third mineral resource identified by BGS are the sand and gravel deposits within the southern part of Green Hill G. These are both the superficial fluvial deposits and river terrace deposits.
- 11.6.49 The southern edge of Green Hill G lies within four MSAs shown in the MKMLP. Two for sand and gravel and two for limestone (see **Volume 2, Figure 11.5**). The Cable Route Search Area connecting Green Hill G to Green Hill F and the Green Hill BESS passes through the sand and gravel MSA shown in the NM&WLP. The Scheme therefore has the potential to sterilise identified mineral deposits at this location for the life of the Scheme.
- 11.6.50 Green Hill G and the Cable Route Search Area connecting Green Hill G to Green Hill F have been assigned as medium sensitivity receptors.

Future Baseline

- 11.6.51 This section considers changes to the baseline conditions, described above, that might occur in the absence of the Scheme and during the time period over which the Scheme would be in place. The future baseline scenarios are set out in **Chapter 2: EIA Process and Methodology**.
- 11.6.52 The baseline is the current geological strata, changes to which occur in timescales which are irrelevant to the Scheme.



11.6.53 In absence of the Scheme, it is considered there will be no change to the future baseline for mineral resources. The baseline details as presented above are not anticipated to change in the absence of the Scheme.

11.7 Embedded Mitigation Measures

11.7.1 Plant and structures will be decommissioned and removed at the end of the life of the Scheme as part of embedded mitigation relevant to mineral resources. Such measures will essentially restore the baseline condition for the identified mineral resources. Some infrastructure will be left in the ground after decommissioning (such as cable ducts) however this infrastructure is not anticipated to present any significant constraint to future mineral extraction and could be removed as part of the removal of overburden or extraction of minerals with the same excavation equipment.

11.7.2 Works relating to the decommissioning phase of the Scheme will set out in the Outline Decommissioning Environmental Management Plan which will be submitted as part of the DCO application. The embedded mitigation of decommissioning and removing plant and structures at the end of the life of the Scheme will be secured by that document.

11.8 Assessment of Likely Effects

11.8.1 For the basis of this PEIR the significance of the effect of the Cable Route Search Area on mineral resources is being assessed on the basis of a worst case scenario i.e. the eventual route of the Cable Corridor occupies/bisecting an identified mineral deposit. However, it acknowledged that depending on the design and location of the final Cable Corridor, these effects can be completely avoided and/or minimised with mitigation. For example, the Cable Route Search Area between Green Hill A2 and Green Hill B, Green Hill F and the BESS, and Green F and Green Hill G are only partially within MSAs and the final Cable Corridor may run outside of those areas leaving the mineral resource unaffected. The impact of the final Cable Corridor will be assessed as part of the ES.

11.8.2 Section 11.6 of this Chapter sets out the reasoning for the sensitivity of the receptor for each site/length of Cable Route Search Area, for ease of reference **Table 11.5** provides a summary.

Table 11.5: Summary of Sensitivity

Site	Sensitivity
Green Hill A	Medium
Cable Route Search Area connecting Green Hill A to Green Hill A.2	Medium
Green Hill B	Medium
Cable Route Search Area connecting Green Hill B to Green Hill A2	Medium
Green Hill A2	Medium
Cable Route Search Area connecting Green Hill A2 to Green Hill C	Low
Green Hill C	Low
Cable Route Search Area connecting Green Hill C to Green Hill D	Low
Green Hill D	Low
Cable Route Search Area connecting Green Hill D to Green Hill E	Low
Green Hill E	Low
Cable Route Search Area connecting Green Hill E to Green Hill BESS	High
Green Hill BESS	Medium
Cable Route Search Area connecting Green Hill BESS to Green Hill F	Medium
Green Hill F	High
Cable Route Search Area connecting Green Hill F to Green Hill G	Medium



Site	Sensitivity
Green Hill G	Medium

- 11.8.3 Taking into account the embedded mitigation measures as detailed in Section 11.7, the potential for the Scheme to generate effects was assessed using the methodology as detailed in Section 11.4 of this Chapter. In the sections below, associated effects during the construction, operation and maintenance and decommissioning phases of the scheme are discussed.
- 11.8.4 The National Planning Policy Framework requires MPAs to define MSAs to protect known locations of specific minerals from sterilisation. MPAs must also define MCAs based on the safeguarding areas. In this case MSA and MCAs have been defined through the NM&WLP and MKMLP to protect mineral resources. The Scheme lies within a number of MSAs identified to protect sand and gravel and limestone resources.
- 11.8.5 The Scoping Opinion (**Volume 3, Appendix 2.1**) notes that parts of the Sites and Cable Route Search Area lie within or in close proximity to MSAs and MCAs. The Opinion states that it should be demonstrated that the Scheme does not impact on future ambitions for minerals extraction within the region. This assessment addresses this requirement, identifies how the Scheme is predicted to affect identified mineral resources and the significance of those effects.
- 11.8.6 The Scheme could possibly impact mineral resources and supply in three ways. Depending upon the level of disturbance the Scheme could:
- Disturb a mineral deposit to the extent the deposit becomes unviable to exploit;
 - Impose a constraint on mineral extraction in the local vicinity by physically preventing its exploitation; and
 - Adversely affect future local mineral supply.
- 11.8.7 In terms of the first point, potentially disturbing a mineral deposit to the extent it becomes unviable to exploit at some point, the only identified surface mineral the Scheme affects are sand and gravel deposits. On the basis that the Scheme does not require deep excavations and foundations are limited to galvanised steel poles driven into the ground or shallow strip foundations, disturbance would be limited to the surface layers rather than underlying deposits and the Scheme would not affect the long-term viability of working the identified sand and gravel resource.
- 11.8.8 In addition to raising mineral safeguarding issue, the Scheme has implications for allocated and operations quarries thus there is a requirement to consider the impact of the Scheme on the future supply of minerals. The NM&WLP makes provision for 10 million tonnes of sand and gravel (equivalent to an annual average of 0.50 million tonnes) over the Plan period 2011 to 2031 to provide for an adequate supply of aggregates and maintain a landbank of seven years beyond the plan period (i.e. up to 2038).
- 11.8.9 To achieve this, the spatial development strategy set out in the NM&WLP is to focus extraction in glacial and pre-glacial areas, and selected river valleys where there is currently or has been mineral extraction. In terms of river valley provision this includes the Nene Valley west of Wellingborough. The inclusion of parts of the Nene Valley supports the strategic approach of having locations for minerals that are closely related to existing and proposed development in particular growth at Northampton and Wellingborough. The Earls Barton West Extension (NM&WLP Policy 4, Site M4) is expected to provide the vast majority of the river valley supply. This site will help to ensure continuity of good quality supplies throughout the NM&WLP Plan period and thus complement and support the pre-glacial and glacial allocations.
- 11.8.10 In terms of glacial and pre-glacial deposits the area of focus for future mineral extraction is broadly based on an arc which extends east to west, south of the River Nene to the south of Northampton and Wellingborough and then turns north, to the southwest of the Northampton extending towards the County boundary to the south of Rugby and east of Daventry. Green Hill F lies within this area of focus and the NM&WLP Policy 4 Site M2 is allocated in accordance with this the area of focus.



- 11.8.11 North and West Northamptonshire Local Aggregates Assessment 2023 reveals that average aggregate sales for sand and gravel for the most recent ten-year period (2013 – 2022) and three-year period (2020 – 2022), are 0.47 million tonnes per annum (Mtpa) and 0.48 Mtpa respectively. The NM&WLP sand and gravel provision rate of 0.50 Mtpa makes provision for sufficient reserves to maintain the required seven-year landbank. The landbank at the end of 2022 for Northamptonshire was nine years.
- 11.8.12 Beyond the Plan period the potential impact on mineral supply is more difficult to quantify. The Scheme is being proposed with a 60-year operational life. The current NM&WLP extends to 2031, although in effect by making provision to maintain a landbank of seven years beyond the Plan period, the NM&WLP identifies sufficient reserves to meet predicted sand and gravel requirements within Northamptonshire until 2038. During the proposed life of the Scheme, additional sand and gravel reserves will need to be identified to supply future needs. The NM&WLP already identifies glacial and pre-glacial deposits as potential sources of supply and an area of focus for future mineral extraction of these deposits. However, in Northamptonshire both MPAs have expressed the view that glacial and pre-glacial and gravel deposits have not proved to particularly commercially attractive options as these deposits tend to be more variable in terms of depth and quality. It has also been suggested that future provision for sand and gravel supply may be less than the current average of 0.50 million tonnes per annum.
- 11.8.13 The Scheme does affect several areas of safeguarded mineral reserves and areas identified to contribute towards future mineral supply. These have been dealt with in turn below.
- [Green Hill A, A.2 and B](#)
- 11.8.14 The majority of both Green Hill A and A.2 together with the Cable Route Search Area connecting the two are within MSAs protecting sand and gravel resources. These are quite extensive deposits that potentially could be of economic interest being relatively unconstrained by surface development and in the case of Green Hill A.2 have a potentially suitable road access (the A43) to accommodate mineral related traffic. Green Hill B is also within 2 MSAs protecting sand and gravel resources, however in this case the MSA is more peripheral extending beyond the Site, to the north and west and southwest. The northern part of Cable Route Search Area connecting Green Hill B to the other sites is also within an MSA. There is no apparent evidence to suggest there has been any significant recent or historic sand and gravel extraction within or in the vicinity of these sites nor the relevant section of the Cable Route Search Area. None are allocated for mineral extraction in the NM&WLP nor have been put forward for extraction. The three sites all lies outside the area of focus for future mineral extraction identified in the NM&WLP spatial strategy.
- 11.8.15 In the case of the development of Green Hill A, A.2 and B together with the interconnecting Cable Route Search Area the Scheme would inhibit exploitation of these mineral resources for the life of the Scheme. The impact is considered to be low impact resulting in a minor effect (not significant). All of these sites contain glacial sand and gravel deposits which West Northamptonshire Council have suggested are of less economic interest than fluvial deposits found elsewhere within Northamptonshire and have not generally been exploited to any significant extent. These are no deposits that form part of the area of focus for future mineral extraction identified in the NM&WLP spatial strategy and the temporary sterilisation of these deposits would not have an impact on mineral supply within Northamptonshire.
- 11.8.16 The significance of the effect of the Scheme on mineral resources within the Cable Route Search Area connecting Green Hill A, Green Hill A.2 and Green Hill B depends on the final route chosen. The final route may completely avoid any identified mineral resources in which case the significance would reduce to negligible or neutral (not significant). The installation of cables does have the potential to become another constraint to future mineral extraction as the cables could bisect the mineral deposit and require stand-off areas either side, which will be further outlined if required in the ES. This could result in operational issues for future mineral operations and might restrict the efficient exploitation of the resource. This impact can be mitigated by, wherever possible, locating cable routes along existing infrastructure corridors or along the edges of significant landscape features.



Green Hill C, D and E

- 11.8.17 Green Hill C, D and E plus the connecting Cable Route Search Area linking Green Hill A.2, C, D and E do not affect any safeguard mineral resources.
- 11.8.18 South of Earls Barton, the Cable Route Search Area linking Green Hill E to Green Hill BESS has to cross the River Nene. In doing so and avoiding the ecological interest to the south east of Earls Barton associated with flooded former sand and gravel workings, it extends into a large MSA protecting fluvial sand and gravel resources associated with the Nene Valley. This is one of the areas of focus for future mineral extraction identified in the NM&WLP spatial strategy. Within this MSA, the Cable Route Search Area potentially affects three separate permitted areas of mineral extraction, Earls Barton Quarry, Earls Barton Spinney Quarry, and Earls Barton West Extension.
- 11.8.19 Earls Barton Quarry is long established quarry which is reaching the end of its life. Mineral extraction in this quarry is due to be completed by August 2026 when planning permission for extraction expires. Given the likely timescale for the development of the Scheme, it is considered that the impact of the installation of any cables on this quarry is more significant in terms of final site restoration than constraining mineral extraction, which is expected to have been completed by that date.
- 11.8.20 Earls Barton Spinney Quarry lies to the north of the Earls Barton Quarry and straddles the River Nene. It is a permitted area of working which contributes to the Northamptonshire minerals landbank. It is currently an operational quarry with mineral extraction taking place to the north of the River Nene. The next phases of working are due to extend to the south of the river.
- 11.8.21 Earls Barton West, allocated for mineral extraction under NM&WLP Policy 4 Site M4, is a new area of working extending west of Earls Barton Spinney Quarry towards Northampton. Well over half of Earls Barton West Extension lies within the Cable Route Search Area. The majority of the Earls Barton West Extension now has the benefit of planning permission (planning permission ref 17/00053/MINFUL). These permitted sand and gravel deposits are essential to maintaining aggregate supply within Northamptonshire and are key to the delivery of the NM&WLP objectives.
- 11.8.22 The provision of a cable route crossing any permitted sand and gravel site would inhibit the working of those deposits and prevent their exploitation during the NM&WLP period. Depending on the route chosen the cable could effectively permanently sterilise permitted reserves by imposing constraints that make it impractical to extract the deposits in full.
- 11.8.23 If the eventual Cable Corridor crosses either of these permitted areas then the route must be restricted to worked out areas or allow mineral extraction to take place prior to the installation of the cable in order to mitigate any implications on the supply of sand and gravel in the Northamptonshire. The impacts of the installation of the cable could still have implications for the approved restoration scheme. Measures to mitigate, if not completely avoid, these potential impacts effects are set out in Section 11.9.
- 11.8.24 The magnitude of impact on Green Hill C, D and E plus the connecting Cable Route Search Area linking Green Hill A.2, C, D and E is considered to be negligible and therefore the significance of effect is negligible (not significant for the purposes of the assessment).
- 11.8.25 The magnitude of impact of the connecting Cable Route Search Area linking Green Hill E and Green Hill BESS is considered to be high and therefore the significance of effect is major (i.e. significant for the purposes of the assessment).

Green Hill BESS

- 11.8.26 The Green Hill BESS lies within the safeguarded Nene Valley deposits; however, it is not specifically allocated for future mineral extraction. Part of Green Hill BESS site to the northwest has recently been dug for sand and gravel, and since the mineral deposit has been removed, it is excluded from the MSA. There is also evidence to suggest the northern fringe of Green Hill BESS site has also been the subject of historic mineral extraction. The remainder of this Site is already heavily constrained by built development not least the existing Grendon Substation and thus the area of mineral deposits affected by the Scheme is relatively limited. Prior extraction of undeveloped parts of Green Hill BESS, to secure these mineral deposits is not considered to be



a practical option given the relatively small and irregular shaped area, the potential amenity, ecological and access constraints that further restrict the area available and the fact the landform post extraction could become susceptible to flooding. The mineral reserves within Green Hill BESS would effectively be sterilised for the life of the Scheme, however this is not considered to represent a significant impact on mineral supply.

- 11.8.27 Green Hill BESS is also within various MCAs associated with the various permitted quarries. The BESS is not considered to be a sensitive land use in terms potential amenity impacts that arise from mineral working and the development of the BESS is not considered to impose additional constraints in terms of being able to continue to operate the permitted mineral extraction operations
- 11.8.28 The magnitude of the impact is considered to be low and the significance of effect is considered to be minor effect (not significant for the purposes of the assessment).

Green Hill F and connecting Cable Route Search Area

- 11.8.29 The northern part of Green Hill F is also within a sand and gravel MSA. This is also an area of proven economic sand and gravel deposits demonstrated by the recent extraction of now closed Bozeat Quarry. Green Hill F abuts the former quarry site on 3 sides. In addition, the NM&WLP allocates a new area for sand and gravel extraction under Policy 4 Site M2: Strixton – Bozeat, which abuts Green Hill F to the north. Future mineral extraction in this allocation is dependent upon utilising the existing vehicular access connecting it to the existing A509 junction which was constructed to the serve the previous workings. This access road lies within Green Hill F.
- 11.8.30 The development of Green Hill F has the potential to affect future mineral supply in two ways. First whilst there is no direct overlap between the NM&WLP Policy 4 Site M2 allocation and Green Hill F, it does directly abut the allocation. The development of the Scheme could affect the exploitation of this deposit by imposing additional constraints on the working of the M2 allocation. This potential impact can be mitigated ensuring the Scheme is designed and developed to incorporate adequate buffers between the solar arrays and the allocated M2 Site to ensure there is no conflict between the two developments. In addition, the Scheme should be developed to ensure that it does not impede access to the M2 allocation either through physical constraints or by limiting the amount of mineral related traffic that can use the existing A509 access. With mitigation the development of Green Hill F should not significantly impact the exploitation of the sand and gravel reserves within M2 Allocation and thus should not have an adverse impact on mineral supply within Northamptonshire during the period of the NM&WLP.
- 11.8.31 Green Hill F is located within the area of focus for future mineral extraction exploiting glacial and pre-glacial sand and gravel deposits identified in the NM&WLP. The deposits are protected by the MSA and have already proved to be of economic value. The deposit already has a suitable access to the A509. It is therefore conceivable that the mineral reserve in the MSA could be considered as a potential source of sand and gravel over the next 60 years. The development of the Scheme would make these reserves unavailable during the life of the Scheme thus restricting the potential sources of supply of sand and gravel over that period. The significance of this impact is difficult to assess given the future demand for sand and gravel is unknown, the quantity and quality of the sand and gravel deposit within the MSA are unknown and the fact there are other potential sources of supply within Northamptonshire.
- 11.8.32 The magnitude of the impact of Green Hill F on mineral resources is considered to be medium and the significance of effect is considered to be major/moderate effect (significant for the purposes of the assessment) without additional mitigation.
- 11.8.33 The Cable Route Search Area west of Green Hill F, linking Green Hill G to Green Hill F extends into a MSA protecting further glacial and pre-glacial sand and gravel resources.
- 11.8.34 The magnitude of the impact of the Cable Route Search Area connecting Green Hill sites F and G to the BESS is considered to be low and therefore the significance of effect is Minor (not significant for the purposes of the assessment).



Green Hill G

- 11.8.35 Green Hill G covers a narrow area of safeguarded sand and gravel in the southern western corner. Although part of much larger MSA, within Green Hill G the potential exploitation of this reserve is already constrained by the A428 to the south and A509 to the west leaving the available deposit as a thin isolated strip which is unlikely to be of any practical economic value. In the southeastern corner, there is a second sand and gravel MSA. This is an isolated deposit of sand and gravel which is partly within Green Hill G. The MSA extends beyond Green Hill G to the north and east. Although it may well contain an economic reserve of sand and gravel, working the deposit is constrained by the presence of overhead power cables, public rights of way and built development. Given the more extensive deposits of sand and gravel elsewhere in the locality it seems unlikely these mineral reserves would be required during the life of the Scheme.
- 11.8.36 Green Hill G is also with a MSA protecting limestone deposits, this affects the southern fringe of the site adjacent to the A428 and the southeastern corner. This is the northern edge of the MSA which covers a large area that extends well to the south of the Green Hill G. Being on the periphery of the identified mineral deposit, the mineral contained within Green Hill G is likely to be a thinner and of poorer quality than elsewhere. There are extensive deposits of limestone elsewhere within Milton Keynes. In the case of the development of Green Hill G, the Scheme would inhibit exploitation of these mineral resources for the life of the Scheme. The impact is not considered significant as the safeguarded sand and gravel deposits lie outside the preferred areas for extraction of sand and gravel resources within Milton Keynes identified in the MKMLP. The deposits of safeguard limestone within Green Hill G have the most significant potential for crushed rock production for aggregate uses. The MKMLP does not identify a specific production rate for limestone for aggregate purposes nor does it make any specific allocations for crushed rock. The temporary sterilisation of these deposits would not have an impact on aggregate supply within Milton Keynes.
- 11.8.37 The magnitude of the impact of Green Hill G on mineral resources is considered to be low and the significance of the effect is considered to be minor effect (not significant for the purposes of the assessment).

11.9 Additional Mitigation Measures

- 11.9.1 The following additional mitigation measures have been identified to be incorporated into the Scheme design:
- To mitigate the impact on identified Safeguarded Mineral Resources, within MSAs the Cable Corridor should be designed so that wherever possible cable routes follow existing infrastructure corridors or alternatively follow the edge of significant landscape features rather than directly crossing open fields. Such an approach avoids creating a further obstruction to the future exploitation of the mineral resource.
 - The existing vehicular access between the mineral extraction allocation identified in the NM&WLP Policy 4 Site M2: Strixton - Bozeat and the A509 will be maintained.
 - Mitigation are incorporated into the Scheme's design to avoid any conflict between the development of the Scheme and the winning and working of mineral within the NM&WLP Policy 4 Site M2 allocation. These measures are suggested to include reinforcing the hedge planting between the Green Hill F and the Site M2 allocation to provide addition mitigation from the effects of dust emissions from mineral working.
 - Where the Cable Corridor crosses areas of permitted mineral extraction to the south of Earls Barton: (a) the route should be either restricted to areas already subject to mineral extraction or b) the timetable for the installation of the cable should be designed to facilitate prior extraction of any mineral reserve.

11.10 Residual Effects

- 11.10.1 Whilst at this stage of the project, residual effects have not been fully assessed, it is anticipated that through the use of further mitigation measures the magnitude of the impact of Green Hill F on mineral resources is considered to be low and the magnitude of impact of the final Cable



Corridor between Green Hill E and Green Hill BESS is considered to be negligible and thus both are considered a minor effect (not significant).

11.10.2 Following the implementation of the appropriate site-specific mitigation measures identified during the decommissioning phases, the residual effects on mineral resources are determined to be negligible.

11.10.3 On completion of decommissioning phase, all surface development associated with the Scheme would have been removed and the underlying mineral resource would be available to be extracted if required. Any remaining below ground infrastructure, such as cabling ducts, would be removed as part of any mineral operations. This would be no different to removing other redundant subterranean infrastructure such as agricultural land drains.

11.11 Cumulative Effects

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

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

Cumulative effects

11.11.3 Following mitigation, it is considered that there will be no cumulative effects on mineral resources in the Study Area arising from the Scheme in conjunction with other similar developments or from the combined effect of a set of developments.

11.11.4 Any other proposals for development that sterilise safeguarded mineral resources, particularly those allocated for future mineral extraction in the NM&WLP or MKMLP, could have an impact on the availability of sand and gravel in Northamptonshire or Milton Keynes. No other developments have been identified that affect permitted or allocated reserves. The total potential impact on safeguarded mineral reserves is considered small as this proposal only affects 0.6% of safeguarded sand and gravel reserves in Northamptonshire for a temporary period. In Milton Keynes the proportion of safeguarded mineral reserves affected is estimated at less than 0.1% for both sand and gravel and limestone again for a temporary period.

In-combination effects

11.11.5 There are considered to be no in-combination effects from inter-topic relationships following respective mitigation that would cumulatively impact the Scheme.

11.11.6 The assessment of in-combination effect interactions has concluded that there is no potential for significant effect interactions as a result of the Scheme. Where effect interactions are predicted to happen, it is acknowledged that it may slightly increase the impact on the receiving receptor or local community, but it is not expected to be to a degree where together it noticeably elevates the significance of the likely effects above what is already reported in Environmental Statement.

11.11.7 The Scheme's combined impact on any mineral resource in any one area within the Scheme is limited to the development taking place in that area. For example, the development of the Green Hill A would not have any impact on any mineral resource contained elsewhere within the Scheme. There are not considered to be any in combination effects in terms of mineral resources.

11.12 Summary

11.12.1 This chapter of the PEIR has identified the existing environment in relation to Mineral resources and the assessment work that has been undertaken to date based on a desk top review of published geological information and the provisions of the relevant minerals local plans.

11.12.2 Preliminary mitigation measures are being explored and have been described with potential residual effects outlined. These include:



- Ensuring the Cable Corridor is designed to avoid creating further obstructions to future mineral extraction.
- Ensuring vehicular access between the mineral extraction allocation identified in the NM&WLP Policy 4 Site M2 and the A509 is maintained and available for quarry related traffic.
- Ensure adequate mitigation is provided to avoid any conflict between the development of the Scheme and the winning and working of minerals
- Where the Cable Corridor crosses areas of permitted mineral extraction, these are either restricted to areas already worked or allow the prior extraction of any remaining mineral reserve.

11.12.3 To complete the minerals assessment, in accordance with the Scoping Opinion, further discussion and consultation with all the respective minerals planning authorities on the implications for mineral supply arising from the Scheme will be undertaken to inform the ES. The impact on mineral resources within the Cable Route Search Area will be reviewed once the cable corridor is determined.



References

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- Ref.4 National Policy Statement for Electricity Networks Infrastructure Department for Energy Security & Net Zero, November 2023
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- Ref.7 Northamptonshire Minerals and Waste Local Plan Adopted July 2017, Northamptonshire County Council.
- Ref.8 Northamptonshire Minerals and Waste Local Plan Minerals and Waste Monitoring Report 2023, West and North Northamptonshire Councils
- Ref.9 The Milton Keynes Minerals Local Plan (July 2017).
- Ref.10 Milton Keynes Local Aggregates Assessment 2022 October 2022
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