



OAKLANDS FARM SOLAR PARK

Applicant: Oaklands Farm Solar Ltd

Environmental Statement

Chapter 9 – Ground Conditions

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Oaklands Farm Solar Park - Environmental Statement Volume 1

Chapter 9: Ground Conditions

Final report

Prepared by LUC

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Chapter 9

Ground Conditions

Introduction

9.1 This chapter considers the potential effects of the Proposed Development on ground conditions. The assessment was undertaken by Yellow Sub Geo Ltd.

9.2 This chapter provides a synopsis of the relevant legislation and guidance documents with respect to ground conditions. It describes the assessment methodology and then details the baseline ground conditions on site, as informed by a Land Quality Desk Study and Preliminary Coal Mining Risk Assessment (**Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment**). Where relevant, this chapter then provides an assessment of the likely environmental effects and, where these are considered to be significant, the proposed mitigation measures required to avoid, prevent, reduce or offset any adverse effects.

9.3 This chapter considers the effect of construction phase activities on the ground conditions beneath the Site, due to the direct interaction of the works with the ground, including potential for contamination, disturbance and erosion of the ground. This includes consideration of groundwater quality as a result of mobilisation of contamination by the works. **Chapter 8: Water Resources and Flood Risk** considers the potential effect that the migration of silt and other substances may have on watercourses. It also considers the potential effects of the Proposed Development on alteration to drainage of the land. **Chapter 15: Agriculture and Land Use** considers agricultural land further in relation to land use and impacts of the loss of land on farming activity.

9.4 This chapter is supported by **Figure 9.1: Field and historic map observations** which is referenced throughout the text and which can be found in **Volume 2**.

9.5 The following appendix is also referred to throughout this chapter and can be found in **Volume 3**:

■ Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment

Scope of the Assessment

9.6 The ground conditions topic area was proposed within the Scoping Report to be scoped out of the assessment in full. This was on the basis that there were no anticipated significant effects on ground conditions associated with the Proposed Development. The Scoping Opinion provided by the Planning Inspectorate indicated that the subject area should be included within the scope of the assessment. This chapter provides an assessment of the subject area in accordance with this opinion.

Effects Assessed in Full

9.7 The operation of the Proposed Development is not considered to have likely significant effects on ground conditions, as discussed further in paragraph 9.13 below. During the construction phase there are certain aspects of the Proposed Development that may adversely affect ground conditions prior to mitigation.

Construction phase

9.8 The following aspects are considered to have the potential to affect the ground conditions during the construction phase of the Proposed Development:

- Direct effects during construction on the ground, including:
 - Leaks and spills of pollutants.
 - Erosion of sediment and soils.
 - Compaction of soils.
 - Disturbance of the ground to install foundations for the Proposed Development infrastructure and access tracks.
- Direct and indirect effects on ground conditions as a result of the construction works encountering contaminated materials within potential historical backfill to former gravel pits and marl pits present in some areas of the Site. This includes the potential for mobilisation of such materials in air (as dust, gasses and vapours) and in groundwater.

- Indirect effects on potential mineral resource sterilisation by the Proposed Development.
- In each of these aspects, mitigation will be in-built within the design and implementation of the construction phase so as to prevent the likelihood that a significant effect may occur.

Operational phase

9.9 Due to the nature of the Proposed Development, the majority of operational effects have been scoped out of detailed assessment (see paragraph 9.12 below). However, indirect effects on groundwater and soils due to the change from intensive arable agriculture to low intensity grazing beneath the panels, are considered further.

Cumulative Impacts

9.10 The construction and operational effects on ground conditions have been assessed alongside those effects from three potentially cumulative schemes within a 1km radius of the Site. These schemes are as follows:

- DMPA/2023/0170 The installation of battery energy storage, substation, transformer stations, site access, internal access track, security measures, access gates, and biodiversity enhancements on Land to the North West of Barn Farm and to the South of Walton Road and the Former Drakelow Power Station.
- DMOT/2023/0621 Screening Opinion request under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 in relation to proposed development of an Energy Storage System (ESS) and substation development.
- DMOT/2020/0598 Consultation from the County Council on application ref. CW9/0420/7 seeking permission for the construction and operation of an 18MW Renewable Energy Centre and associated infrastructure on land at the former Drakelow C Power Station, Walton Road, Drakelow. This is now under construction.

9.11 A 1km radius is considered appropriate due the low likelihood of combined effects from other development schemes beyond this geographical extent.

Effects Scoped Out

9.12 On the basis of the desk based and field survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects, policy guidance and standards, the following topic areas have been ‘scoped out’ of detailed assessment:

- Operational phase effects on ground conditions. This is on the author’s professional opinion that the Proposed Development’s interaction with ground conditions will all have taken place during the construction phase, including the remediation of any contaminated materials within infilled pits, if present (with the exception of that identified at paragraph 9.9).
- Interaction of the Proposed Development with coal mining and associated potential land instability. The preliminary coal mining risk assessment (**Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment**) has identified that former coal workings lie beneath the Site in a small area, but at depths in excess of 330m. The intervening rock does not comprise coal measures and the depth to coal prohibits the likelihood of unrecorded mine shafts within the Site. The Coal Authority has advised that they agree to scoping this subject out of the EIA (see **Table 9.1**).

Assessment Methodology

Legislation, Policy and Guidance

Legislation

9.13 This assessment is carried out in accordance with the principles contained within the following legislation:

- Part IIA of the Environmental Protection Act 1990 (EPA)¹. This is the contaminated land regime which provides a risk-based approach to the identification of risks to human health or the environment from contaminated land, based on the pathway-receptor concept.

¹ Environmental Protection Act 1990. Available at: <https://www.legislation.gov.uk/ukpga/1990/43/contents>
[Accessed 29/09/23]

- Environment Act 1995². This sets out liabilities relating to contaminated land.
- Control of Substances Hazardous to Human Health Regulations 2002³. This requires employers to control substances that are hazardous to health.
- The Water Environment (Water Framework Directive) (England and Wales) Regulations, 2017 (2000/60/EC)⁴. This sets out the basis for assessing quality of surface waters and groundwaters.
- Groundwater Directive 2006/118/EC transposed to English and Welsh law by the Environmental Permitting (England and Wales) Regulations 2016, SI 2016/1154⁵. This sets out the regime for groundwater quality standards and introduces measures to prevent or limit pollution of groundwater.
- Environmental Damage (Prevention and Remediation) Regulations 2015⁶. This sets out the requirements where damage to land or water by pollution is caused.
- The Environmental Permitting (England and Wales) Regulations 2016. This sets out the environmental permitting regime.
- Control of Asbestos Regulations 2012⁷. This sets out the duties for managing risk of asbestos, primarily in buildings but it also has ramifications for asbestos in soil.
- Contaminated Land (England) Regulations 2006⁸. This sets out the actions for remediation of contaminated land.

² Environment Act 1995. Available at: <https://www.legislation.gov.uk/ukpga/1995/25/contents> [Accessed 29/09/23]

³ The Control of Substances Hazardous to Health Regulations 2002, SI 2002/2677. Available at: <https://www.legislation.gov.uk/uksi/2002/2677/regulation/7/made> [Accessed 29/09/23]

⁴ The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. SI 2017/407. Available at: <https://www.legislation.gov.uk/uksi/2017/407/made> [Accessed 29/09/23]

⁵ Environmental Permitting (England and Wales) Regulations 2016, SI 2016/1154. Available at: <https://www.legislation.gov.uk/uksi/2016/1154/contents/made> [Access 29/09/23]

⁶ Environmental Damage (Prevention and Remediation) Regulations 2015. SI 2015/810. Available at: <https://www.legislation.gov.uk/uksi/2015/810/contents> [Accessed 29/09/23]

⁷ Control of Asbestos Regulations 2012. SI 2012/632. Available at: <https://www.legislation.gov.uk/uksi/2012/632/contents/made> [Accessed 29/09/23]

⁸ Contaminated Land (England) Regulations 2006. SI 2006/1380. Available at: <https://www.legislation.gov.uk/uksi/2006/1380/contents/made> [Accessed 29/09/23]

- Construction (Design & Management) Regulations 2015⁹. This requires consideration of the health and safety of workers during the construction phase of a project.

National Policy

National Policy Statements

9.14 The Department of Energy and Climate Change Overarching National Policy Statement for Energy (EN-1)¹⁰ notes that there may be negative effects on geological conservation (Section 4.3.1), health (including potential increased water pollution, dust and hazardous waste (Section 4.13.3)) and agricultural land (Section 5.10.8). It provides advice on the siting of projects such that the design:

- a) conserves and enhances geological conservation interests where present (Section 5.3.4)
- b) minimises potential impacts on the best and most versatile agricultural land (Section 5.10.8)
- c) considers potential risks posed by land contamination (also Section 5.10.8)
- d) the safeguarding of mineral resources as far as possible, taking into account the long-term potential of the land use after future decommissioning (Section 5.10.9).

9.15 The November 2023 draft NPS EN-1¹¹ to be designated is in keeping with the above current version. However, with respect to contamination, it requires consideration of opportunities for remediation of said contamination where possible and to develop and implement a Soil Management Plan (Section 5.11.14).

9.16 The November 2023 draft NPS (EN-3)¹² to be designated provides advice regarding the use of previously developed land, brownfield land, contaminated land, industrial land or lower grade agricultural land where possible. However, it also notes that land type should not be a

⁹ Construction (Design & Management) Regulations 2015. SI 2015/51. Available at: <https://www.legislation.gov.uk/uksi/2015/51/contents/made> [Accessed 29/09/23]

¹⁰ Department for Energy and Climate Change (2011) Overarching National Policy Statement for Energy (EN-1)

¹¹ Department for Energy Security and Net Zero (2023) Draft Overarching National Policy Statement for Energy (EN-1)

¹² Department for Energy Security and Net Zero (2023) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3)

predominating factor in determining the suitability of the site location (Section 2.10.29). The policy also provides advice on the storage of stripped topsoil and subsoil for future site restoration (Section 2.10.81).

National Planning Policy Framework

9.17 The National Planning Policy Framework (NPPF)¹³ summarises, in a single document, the Government’s planning policies for England and how these are expected to be applied.

9.18 The NPPF introduces the presumption in favour of sustainable development at the heart of the framework, where Section 2, Paragraph 11 states that local planning authorities should apply this presumption in favour of sustainable development when creating plans, and assessing and determining development proposals.

9.19 Policies and objectives which are of particular relevance to ground conditions and contamination include the following:

9.20 Paragraph 180 states that *“planning policies and decisions should contribute to and enhance the natural and local environment by:*

- *a. protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan)....;*
- *e. preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
- *f. remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate”.*

9.21 In Section 15, paragraph 189 also states that: *“Planning policies and decisions should ensure that:*

¹³ Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework

- *a. a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);*
- *b. after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*
- *c. adequate site investigation information, prepared by a competent person, is available to inform these assessments”.*

Local Policy

9.22 South Derbyshire Local Plan¹⁴ Policy SD4 covers contaminated land and the mining legacy. It notes the development on land which includes made ground, or is unstable, contaminated or potentially contaminated, will only be granted permission where the applicant has demonstrated through appropriate investigations, that the proposed development will incorporate any necessary remediation measures to protect human health and/or the natural environment.

9.23 The Policy also notes that the Council will work with relevant stakeholders to bring forward the regeneration of derelict, unstable or contaminated sites.

Guidance

9.24 This assessment is carried out in accordance with the principles contained within the documents described below:

Contaminated land

9.25 In England, current technical guidance on land contamination is as follows:

- Land Contamination Risk Management Guidance¹⁵.

¹⁴ South Derbyshire District Council (2016) Adopted Local Plan Part 1.

¹⁵ Environment Agency (2023) Land Contamination Risk Management Guidance. Available at: <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm> [Accessed 29/09/23]

- Land Contamination Technical Guidance¹⁶.
- Land Affected by Contamination¹⁷.

9.26 In October 2020 (updated July 2023), the Environment Agency published the Land Contamination Risk Management (LCRM) guidance. This has replaced two previous versions of the same guidance, and has formally replaced the Model procedures for the management of land contamination (CLR11), which had formed the backbone of contaminated land assessment in the UK since 2002.

9.27 LCRM is split into four guides. The first of these provides the background to contaminated land and sets out the sequencing and structure of the subsequent guides. The other three guides describe the three stages of contaminated land assessment; risk assessment, options appraisal and remediation & verification.

9.28 The Department for Levelling Up, Housing and Communities updated Planning Practice Guidance on land affected by contamination and on water supply, wastewater and water quality on 22nd July 2019¹⁷. This guidance provides guiding principles on how planning can deal with land affected by contamination and on how planning can ensure water quality and the delivery of adequate water and wastewater infrastructure.

Investigation and assessment of ground conditions

9.29 Numerous British Standards cover the desk-based work, fieldwork and laboratory testing entailed in investigating and assessing brownfield land, each of which contemplates the sequential progression of investigation and assessment from desk-based studies through to detailed intrusive investigation of soils and rock. Of these, two noteworthy standards are:

- BS 5930:2015+A1:2020: Code of practice for ground investigations¹⁸.

¹⁶ Environment Agency (2022) Land Contamination Technical Guidance. Available at: <https://www.gov.uk/government/collections/land-contamination-technical-guidance> [Accessed 29/09/23]

¹⁷ Department for Levelling Up, Housing and Communities (2019) Land Affected by Contamination. Available at: <https://www.gov.uk/guidance/land-affected-by-contamination> [Accessed 29/09/23]

¹⁸ British Standards Institute (2020) BS 5930:2015+A1:2020: Code of practice for ground investigations

- BS 10175:2011+A2:2017: Investigation of potentially contaminated sites – Code of practice¹⁹.

Construction phase

- Guidance on the control of effects during construction works is provided in the document CIRIA C532 (2001) Control of Pollution from Construction Sites.²⁰.

Consultation

9.30 In undertaking the assessment, consideration has been given to the scoping responses and other consultation which has been undertaken as detailed in **Table 9.1**.

¹⁹ British Standards Institute (2017) BS 10175:2011+A2:2017: Investigation of potentially contaminated sites – Code of practice

²⁰ CIRIA (2001) C532 Control of Pollution from Construction Sites

Table 9.1: Consultation Responses

| Consultee | Issue Raised | Response/Action Taken |
|---|---|--|
| Scoping Consultation Response | | |
| Coal Authority 02/09/21 | Advised that whilst the site falls within the coalfield, it is located outside the defined Development High Risk Area; meaning that there are no recorded coal mining legacy hazards at shallow depth that could pose a risk to land stability. Advised that coal mining need not be scoped into the assessment and no further consultation with them will be required. | A Preliminary Coal Mining Risk Assessment is provided at Appendix 9.1 . |
| Derbyshire County Council 20/09/21 | Advised that a small area of the far north of the Site lies within a Mineral Consultation Area | While the red line boundary includes a large proportion of the former Drakelow Power Station, only a narrow corridor will be used for the grid connection once the point of connection is known, therefore possible sterilisation of resources is considered to be negligible. Nevertheless, mineral resources are considered in paragraph 9.45 for completeness. |

| Consultee | Issue Raised | Response/Action Taken |
|--|---|--|
| Drakelow Parish Meeting 25/08/21 | Advised that ground conditions should be scoped into the assessment. | Ground conditions considered within the assessment. |
| Environment Agency 20/09/21 | Welcomes the undertaking and submission of a desk top study of ground conditions. No further requirements. | Desk top study provided in Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment. |
| Natural England 20/09/21 | Requirement for an Agricultural Land and soil survey. Scoping into the Environmental Statement (ES) and assessment of impact on soils | Agricultural Land surveys are included in Appendix 15.1: Agricultural Land Classification Survey for Oaklands Farm and Appendix 15.2: Agricultural Land Classification Survey for Park Farm and use is covered in this assessment. Chapter 15: Agriculture and Soils covers the impacts of the loss of this land on farming activity. |
| Public Health England 17/09/21 | Recommends that a CEMP be provided to demonstrate that construction phase effects can be controlled and mitigated. Sets out guidance for assessment of emissions to air and water. | The Outline Construction and Environmental Management Plan (CEMP) is included at Appendix 4.3. |

| Consultee | Issue Raised | Response/Action Taken |
|-----------|---|---|
| | <p>Requirements for an assessment of land quality are set out, including consideration of emissions to and from the ground associated with;</p> <ul style="list-style-type: none"> a) pre-existing ground conditions; b) construction-phase activities c) re-use of soils. | <p>Nature of the greenfield site and the low-impact development limits potential for emissions to air from disturbance of ground conditions. Dust particulates are considered herein in accordance with the guidance provided in terms of human health and are considered further in Appendix 16.1: Air Quality Assessment.</p> <p>Land quality is considered within this chapter, specifically;</p> <ul style="list-style-type: none"> a) pre-existing land conditions are considered in Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment b) and c) control of emissions during construction-phase and re-use of soils are considered within Appendix 4.3: Outline Construction and Environmental Management Plan. |

| Consultee | Issue Raised | Response/Action Taken |
|--|--|---|
| Rosliston Parish Council and Walton- on-Trent Parish Council 17/09/21 | Does not agree with the scope of proposed significant effects in relation to socio-economics as the Proposed Development falls within grades 2 and 3 agricultural land and therefore land use should not be scoped out of the ES. | Agricultural Land surveys are included in Appendix 15.1: Agricultural Land Classification Survey for Oaklands Farm and Appendix 15.2: Agricultural Land Classification Survey for Park Farm . Land use is covered in Chapter 15: Agriculture and Soils . |
| South Derbyshire District Council 07/09/21 | No points raised with respect to ground conditions. | N/A |
| PEIR Consultation Response | | |
| Coal Authority 12/05/22 | Confirmed the Site does not fall within the defined Development High Risk Area and is instead located within the defined Development Low Risk Area and therefore the Coal Authority has no comments to make on the Proposed Development. | Noted. |

| Consultee | Issue Raised | Response/Action Taken |
|--|---|---|
| Derbyshire County Council (DCC) and South Derbyshire District Council (SDDC) 06/06/22 | <p>Members have raised a number of objections which are summarised below:</p> <p>The proposal will lead to the loss of good quality agricultural land.</p> <p>This agricultural land is valuable and is important nationally to ensure food security.</p> <p>DCC do not have any objections to this proposal in terms of its impact on the sand and gravel resource.</p> | <p>Agricultural Land surveys are included in Appendix 15.1: Agricultural Land Classification Survey for Oaklands Farm and Appendix 15.2: Agricultural Land Classification Survey for Park Farm. Land use is covered in Chapter 15: Agriculture and Soils.</p> <p>Noted.</p> |
| Environment Agency 26/05/22 | <p>Advised that mitigation measures need to be identified and considered to ensure sediment does not enter the tributary of the Mease or the River Trent especially during wet weather. The plans do include a plan to introduce hedgerows and wildflower meadows around the panels which should help act as mitigation against silt and other sediment entering the watercourse however these would need to be maintained.</p> | <p>The detailed CEMP for the Proposed Development will include measures to control surface water run off during the construction phase including provision to ensure sediment is allowed to settle prior to discharge to a watercourse.</p> <p>During operation, the Site will provide betterment when compared to the baseline conditions as the fields will be taken out of</p> |

| Consultee | Issue Raised | Response/Action Taken |
|---------------------------------------|---|---|
| | | <p>intensive agricultural use which can include significant areas and periods of bare earth over the winter months. The Site will instead be allowed to vegetate in a controlled manner.</p> <p>These are covered in this assessment.</p> |
| Targeted Consultation Response | | |
| <p>Coal Authority 23/03/23</p> | <p>Confirmed the Site does not fall within the defined Development High Risk Area and is instead located within the defined Development Low Risk Area and therefore the Coal Authority has no comments to make on the Proposed Development.</p> | <p>Noted.</p> |
| <p>DCC 24/03/23</p> | <p>Advised that the site initially included a small area identified for inclusion as a Sand and Gravel Safeguarding Area in the Draft Derbyshire and Derby Minerals Local Plan. The realignment of the proposal boundary now largely excludes this safeguarding area other than a short section of cable routing parallel to Drakelow Road to the north of Grove Wood. This reduces any potential conflict with the</p> | <p>Noted.</p> |

| Consultee | Issue Raised | Response/Action Taken |
|-----------------------------|---|---|
| | allocation for safeguarding in the existing or emerging Minerals Local Plan and is unlikely to impact on the availability of the resource. | |
| Natural England 21/04/23 | <p>Commented that soil is a finite resource which plays an essential role within sustainable ecosystems, performing an array of functions supporting a range of ecosystem services, including storage of carbon, the infiltration and transport of water, nutrient cycling, and provision of food. It is recognised that a proportion of the agricultural land will experience temporary land loss. In order to both retain the long term potential of this land and to safeguard all soil resources as part of the overall sustainability of the whole development, it is important that the soil is able to retain as many of its many important functions and services (ecosystem services) as possible through careful soil management and appropriate soil use, with consideration on how any adverse impacts on soils can be avoided or minimised.</p> <p>Consequently, Natural England would advise that to safeguard soil resources and agricultural land, including a required commitment for the preparation of reinstatement, restoration and aftercare plans;</p> | <p>An Outline Soil Management Plan (oSMP) is included as an appendix to the CEMP (Appendix 4.3).</p> <p>The Applicant is aware of Defra’s Construction Code of Practice for the Sustainable Use of Soils on Construction Sites and will adhere to the guidance for the handling and trafficking of soils. Further details of the handling and trafficking of soils is included in the oSMP in Appendix 4.3.</p> <p>ALC grading and land restoration plans returning the land to the baseline ALC grade is discussed further within Chapter 15: Agriculture and Soils. Decommissioning plans are included within the oSMP in Appendix 4.3.</p> |

| Consultee | Issue Raised | Response/Action Taken |
|-----------|--|---|
| | <p>normally this will include the return to the former land quality (ALC grade).</p> <p>General guidance for protecting soils during development is also available in Defra’s Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, and should the development proceed , we recommend that relevant parts of this guidance are followed, e.g. in relation to handling or trafficking on soils in wet weather.</p> <p>The British Society of Soil Science has published the Guidance Note Benefitting from Soil Management in Development and Construction which sets out measures for the protection of soils within the planning system and the development of individual sites, which we also recommend is followed.</p> <p>Solar Parks – Further information</p> <p>For additional information relating to Solar Parks please refer to the Technical Information Note at the link below, which provides a summary of advice about their siting, their potential impacts and</p> | <p>The Applicant is aware of the British Society of Soil Science’ Guidance Note: Benefitting from Soil Management in Development and Construction and will adhere to measures for protecting soils. Measures to protect soils are discussed further in included in the oSMP in Appendix 4.3.</p> |

| Consultee | Issue Raised | Response/Action Taken |
|------------------|--|-----------------------|
| | mitigation requirements for the safeguarding of the natural environment. | |
| SDDC 21/04/23 | State that their comments on the PEIR still remain valid. | Noted. |

Study Area

9.31 The study area is equivalent to the Site for the Proposed Development, plus a buffer of 500m shown in **Figure 9.1**. This buffer is considered to be sufficient and proportionate based on professional experience for sites located in a predominantly rural / agricultural area. Effects on ground conditions will not be experienced outside a 500m buffer. No potentially significant contaminative sites have been identified outside of this buffer which, if present, would be unlikely to have a significant impact on the Site.

Desk Based Research and Data Sources

9.32 The desk-based research for this chapter is detailed within **Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment**, within which the full list of data sources is referenced. **Appendix 9.1** includes environmental database reports covering the study area (Envirocheck Ref. 279264891_1_1 and Ref. 283096012_1_1) and a CON29M coal mining report from the Coal Authority (Ref. 51002546237001).

Field Survey

9.33 A site walkover survey was undertaken to inform the writing of the Land Quality Desk Study. The visit was undertaken on 16 July 2021 and comprised a combination of walkover and, where access allowed, vehicular survey of the entire Site area and its immediate surroundings within the aforementioned buffer area. This survey enabled the identification of historical gravel and marl pits, general ground conditions and survey of the watercourses and water features on Site and in the immediate surrounding area. A second visit was undertaken on the 23rd of June 2022 to ascertain the location of land drains across the Site area.

Assessing Significance

9.34 The following criteria have been defined for use in assessing the sensitivity of receptors, the magnitude of anticipated change to receptors in the context of ground conditions caused by the development and the resulting significance of effect that is created.

Sensitivity

9.35 The following table provides the framework for defining the sensitivity of receptors. We have not included a negligible sensitivity classification for ground conditions as this is not considered appropriate in line with EIA best practice.

Table 9.2: Classification of sensitivity

| Classification | Definition |
|----------------|---|
| High | The receptor has little ability to absorb change without fundamentally altering its present character, is of high environmental value, or of international importance. |
| Medium | The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional or national importance. |
| Low | The receptor has high capacity to absorb change without significantly altering its present character, has low environmental value, or is of local importance. |

Magnitude of change

9.36 The potential changes brought about by the Proposed Development are identified and classified according to their magnitude of change. These changes are adverse unless specifically labelled as being beneficial. The categories of the magnitude of change are defined below.

Table 9.3: Classification of magnitude of change

| Classification | Example definitions |
|----------------|---|
| Large | Construction phase: Activities result in a major pollution release (Category 1) or create / remove a pollutant linkage with a substantial pollutant source. Serious risk / improvement to human health / life. |

| Classification | Example definitions |
|----------------|---|
| | Operational Phase: The Proposed Development introduces or removes a large-scale source of potential contamination or a pollutant linkage for the same. |
| Medium | <p>Construction phase: Activities result in a moderate pollution release (Category 2) or create / remove a pollutant linkage with moderate pollutant source.</p> <p>Moderate risk / improvement to human health / life.</p> <p>Operation phase: The Proposed Development introduces or removes a relatively small-scale source of potential contamination or a pollutant linkage for the same.</p> |
| Small | <p>Construction phase: Activities result in a minor pollution release (Category 3) or create / remove a pollutant linkage with a minor pollutant source. Temporary pathway or receptor is introduced or removed during construction phase.</p> <p>Minor risk / improvement to human health.</p> <p>Operational phase: The Proposed Development introduces or removes a minor source of potential contamination or a pollutant linkage for the same.</p> |
| Negligible | There would be no perceptible changes. |

Significance

9.37 The predicted significance of the effect was determined through a standard method of assessment based on professional judgement, considering both sensitivity and magnitude of change as detailed in **Table 9.4** below. Major and moderate effects are considered significant in the context of the EIA Regulations.

Table 9.4: Matrix for assessment of significance of effects

| | | Magnitude of change | | | |
|-------------|--------|---------------------|----------|------------|------------|
| | | Large | Medium | Small | Negligible |
| Sensitivity | High | Major | Major | Moderate | Minor |
| | Medium | Major | Moderate | Minor | Negligible |
| | Low | Moderate | Minor | Negligible | Negligible |

Assessment Limitations

9.38 The assessment of cumulative effects within this chapter assumes that other schemes will adopt a similar range of mitigation measures in accordance with current legislation, guidance and best practice as shall be deployed in the Proposed Development.

9.39 It should be noted that the information used in this assessment is based on the desk study and Site walkover which are presented in **Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment**. It is considered that there is sufficient information to enable an informed decision to be taken to the identification and assessment of likely significant environmental effects on ground conditions.

Baseline Conditions

Site Topography and History

9.40 The Site predominantly comprises a series of agricultural fields from three different farms: Park Farm, Fairfield Farm and Oaklands Farm (see **Figure 1.4: Areas of the Site**). The fields are bordered by a combination of wooden fencing, mature hedgerows and small country roads. The fields are further bisected by access tracks and public footpaths. The Site is variable in elevation generally sloping down from an elevated high point of 92m above Ordnance Datum (m aOD) in the southern section of Site to around 64m aOD at the northern extent. **Figure 9.1** summarises the features identified during the site walkover and review of historical Ordnance Survey mapping.

9.41 It was also noted during a Site walkover that there are many localised changes in slope on Site. The changes in slope are more pronounced in the fields to the south which are undulating in nature. Some of these changes in slope are coincident with areas that are shown on historical Ordnance Survey mapping to be former gravel pits (at the edge of field P4) and marl pits (in Fields O4 & O11). The location of these features is illustrated in **Figure 9.1**. Historical mapping also indicates the location of a number of former ponds (in Fields O15, O14, O21 & O12) and a former reservoir (in Field O5), which are no longer present and hence have likely been filled in. Structures labelled as New Barn were constructed in Field O12 in the 1880s and subsequently demolished in the 1990s, these features are also labelled on **Figure 9.1**.

Geology

9.42 British Geological Survey (BGS) geological mapping and historical boreholes confirm the geology at the Site to have limited to no superficial deposits overlying a significant thickness (in the region of 333 to 500m) of Triassic strata followed by the Coal Measures including productive coal seams at depth beneath the Site.

9.43 Superficial deposits are absent from the northern portion of the Oaklands Farm area and from the central-southern section of the Park Farm area. Diamicton (glacial till) is recorded as covering the southern half of the Oaklands Farm area, the northern half of Park Farm and the far east of the Park Farm area. A small area of glacio-fluvial deposits is recorded in the area of field P2. The stream corridor that crosses the south-west of Fairfield Farm and provides the connection between the two farms is shown as covered in alluvium. River Terrace Deposits are present to the north of Site in the area of the former Drakelow Power Station. Some peat is shown offsite to the west, but none is shown on the Site itself.

Mineral resources

9.44 The current development plan relating to minerals is made up of:

- The policies contained within the Derby and Derbyshire Minerals Local Plan (adopted 2000 and amended in 2002) - policies MP8, 9, 14, 20, 26, 30 and 31 have now expired.
- The policies contained within the Derby and Derbyshire Waste Local Plan (adopted 2005) - policy W1a has now expired.

9.45 DCC, in their response to the Targeted Consultation, note that the Site initially included a small area identified for inclusion as a Sand and Gravel Safeguarding Area in the Draft Derbyshire and Derby Minerals Local Plan. However, the revised red line boundary now largely excludes this safeguarding area other than a short section of cable routing parallel to Walton Road to the north of Grove Wood. DCC confirmed that this reduces potential conflict with the allocation for safeguarding in the existing or emerging Minerals Local Plan and is unlikely to impact the availability of the resource. Across the rest of the Proposed Development, the superficial geology and solid geology are such that key minerals are not present. This is confirmed by the DCC's Minerals Plan²¹, which does not detail any safeguarding or consultation areas within the footprint of the developable area.

9.46 DCC is in the process of updating the existing Minerals Local Plan with a new Minerals Local Plan to 2038. In December 2017 a report entitled Background Paper Mineral Safeguarding²² was prepared for the Spring 2018 consultation on the emerging Minerals Local Plan. This document sets out the rationale for Mineral Safeguarding Areas (MSAs), defined as *“an area of proven mineral resource that is considered to be of sufficient economic or conservation importance to warrant long term protection”*. Development within or close to (but not actually within), a mineral resource may lead to the sterilisation of part of the resource.

9.47 The background paper provides a map of the County's mineral resources which shows that the area of South Derbyshire within which the Site sits is underlain by predominantly Mercia mudstone and river valley sand and gravel (from the Trent valley). The map is too crude to point exactly where the Site is located but it is likely Mercia mudstone makes up the majority, if not all, of the Site. The background paper also identifies the mineral resources to be safeguarded in the emerging Minerals Local Plan; referring to the need to safeguard sand and gravel (as a *“strategic mineral of local and national importance”*), but not Mercia sandstone (*“of only limited local importance”*).

²¹ Derbyshire County Council (2002) Derby and Derbyshire Minerals Local Plan

²² Derbyshire County Council (2017) Derby and Derbyshire Minerals Local Plan – Towards a Minerals Local Plan: Spring 2018 Consultation. Background Paper Mineral Safeguarding. Available at: <https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/planning/planning-policy/minerals-local-plan/mineral-safeguarding-background-paper.pdf> [Accessed 29/09/23]

9.48 The exact location of proposed MSAs have not yet been identified. However, it can reasonably be concluded that the developable area of the Site will not be within an MSA due to the significant area of Mercia mudstone in this area.

Geohazards and land instability

9.49 The British Geological Society (BGS) list all geohazards that could exist on Site. Most hazards listed were classed as 'no hazard' to 'low hazard' with the exception of compressible ground, which is assessed as posing a 'moderate hazard'. This is anticipated to be related to the presence of alluvium along the stream corridor.

9.50 Zetica online mapping of risk associated with unexploded ordnance (UXO) indicate the Site to be at low risk of UXO²³.

Contaminated land

9.51 A desk study including preliminary conceptual site model and risk assessment is included within **Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment** which confirms that the Site is in agricultural use and has been throughout its history, thus provides little potential source term for contamination.

9.52 Notwithstanding this, the existence of historic marl and gravel pits and an historic infilled reservoir and ponds provides the potential for there to be localised made ground on site which may provide some limited point sources of contamination.

9.53 The use of pesticides and fertiliser as part of the ongoing agricultural practice onsite may have led to increased nutrient and chemical loading of shallow soils and subsequently impacted local groundwater, watercourses and water features. In the Park Farm area, field drains all run to the western boundary ditches running parallel with the tributary of the River Trent.

Soils and agricultural land

9.54 Aerial photographic imagery has been consulted to provide an overview of the agricultural use of the land. **Table 9.5** summarises the predominant agricultural practices between 2010 and 2021 as noted from aerial photography and the results of the farming questionnaire. Field

²³ Zetica Online Risk Map, updated 14th March 2022. <https://zeticauxo.com/downloads-and-resources/risk-maps/>

numbers referred to in **Table 9.5** are shown in **Figure 1.5**. Agricultural Land Classification (ALC) / Best and Most Versatile (BMV) grading can be found in **Chapter 15: Agriculture and Soils** and **Appendix 15.1: Agricultural Land Classification Survey for Oaklands Farm**.

Table 9.5: Agricultural practice

| Field(s) | Agricultural practice |
|--|---|
| Field O13 | Permanent grass, grazing. 5/6 years to reseed |
| Fields O14 to O16. | Ploughed every 3-4 years on arable rotation (wheat, barley maize) and 2 years grass. Reseeded every 4 years. Fertilisers & agrochemicals usually annually 120 units nitrogen (N), 40 units phosphorous (P) & 40 units potassium (K). |
| Field O5 | Ploughed in 2013. No evidence of ploughing since that date. Arable rotation (wheat, barley maize) 3-4 years & 2 years grass. Reseeded every 4 years. Fertilisers & agrochemicals usually annually 120 units N, 40 units P & 40 units K. |
| Field O1 | Arable rotation (wheat, barley maize) 3-4 years & 2 years grass. Reseeded every 4 years. Fertilisers & agrochemicals usually annually 120 units N, 40 units P & 40 units K. |
| Fields O2, O4 and O21 | Permanent grass, grazing. 5/ 6 years to reseed. |
| Fields O19, O21, O22, O20, O10, O11, O3, and O7, | Ploughed annually for arable production. Arable rotation (wheat, barley maize) 3-4 years & 2 years grass. Fertilisers & agrochemicals usage comprises 120 units N, 40 units P & 40 units K annually. |
| Fields O24, O12, O6 and O8 | Permanent grass, grazing. |
| Fields F3, F2 and P2. | Grass pasture. |

Hydrogeology and hydrology

9.55 The alluvium and glaciofluvial deposits beneath some areas of the Site are classified by the Environment Agency (EA) as Secondary A Aquifers. These are defined by the EA as ‘permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers’.

9.56 The Edwalton Member bedrock beneath the Site is classified as a Secondary B Aquifer. These are defined by the EA as ‘predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering’.

Future Baseline in the Absence of the Proposed Development

9.57 Current land management practices lead to bare soil in winter periods and compaction of soils under agricultural vehicles during crop management. Continuation of these practices may exacerbate the effects of increased duration and intensity of rainfall events (as are expected from climate change modelling) and hence contribute to further deterioration in soil structure, soil carbon storage and overall soil health.

9.58 The continued use of the Site for intensive arable farming may prevent any improvement to current soil, groundwater or surface water quality and may cause further deterioration of it due to continued use of pesticides and fertilisers.

Implications of Climate Change

9.59 Current climate change projections (UKCP18) are for increased winter rainfall and an increase in heavy rain days. Given the arable nature of the majority of the land, and hence the exposure of soils due to ploughing on a regular basis, this will may lead to increased soil loss through erosion and run-off.

9.60 Increased rainfall and increased intensity of rainfall has the potential to lead to increased leaching and run-off of contaminants, both from point sources (e.g. discrete areas of made ground) and diffuse sources (e.g. agrochemicals).

9.61 The Proposed Development may help increase climate resilience with heightened water retention from the change of land use from agriculture to solar PV. Implementation of a sustainable drainage strategy included in **Appendix 8.1: Flood Risk Assessment and Outline Drainage Strategy**, will also increase resilience in relation to water scarcity and increasing flood risk due to climate change.

Design Considerations and Embedded Mitigation

9.62 The consultation responses have been used, together with the desk study in **Appendix 9.1: Land Quality Desk Study and Preliminary Coal Mining Risk Assessment** and professional judgement and experience, to guide the proposed construction design and methodology.

Construction Environmental Management Plan

9.63 The Applicant is committed to implementing the construction phase works in accordance with the Outline CEMP in **Appendix 4.3**. The CEMP will be a live document that will be reviewed and updated at regular intervals throughout the construction phase.

9.64 The purpose of the CEMP is to provide a series of outline considerations and measures that will be implemented during the construction phase in order to suitably control and mitigate the environmental impact of the Proposed Development.

9.65 The CEMP will set out the commitments to suitably limit the environmental impact of construction as part of the Proposed Development. It will demonstrate that the Proposed Development can be delivered in such a way as to minimise all environmental impacts during the construction phase to non-significant impacts.

9.66 It will be the responsibility of the Main Contractor to build upon the outline CEMP and provide a detailed CEMP as part of their contractual requirements on the Proposed Development. This detailed CEMP will provide detailed information as to how the Main Contractor and their sub-contractors shall design and implement the principles set out within the outline CEMP. The final detailed CEMP will be submitted to the LPA for approval prior to commencement of Proposed Development and is secured by Requirement 5 in the draft Development Consent Order (DCO).

9.67 The following elements of the CEMP will minimise the impacts on soil and ground conditions:

- Phasing of works, particularly phasing of any required turf and topsoil strip, such that as little bare soil is exposed at any one time.
- Sealing of all soils in storage areas (stockpiles) using an excavator bucket at the end of each shift, to minimise the potential for sediment to be washed off during a rainfall event.
- Where long-term storage of soil is planned, vegetation on stockpiles shall be allowed to naturally regenerate and/ or be seeded to facilitate a cover of vegetation.
- The weather forecast will be monitored daily throughout the Proposed Development, in order to predict periods of likely heavy rainfall. Where heavy rainfall is predicted works may need to be suspended. Ahead of a period of forecasted heavy rain, the Site Management Team shall inspect the works to assess areas susceptible to sediment run-off and take additional precautions in accordance with current best practice.

9.68 A Soils Management Plan (SMP) has been incorporated into the Outline CEMP outlining measures to reduce any detrimental impact and degradation to soils on the Site. Measures such as stockpiling removed areas of topsoil and subsoil will be put in place to safeguard the resource for future restoration purposes.

Site investigation and remediation

9.69 In order to inform the design of the Proposed Development, a programme of intrusive targeted site investigation will be required. This is a pre-commencement requirement in the draft DCO (Requirement 6). During this process, the site investigation will target potential areas of made ground infill to former pits, reservoirs/ponds and in the area of former buildings at New Barn. Soil sampling, laboratory analysis and a suitable assessment shall then be undertaken in accordance with current best practice in order to ascertain the potential risk posed to ground conditions human health and the wider environment.

9.70 If this assessment determines that remediation or risk management is required in order to address any potential risks posed by made ground, a process of remediation options appraisal, remediation strategy, remediation implementation and verification shall be entered into. This work is standard practice and standard effective mitigation exists, improving the ground conditions such that any risks posed are reduced to acceptable levels.

Assessment of Construction Effects

9.71 The assessment of effects is based on the Proposed Development description as outlined in **Chapter 4: Project Description** and the embedded mitigation outlined above. Unless otherwise stated, potential effects identified are considered to be adverse.

Receptors

9.72 The key sensitive receptors are considered to be the superficial and bedrock strata including the presence of mineral resources onsite and the groundwater beneath the Site.

9.73 The superficial and bedrock strata beneath the Site are considered to be highly resilient to change. The groundwater is judged to be able to absorb some change but is already partially impacted by the current land management practices on Site and much of the surrounding farmland.

9.74 The sensitivity of the receptors are summarised in **Table 9.6** below. Impacts on surface water receptors are assessed in **Chapter 8: Water Resources and Flood Risk**.

Table 9.6: Receptors considered during the assessment

| Receptor | Importance* | Sensitivity (see Table 9.2) |
|--|--------------------|--------------------------------|
| Groundwater beneath the Site | Local | Medium |
| Superficial deposits and bedrock (soils) | Local | Low |
| Mineral resources | National/ regional | Medium |
| Soil (as a resource) | Local | Low |

*Importance is split into three categories: local, regional, national based upon geographical extent.

Predicted Construction Effects

9.75 The construction of the Proposed Development has the potential to cause changes to ground conditions, if unchecked by proper environmental controls. These impacts could take the form of:

- Pollution from fuels, oils and other chemicals that are being used and/ or stored onsite entering the soils and groundwater following spills, leaks or accidental releases (C1 – **Table 9.7**).

- Erosion of sediment/ silt due to exposed soils being eroded by rainfall (C2 – **Table 9.7**).

9.76 This would result in a medium magnitude of change to receptors of low (soils) and medium (groundwater) sensitivity which could result in a minor to moderate effect (significant).

9.77 Mitigation is embedded within the outline CEMP. The Proposed Development would adhere to a Safe System of Work under the Health and Safety at Work Act 1974 and CDM (2015).

9.78 The embedded mitigation is considered sufficient to reduce the potential medium magnitude of these changes and the effect would be **negligible (not significant)**.

9.79 The construction phase will involve the use of heavy machinery and plant within the agricultural fields onsite (C3 – **Table 9.7**). Whilst this will represent an intensive period of trafficking on the soil, it is not considered that this is any greater in magnitude than would occur from use of heavy agricultural plant and machinery in a typical growing season for arable crops. The potential magnitude of this change is therefore considered to be negligible on a receptor of low sensitivity (soils). The significance of effect would be **negligible (not significant)**.

9.80 The proposed construction method for the panels uses driven steel tube/'H' piles to form the foundation of the panels, founding within the shallow soils/ superficial deposits/ weathered bedrock. Proposed foundations for both the BESS and Proposed Development's substation are concrete slab footings, founding within shallow soils. Installation of underground cable across the Site is proposed via trenching and directional drilling will also be dug within the shallow soils/ superficial deposits (all C4 – **Table 9.7**). These foundation works across Site are not considered to significantly alter the soil structure or the nature of the underlying geology. This is considered to represent a negligible magnitude of change to a receptor of low sensitivity (soils). The significance of effect would be **negligible (not significant)**.

9.81 There are potential point sources of contamination on the Site associated with areas of made ground where former pits/ reservoir/ ponds have been filled in and in the area of former buildings at New Barn in field O12 (C5 – **Table 9.7**). These shall be investigated, assessed and, if necessary, remediated as part of the construction phase. If remediation is required, once it is undertaken there will be a small beneficial change on the surrounding soils, geology and

groundwater. If no remediation is required, the magnitude of change associated with developing over these areas of made ground will be negligible. The significance of effect would be **negligible to minor beneficial (not significant)**.

9.82 DCC has confirmed that the Proposed Development is largely excluded from a sand and gravel mineral safeguarding area. There is only a short section of cable routing parallel to Walton Road to the north of Grove Wood. DCC has therefore confirmed that this reduces potential conflict with the allocation for safeguarding in the existing or emerging Minerals Local Plan and is unlikely to impact on the availability of the resource. Therefore, in the context of mineral resources, the Proposed Development is not considered to sterilise a significant reserve.

9.83 In addition, the Proposed Development, having a temporary operational life of up to 40 years, would not lead to the permanent sterilisation of a potential mineral resource and, if required, the gird connection may also be diverted in the future.

9.84 This is considered to represent a negligible magnitude of change to a receptor of low sensitivity. The significance of effect would be **negligible (not significant)**.

9.85 The Proposed Development will alter the land use in certain areas from previously intensive agricultural fields to solar-PV panels, resulting in the soil being left in-situ and undisturbed beneath the panels opposed to being ploughed and/or fertilised (C7 – **Table 9.7**). Less erosion and degradation of soils will result from this change in land-use resulting in a small improvement to the resource. A change from agricultural to pastureland will increase the soil organic content (SOC) and a reduction in heavy machinery trafficking over the soils will reduce compaction. As a low sensitivity receptor, the magnitude of change to the soil will be negligible. Therefore the significance of effect would be **negligible** but beneficial (**not significant**).

9.86 Stripping of topsoil and subsoil, where required, across the Proposed Development to create access trackways, the Proposed Development's substation and BESS will result in the removal and degradation of the receptor (C8 – **Table 9.7**). In total 5.3ha of land will be affected by fixed equipment which equates to an insignificant loss. All soils stripped are to be reused on Site for landscaping and restoration. These soils should be vegetated as soon as practicable or hessian, mulches or trackifiers should be used where it is not possible to revegetate.

9.87 Removal of topsoil is considered to represent a negligible magnitude of change given the low sensitivity of the receptor. The significance of the effect would be **negligible (not significant)**.

9.88 Effects are summarised in **Table 9.7** below.

Table 9.7: Summary of construction phase effects prior to mitigation

| Ref. No. | Change | Magnitude of change | Receptors (sensitivity) | Significance of effect |
|----------|---|--------------------------------|--|--------------------------------|
| C1 | Pollution from fuels, oils and other chemicals | Medium | Soils and groundwater (medium) | Negligible |
| C2 | Erosion of sediment/ silt created by exposed soils | Medium | Superficial deposits and bedrock (low) | Negligible |
| C3 | Soil compaction from heavy plant/ machinery | Negligible | | Negligible |
| C4 | Alteration to soil structure/ geology (e.g. by foundations) | Negligible | | Negligible |
| C5 | Interaction of Proposed Development with contaminated made ground causing effect on receptors | Negligible to Small beneficial | | Negligible to minor beneficial |
| | | | | |

| Ref. No. | Change | Magnitude of change | Receptors (sensitivity) | Significance of effect |
|----------|---|---------------------|-------------------------|-------------------------|
| C6 | Mineral sterilisation | Negligible | Mineral resources (low) | Negligible |
| C7 | Effect of leaving soils in-situ under panels | Negligible | Topsoil (low) | Negligible (beneficial) |
| C8 | Stripping topsoil and subsoil from proposed locations of trackways, the Proposed Development's substation and BESS. | Negligible | Topsoil (low) | Negligible |

Proposed Mitigation

9.89 The Applicant is committed to undertaking any remediation of soils or groundwater that is deemed required following the investigation and assessment of ground conditions as set out in the pre-commencement requirement of the draft DCO (Requirement 6).

Remediation

9.90 If contaminated land is encountered on Site (C5 – **Table 9.7**), the Applicant will adhere to LCRM best practice implementing a programme of targeted site investigation, assessment and remediation and/ or risk management shall be implemented in the construction phase. Soil sampling, laboratory analysis and contaminated land assessment shall then be undertaken in accordance with LCRM and current best practice to ascertain the potential risk posed to ground conditions human health and wider environment.

9.91 If this assessment determines that remediation or risk management is required to address any potential risks posed by made ground, a process of remediation options appraisal, remediation strategy, remediation implementation and verification shall be entered into. This work shall improve the ground conditions such that any risks posed are reduced to acceptable levels.

Residual Construction Effects

9.92 All residual construction effects would remain **negligible (not significant)** as presented above.

Assessment of Operational Effects

Predicted Operational Effects

9.93 The majority of operational effects from the Proposed Development have been scoped out (see paragraph 9.9). However, one potential effect remains which is the change in land used from intensive agriculture to low-intensity grazing resulting in a reduction in potential contaminants entering aquifer (O1).

9.94 The Proposed Development has been designed such that the land surrounding and beneath the solar panels will be returned to grassland grazing (where it is not already). Upon completion of the construction phase, fields that are currently used to produce arable crops (in excess of 50% of the land based on recent aerial photography) will become vegetated year-round. The areas under the panels will be grazed less intensively than currently (see **Chapter 6: Ecology**). Pesticides and fertiliser application will also be none or minimal. The sward within the Proposed Development boundary will be allowed to grow and will not be cropped or harvested. Therefore, the conversion of much of the Site from intensive arable production to low-intensity grazing will reduce/remove pesticide and fertiliser use. This will prevent potential contaminants from entering groundwater receptors. This is considered to be a small beneficial magnitude of change of the Proposed Development on water quality in the Secondary A aquifer (of medium sensitivity) under the Site. The overall effect would be **minor beneficial (not significant)** as summarised in **Table 9.8**.

9.95 Further, unlike under the current land management scenario, during the operational phase of the Proposed Development, the fields will only be accessed occasionally by plant for maintenance works, thus reducing compaction effects on the soil.

Table 9.8: Summary of operational phase effects

| Ref. No. | Change | Magnitude of change | Receptor (sensitivity) | Significance of effect |
|----------|--|---------------------|------------------------|------------------------|
| O1 | Change in land used from intensive agriculture to low-intensity grazing resulting in reduction in potential contaminants entering aquifer. | Small beneficial | Groundwater (medium) | Minor beneficial |

Proposed Mitigation

9.96 No adverse effects from the Proposed Development on the Secondary A aquifer under the Site is predicted and no additional mitigation is therefore required.

Residual Operational Effects

9.97 The residual operational effects would remain minor beneficial, as set out above.

Assessment of Decommissioning Effects

9.98 In terms of ground conditions, it is considered that decommissioning effects would be similar to the construction effects and therefore negligible to minor beneficial. A decommissioning environmental management plan (DEMP) similar to the CEMP forms a requirement of the draft DCO and will need to be approved by the Local Planning Authority before any decommissioning works take place after 40 years of operation.

Cumulative Effects

9.99 Table 9.9 summarises the proposed developments that have been identified in **Chapter 2: The Environmental Impact Assessment** to have the potential for cumulative effect with this

Proposed Development due to geographical proximity <1km, together with a commentary on the likelihood that the effects on ground conditions will be cumulative. Identified developments further afield than 1km are considered to be sufficiently far enough away from the Site that any effects on ground conditions would be irrelevant due to the natural processes of dispersion and attenuation. The cumulative effects of ground conditions are considered to be typically diluted to a point where there is minimal impact on the immediate surroundings.

Table 9.9: Comment on likelihood of cumulative effect with other planned schemes

| Planned scheme | Comment |
|---|--|
| <p>DMPA/2023/0170 The installation of battery energy storage on Land to the North West of Barn Farm and to the South of Walton Road and the Former Drakelow Power Station.</p> | <p>This scheme lies approximately 650m northeast of the Proposed Development. The area of the proposed scheme is currently an agricultural field entirely covered by Glacial Till over the Edwalton and Gunthorpe Members (both mudstone).</p> <p>There is considered very limited connectivity in groundwater between the Proposed Development and this scheme due to the different superficial geology and both the superficial and bedrock strata being cohesive in nature. The potential for cumulative effect is considered very limited.</p> |
| <p>DMOT/2023/0621 Proposed development of an Energy Storage System (ESS) and substation development.</p> | <p>This scheme is adjacent (west) to part of the proposed cable route of the Proposed Development on the opposite side of the watercourse which flows through the Site.</p> <p>The location of the scheme comprises agricultural fields with discrete areas underlain by Head, Glacial Till and Glacio-fluvial Deposits. Alluvium is also present within the channel of the watercourse along the sites eastern boundary. The site is underlain by bedrock of the Edwalton Member (mudstone).</p> <p>There is considered very limited connectivity in groundwater between the Proposed Development and this development due to the bedrock strata being cohesive in nature. It is assumed that</p> |

| Planned scheme | Comment |
|---|--|
| | <p>the application for this development will provide a suitable flood risk assessment, drainage strategy and soils assessment in accordance with current best practice which shall be underpinned by suitable planning conditions. Therefore, the potential for cumulative effect is considered very limited.</p> |
| <p>DMOT/2020/0598 Consultation from the County Council on application ref. CW9/0420/7 seeking permission for the construction and operation of an 18MW Renewable Energy Centre and associated infrastructure on land at the former Drakelow C Power Station, Walton Road, Drakelow. <i>This project is now under construction.</i></p> | <p>This scheme lies adjacent (north) of the Proposed Development.</p> <p>The area of the proposed scheme is entirely covered by River Terrace Deposits over Mercia Mudstone.</p> <p>There is considered very limited connectivity in groundwater between the Proposed Development and the land at Park Farm, due to this different superficial geology.</p> <p>The potential for cumulative effect is considered very limited.</p> |

Predicted Cumulative Effects

9.100 Table 9.10 below summarises the cumulative effects considered to arise from the contemporaneous construction and operation of the Proposed Development and the other identified cumulative schemes. In assessing this cumulative effect, it has been assumed that other schemes will be subject to the same good practice and mitigation through design as is being employed in this Proposed Development.

9.101 The Applicant is committed to implementing the construction phase works in accordance with the Outline CEMP in **Appendix 4.3**. The final detailed CEMP will be submitted to the LPA for approval prior to commencement of the Proposed Development and be secured by means of a DCO requirement. It is assumed that the cumulative schemes will also have their own CEMP in accordance with current best practice.

Table 9.10: Summary of cumulative construction and operational phase effects

| Ref. No. | Change | Magnitude of effect | Cumulative change | Significance of cumulative effect |
|---------------------|--|---------------------|--|-----------------------------------|
| Construction | | | | |
| C1 | Pollution from fuels, oils and other chemicals | Small | Groundwater bodies unlikely to be in connectivity. Distance between projects inhibits potential for cumulative effect. | Negligible |
| C2 | Erosion and release of sediment/ silt created by exposed soils | Small | | Negligible |
| C3 | Soil compaction from heavy plant/ machinery | Negligible | Possibility of multiple sites discharging construction phase water to the | Negligible |
| C4 | Alteration to soil structure/ geology (e.g. by foundations) | Negligible | | Negligible |

| Ref. No. | Change | Magnitude of effect | Cumulative change | Significance of cumulative effect |
|------------------|---|---------------------|--|-----------------------------------|
| C5 | Interaction of Proposed Development with contaminated made ground causing effect on receptors | Negligible to small | watercourse to the west of Park Farm. | Negligible to minor beneficial |
| C6 | Sterilisation of mineral resources to the north of the Site (Drakelow Power Station) | Negligible | DCC has confirmed that the Proposed Development will not have a material effect on minerals. | Negligible |
| C7 | Effect of leaving soils in-situ under panels | Negligible | Topsoil/ subsoil remains in-situ rather than being heavily and frequently modified. | Negligible (beneficial) |
| C8 | Stripping topsoil and subsoil from proposed locations of trackways, the Proposed Development's substation and BESS. | Negligible | Soil, as a resource, is lost due to development. | Negligible to minor |
| Operation | | | | |

| Ref. No. | Change | Magnitude of effect | Cumulative change | Significance of cumulative effect |
|----------|---|---------------------|---|-----------------------------------|
| O1 | Change in land used from intensive agriculture to low-intensity grazing resulting in reduction in potential contaminants entering aquifer | Small | The majority of cumulative developments are similar in nature. Therefore, this is considered to have an overall minor beneficial effect on the wider ground conditions. | Minor beneficial |

9.102 The cumulative construction phase effect of these schemes with the Proposed Development on surface water and watercourses is assessed in **Chapter 8: Water Resources and Flood Risk**.

Proposed Mitigation

9.103 No mitigation other than embedded mitigation discussed in the previous section is deemed to be required.

Residual Cumulative Effects

9.104 All potential residual effects would remain as presented in **Table 9.10** above.

Combined Effects

9.105 The effects of the Proposed Development on ground conditions are associated with receptors that are particular to the soil, bedrock and groundwater beneath the Site. There is an interaction between these receptors and surface water and watercourse receptors considered in **Chapter 8: Water Resources and Flood Risk** (as groundwater may provide baseflow to the surface water features). In theory, there are scenarios where a water quality impact on groundwater may have an additive effect (via groundwater flow) on surface water. For example,

mobilisation of groundwater contamination as a result of project earthworks, might lead to a water quality impact on surface water that might also be experiencing impact directly from construction phase pollution. However, the combination of embedded and additional mitigation set out within both Chapters are considered sufficient to address any such combined effects, such that they remain of a similar significance to those posed individually.

Further Survey Requirements and Monitoring

9.106 A targeted site investigation, assessment and (if necessary) remediation of made ground soils within areas of filled ground onsite (pits, reservoir and ponds) and areas of former buildings (New Barn) shall be undertaken as part of the construction phase of the Proposed Development. Further investigative works are secured via a Requirement in the draft DCO. No other field survey or monitoring are considered warranted.

Summary of Effects

9.107 Table 9.11 summarises the predicted effects of the Proposed Development on ground conditions.

Table 9.11: Summary of Effects

| Ref No. | Predicted Effect | Significance | Mitigation | Significance of Residual Effect |
|---------------------|--|--------------|---|---------------------------------|
| Construction | | | | |
| C1 | Pollution from fuels, oils and other chemicals | Negligible | No additional mitigation measures beyond those embedded within the CEMP | Negligible |
| C2 | Erosion of sediment/ silt created by exposed soils | Negligible | No additional mitigation measures beyond those | Negligible |

| Ref No. | Predicted Effect | Significance | Mitigation | Significance of Residual Effect |
|------------------|---|--------------------------------|--------------------------|---------------------------------|
| | | | embedded within the CEMP | |
| C3 | Soil compaction from heavy plant/ machinery | Negligible | N/A | Negligible |
| C4 | Alteration to soil structure/ geology (e.g. by foundations) | Negligible | N/A | Negligible |
| C5 | Interaction of Proposed Development with contaminated made ground causing effect on receptors | Negligible to minor beneficial | N/A | Negligible |
| C6 | Mineral sterilisation | Negligible | N/A | Negligible |
| C7 | Effect of leaving soils in-situ under panels | Negligible | N/A | Negligible |
| C8 | Stripping topsoil and subsoil from proposed locations of trackways, the Proposed Development's substation and BESS. | Negligible | N/A | Negligible |
| Operation | | | | |
| O1 | Change in land used from intensive agriculture to low- | Minor beneficial | N/A | Minor beneficial |

| Ref No. | Predicted Effect | Significance | Mitigation | Significance of Residual Effect |
|--------------------------------|---|--------------------------------|--------------------------|---------------------------------|
| | intensity grazing resulting in reduction in potential contaminants entering aquifer | | | |
| Cumulative Construction | | | | |
| C1 | Pollution from fuels, oils and other chemicals | Negligible | Measures within the CEMP | Negligible |
| C2 | Erosion of sediment/ silt created by exposed soils | Negligible | Measures within the CEMP | Negligible |
| C3 | Soil compaction from heavy plant/ machinery | Negligible | N/A | Negligible |
| C4 | Alteration to soil structure/ geology (e.g. by foundations) | Negligible | N/A | Negligible |
| C5 | Interaction of Proposed Development with contaminated made ground causing effect on receptors | Negligible to minor beneficial | N/A | Negligible to minor beneficial |
| C6 | Sterilisation of mineral resources to the north of the Site (Drakelow Power Station) | Negligible | N/A | Negligible |

| Ref No. | Predicted Effect | Significance | Mitigation | Significance of Residual Effect |
|-----------------------------|--|-------------------------|------------|---------------------------------|
| C7 | Effect of leaving soils in-situ under panels | Negligible (beneficial) | N/A | Negligible (beneficial) |
| C8 | Stripping topsoil and subsoil from proposed locations of trackways, the Proposed Development's substation and BESS. | Negligible | N/A | Negligible |
| Cumulative Operation | | | | |
| O1 | Change in land use from intensive agriculture to low-intensity grazing resulting in reduction in potential contaminants entering aquifer | Minor beneficial | N/A | Minor beneficial |
| Combined Effects | | | | |
| None predicted. | | | | |