



Yeargate Limited

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# LAND NORTH OF BIRCH BUSINESS PARK

Environmental Statement Volume I Chapter 9 –  
Ground Conditions and Contamination

August 2026

UK0040790.1297





Yeargate Limited

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## LAND NORTH OF BIRCH BUSINESS PARK

Environmental Statement Volume I Chapter 9 – Ground  
Conditions and Contamination

**TYPE OF DOCUMENT (VERSION) PUBLIC**

**PROJECT NO. UK0040790.1297**

**OUR REF. NO. UK0040790.1297**

**DATE: AUGUST 2026**

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# QUALITY CONTROL

| Issue/revision | First issue                                                                         | Revision 1 | Revision 2 | Revision 3 |
|----------------|-------------------------------------------------------------------------------------|------------|------------|------------|
| Date           | 01.05.2026                                                                          |            |            |            |
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| Project number | UK0040790.1297                                                                      |            |            |            |
| Report number  | AG3696A-25-AV41                                                                     |            |            |            |
| File reference | UK0040790.1297 - Birch Business Park New - Documents\03 WIP\5.EIA                   |            |            |            |

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## ABBREVIATIONS

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|      |                              |
|------|------------------------------|
| EA   | Environment Agency           |
| CSM  | Conceptual Site Model        |
| UXO  | Unexploded Ordnance          |
| CMRA | Coal Mining Risk Assessment  |
| MRA  | Mining Remediation Authority |

## GLOSSARY

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|                       |                                                                                                                                                                                |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                                                                                                                                                                                |
| Aquifer               | A water-bearing permeable rock layer.                                                                                                                                          |
| Source                | A material, activity or site feature that has the potential to release contamination or ground gas.                                                                            |
| Pathway               | The route by which contamination or ground gas can migrate from a source to a receptor.                                                                                        |
| Receptor              | A human, environmental or structural element that could be adversely affected by contamination or ground conditions.                                                           |
| Conceptual Site Model | A simplified representation of the Site and anticipated geology, showing the relationship between potential contamination sources, migration pathways and sensitive receptors. |

## 9 GROUND CONDITIONS AND CONTAMINATION

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### 9.1 INTRODUCTION

- 9.1.1. This chapter reports the outcome of the assessment of likely significant effects arising from the Proposed Development in relation to ground conditions and contamination. This chapter has been produced by Applied Geology Limited.
- 9.1.2. The assessment of ground conditions and contamination has established that the proposed development is unlikely to give rise to significant adverse environmental effects in relation to ground conditions and contamination, and it is considered probable that only standard mitigation controls will be required.
- 9.1.3. The following residual effects have been identified:
- there is likely to be a **negligible adverse** residual effect on construction workers (**not significant**);
  - there is likely to be a **negligible adverse** residual effect on controlled waters during construction (**not significant**);
  - there is likely to be a **negligible** residual effect on future site users during operation (**not significant**);
  - there is likely to be a **negligible** residual effect on controlled waters during operation (**not significant**); and
  - there is likely to be a **negligible** residual effect on buried concrete foundations and buried services during operation (**not significant**).
  - there is likely to be a **negligible** residual effect on the site surface (coal mining legacy) during operation (**not significant**).
- However, should contamination be identified and subsequently remediated, there is likely to be an overall minor beneficial residual effect on human health and controlled waters during the operational phase.
- 9.1.4. The following monitoring requirements have been identified:
- standard construction-phase supervision and environmental controls implemented in accordance with the Construction Environmental Management Plan (CEMP).
- 9.1.5. Phase 2 Intrusive ground investigation shall be undertaken prior to construction, to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages. Should contamination be identified which is considered to pose a risk to sensitive receptors then remediation will be undertaken and appropriately validated which would represent an overall improvement to the existing baseline.
- Beyond this, it is not considered that there are further opportunities for environmental enhancements in relation to ground conditions for the Proposed Scheme.
- 9.1.6. The remainder of this chapter describes the assessment methodology and the baseline conditions relevant to the assessment, which have been used to reach these conclusions, as well as a summary of the likely significant effects leading to the additional mitigation measures required to avoid, prevent, reduce or, if possible, offset any likely significant adverse effects, and the likely

residual effects and any required monitoring after these measures have been employed. Opportunities for environmental enhancement, where such opportunities exist, are also discussed.

9.1.7. This chapter (and its associated appendices as given below) is intended to be read as part of the wider ES.

- **Appendix 9.1:** Applied Geology (2025). *Report on Desk Study and Coal Mining Risk Assessment at Land to the North of Birch Business Park, Heywood.* Report Ref: AG3696-25-AT96, July 2025.

## 9.2 CONSULTATION, SCOPE, METHODOLOGY AND SIGNIFICANCE CRITERIA

### CONSULTATION UNDERTAKEN TO DATE

9.2.1. **Table 9-1** provides a summary of the consultation activities undertaken in support of the preparation of this assessment.

**Table 9-1 – Summary of Consultation Undertaken**

| Body / Organisation                 | Individual / Stat Body / Organisation                     | Meeting Dates and Other Forms of Consultation                                                            | Summary of Outcome of Discussions                                                                                                     |
|-------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Mining Remediation Authority (MRA). | MRA Customer Services via groundstability@coal.gov.uk     | A MRA Consultants Coal Mining Report was obtained (Ref. 51003509287001) dated 2 <sup>nd</sup> July 2025. | The Consultants Coal Mining Report was used to inform the preliminary CMRA as given in the Phase 1 desk study ( <b>Appendix 9.1</b> ) |
| MRA                                 | MRA Customer Services via InformationManagers@coal.gov.uk | MRA Mine Abandonment Plan Search, 8 <sup>th</sup> July 2025.                                             | The search reported that there were no recorded workings beneath the site and as such no abandonment plans relating to the site.      |
| Groundsure Ltd                      | Groundsure Ltd via www.groundsure.com                     | Groundsure Report Ref: GS-WF2-WWW-XQI-T2P ordered on 2 <sup>nd</sup> July 2025                           | Provision of GroundSure GeoInsight & EnviroInsight environmental databases. GroundSure – MapInsight historical maps.                  |
| British Geological Survey (BGS)     | BGS GeoIndex Onshore                                      | July 2025                                                                                                | Review of published BGS map data and BGS Archive data relevant to the site.                                                           |
| Rochdale Borough Council            | Rochdale Borough Council via Planning Portal              | 8 <sup>th</sup> July 2025                                                                                | Review of Planning Applications relevant to the site.                                                                                 |

### SCOPE OF THE ASSESSMENT

9.2.2. The scope of this assessment has been established through an ongoing scoping process. Further information can be found in **Chapter 5: Approach to EIA**.

9.2.3. This section provides a summary of the scope of the assessment presented within this Chapter and the evidence base for scoping out some elements following further assessment.

- 9.2.4. Potential land contamination will be assessed with due regard to the NPPF, Part 2A, best practice guidance from land contamination risk management set out in LCRM.
- 9.2.5. The assessment shall identify potential sources and receptors, in order to quantitatively assess the possibility for land to be contaminated, thereby enabling an evaluation of the potential for pathways to exist between them to form complete contaminant linkages under baseline conditions, during construction and during the operational phase of the Proposed Development. The likely significance of the risk for each plausible linkage will then be assessed and compared to determine beneficial and adverse effects of the Proposed Development against baseline conditions.
- 9.2.6. An assessment of potential effects from historical coal mining will also be included.

#### **ELEMENTS SCOPED OUT OF THE ASSESSMENT**

- 9.2.7. No environmental elements in relation to ground conditions have been scoped out for the Proposed Scheme.

#### **ELEMENTS SCOPED INTO THE ASSESSMENT**

##### **Construction Phase**

- 9.2.8. The following elements are considered to have the potential to give rise to likely significant effects during construction of the Proposed Development and have therefore been considered within this assessment:
- Potential effects on human health from exposure to contamination and/or ground gas associated with historical and current land use; and
  - Potential for increased mobilisation of chemical contaminants into surface water and / or groundwater.

##### **Operation Phase**

- 9.2.9. The following elements are considered to have the potential to give rise to likely significant effects during operation of the Proposed Development and have therefore been considered within this assessment:
- Potential effects on future commercial/industrial site users (human health) from exposure to contamination and/or ground gas/vapours associated with historical and current land use;
  - Potential for increased mobilisation of chemical contaminants into surface water and / or groundwater (Controlled Waters);
  - Potential effects on buried concrete foundations/ sub-structures and water supply services (Building Fabric), in relation to potential aggressive ground conditions and hydrocarbon contamination; and
  - The site surface (Building Fabric) may be at potential risk of crown hole development relating to possible localised unrecorded coal workings beneath the site.

#### **EXTENT OF THE STUDY AREA**

- 9.2.10. The 'study area' includes the area within the Site boundary as described in **Chapter 1: Introduction** and consists of the area within the red line boundary as well as identified receptors within the immediate vicinity.

## METHOD OF BASELINE DATA COLLATION

### DESK STUDY

- 9.2.11. The baseline information is based on the Applied Geology Phase 1 desk study prepared in July 2025 (see Appendix 9.1).
- 9.2.12. The key aims of the desk study was to:
- Permit formulation of an opinion, as to the potential for hazardous substances or conditions to exist on, at or near the site at levels or in a situation likely to warrant mitigation or consideration appropriate to the proposed end use
  - Establish likely geological conditions and potential geotechnical constraints to aid safe and economic development design;
  - Identify site-specific coal mining risks and set out the proposed mitigation strategy to show that the site can be made safe and stable for the proposed development;
- 9.2.13. The scope of works for the desk studies included:
- A site inspection and walkover survey to identify indicators of the existence of hazardous substances or conditions on and in the vicinity of the site.
  - A review of the following sources to provide data on likely ground conditions, geohazards and features which may affect development and to obtain information about the potential for hazardous substances to exist at and in the vicinity of the site:
    - GroundSure – GeoInsight & EnviroInsight environmental databases;
    - GroundSure – MapInsight historical maps;
    - British Geological Survey (BGS) - published information & on-line borehole database Historical Maps;
    - Mining Remediation Authority Consultants Coal Mining Report (Ref. 51003509287001, dated July 2025);
    - Previous geo-environmental and geotechnical ground investigations undertaken on land adjacent to, or in the vicinity of, the Site;
    - Online aerial images;
    - Rochdale Borough Council Online Planning Portal (July 2025);
    - Previous geo-environmental and geotechnical ground investigations undertaken on land adjacent to, or in the vicinity of, the Site; and
    - Previous UXO report Ref. EP7217-00, September 2018.

### SITE VISIT AND SURVEYS

- 9.2.14. A site inspection and walkover survey was undertaken by Applied Geology on 9 July 2025 during preparation of the Phase 1 desk study, which has been used to establish baseline conditions. At the time of inspection, the site comprised a vacant plot of land. The ground surface across the western and central portions of the site were laid to crushed and compacted materials, generally comprising concrete, brick and sandstone, whilst the eastern portion of the site was vegetated with grasses and young trees. Reeds, rushes, and other plant species generally indicative of marshy conditions/ waterlogged ground were noted in the northeastern and southeastern parts of the site.

- 9.2.15. Two mounds of spoil were located in the western portion of the site. The larger mound measured approximately 20m by 18m, with a maximum height of around 2m above the surrounding ground level. The smaller mound (located to the north of the first mound), measured approximately 15m by 10m, with a maximum height of approximately 1.3m above surrounding ground level. The larger mound generally comprised dark brown gravelly sand with gravel of brick, sandstone and concrete, while the smaller mound predominantly comprised reddish-brown sand.
- 9.2.16. The crushed and compacted materials across the relatively higher western and central parts of the site and the mounds are understood to have been generated during various phases of relatively recent construction across the wider Birch Business Park.
- 9.2.17. An area of burnt ground was observed at the surface to the south of the spoil mounds. Some waste materials including wood, concrete, rubber tyres, plastic and brick, with several panels of security fencing were noted at the southwestern corner of the site.
- 9.2.18. A pond was present adjacent to the western corner of the site.
- 9.2.19. The site was bounded to the north, east and west by agricultural land and to the south by Birch Business Park.

#### **ASSESSMENT METHODOLOGY**

- 9.2.20. Potential land contamination will be assessed with due regard to the NPPF paragraphs 189-197, Part 2A, best practice guidance from land contamination risk management set out in LCRM.
- 9.2.21. The basis of this approach comprises three elements: a source, a pathway and a receptor. Without each of these there can be no contamination risk. Therefore, the presence of measurable concentrations of contaminants within the ground and subsurface environment does not automatically imply that a contamination risk exists, since the contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors, which are relevant to a particular site, will vary according to the intended use of the site, its characteristics and its surroundings. The potential for harm to occur requires three conditions to be satisfied:
- The presence of substances (potential contaminants/pollutants) that may cause harm (the 'Source' of pollution);
  - The presence of a receptor that may be harmed, (e.g. the water environment or humans, buildings, fauna and flora) (the 'Receptor'); and
  - The existence of a linkage between the source and the receptor (the 'Pathway').
- 9.2.22. The CSM will be used to identify and assess the potential effects on the identified sensitive receptors (including human health, controlled waters, buildings and services) and outline mitigation measures to manage the risks identified in the assessment which should be minimised and mitigated for

## SIGNIFICANCE CRITERIA

- 9.2.23. The significance level attributed to each effect has been assessed based on the sensitivity/value of the affected receptor(s) and the magnitude of change arising from the Proposed Development, as well as a number of other factors that are outlined in more detail in **Chapter 5: Approach to EIA**. The sensitivity of the affected receptor is assessed on a scale of high, medium, low and negligible, and the magnitude of change is assessed on a scale of large, medium, small, negligible and no change, as set out in **Chapter 5: Approach to EIA**.

## EFFECT SIGNIFICANCE

- 9.2.24. The following terms have been used to define the significance of the effects identified and apply to both beneficial and adverse effects:
- **Major effect:** where the Proposed Development could be expected to have a substantial improvement or deterioration on receptors;
  - **Moderate effect:** where the Proposed Development could be expected to have a noticeable improvement or deterioration on receptors;
  - **Minor effect:** where the Proposed Development could be expected to result in a perceptible improvement or deterioration on receptors; and
  - **Negligible:** where no discernible improvement or deterioration is expected as a result of the Proposed Development on receptors, including instances where no change is confirmed.
- 9.2.25. As set out in **Chapter 5: Approach to EIA**, effects that are classified as **moderate or above** are considered to be **significant**. Effects classified as below **moderate** are considered to be **not significant**.

## 9.3 LEGISLATIVE FRAMEWORK, POLICY AND GUIDANCE

### LEGISLATIVE FRAMEWORK

- 9.3.1. The applicable legislative framework is summarised as follows:
- Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (**Ref. 9.1**) ;
  - Part 2A of the Environmental Protection Act (EPA), 1990 (**Ref. 9.2**);
  - Environment Act, 1995 (**Ref. 9.3**);
  - Control of Substances Hazardous to Human Health (Amendment), 2004 (**Ref. 9.4**);
  - CLP Regulation, 2008 (**Ref. 9.5**);
  - Groundwater Directive 2006/118/EC (**Ref. 9.6**);
  - Control of Asbestos Regulations, 2012 (**Ref. 9.7**);
  - Contaminated Land (England) (Amendment) Regulations, 2012 (**Ref. 9.8**);
  - Construction (Design & Management) Regulations, 2015 (**Ref. 9.9**);
  - Environmental Damage (Prevention and Remediation) (Amendment) Regulations, 2019 (**Ref. 9.10**);
  - The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations, 2019 (**Ref. 9.11**);
  - The Water Environment (Water Framework Directive) (England and Wales) Regulations, (2000/60/EC), 2017 (**Ref. 9.12**); and

## POLICY

- National Planning Policy Framework, 2024 (**Ref. 9.13**).
- National Planning Practice Guidance, Land Affected by Contamination, July 2019 (**Ref. 9.14**);

## GUIDANCE

9.3.2. The following guidance documents have been used during the preparation of this Chapter:

- Health and Safety Executive (HSE) (1991) Guidance Note HS (G) 66, Protection of Workers and the General Public during the Development of Contaminated Land (**Ref. 9.15**);
- British Standard (BS) BS8576 (2013) Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds (**Ref. 9.16**);
- Construction Industry Research and Information Association (CIRIA) C552 (2001) Contaminated Land Risk Assessment. A Guide to Good Practice (**Ref. 9.17**);
- CIRIA C532 (2001) Control of Pollution from Construction Sites (**Ref. 9.18**);
- Environment Agency (EA) (2020) Land Contamination Risk Management (LCRM) (**Ref. 9.19**);
- CIRIA C665 (2007) Assessing Risks Posed by Hazardous Gases to Buildings (**Ref. 9.20**);
- CIRIA C681 (2009) Unexploded Ordnance - A Guide for the Construction Industry (**Ref. 9.21**);
- CIRIA C682 (2009) The VOCs Handbook (**Ref. 9.22**);
- Department for Environment Food & Rural Affairs (DEFRA) (2012) Contaminated Land Statutory Guidance (**Ref. 9.23**);
- CIRIA C733 (2014) Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks (**Ref. 9.24**);
- BS5930 (2015)+A1 (2020) Code of Practice for ground investigations (**Ref. 9.25**);
- BS 8485: 2015+A1 (2019) Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings (**Ref. 9.26**);
- BS 10175:2011+A2 (2017) Investigation of Potentially Contaminated Sites – Code of Practice (**Ref. 9.27**);
- EA (2017) Groundwater Protection Technical Guidance (**Ref. 9.28**); and
- CIRIA C758D (2019) Abandoned Mine Workings Manual (**Ref. 9.29**).

## 9.4 BASELINE CONDITIONS

### SITE HISTORY

9.4.1. The earliest available Ordnance Survey maps dated 1848-1851 show the site to be occupied by fields/agricultural land, with a small rectangular structure labelled 'Crow Fields' in the southwestern corner. A brook forms the eastern and northern site boundary. Two ponds are shown off-site, immediately west of the western site boundary. A cluster of small ponds are also shown on and immediately adjacent to the eastern tip/boundary of the site. Old sandstone quarries are shown approximately 80m to the north and 400m to the northwest of the site. Barlow's Coal Pits are also shown approximately 480m to the northwest of the site. Apart from the small rectangular structure ('Crow Fields') in the southwestern corner, which is no longer shown by the 1890s, no significant changes are shown across the site until 1981/1982, when several large buildings and associated access roads (generally concurrent with the current layout of Birch Business Park) are shown

immediately south of the site. The pond on/adjacent to the eastern site boundary is also no longer shown by this time.

- 9.4.2. By 2000, available aerial images show a rectangular warehouse unit (generally concurrent with the present-day layout of existing Unit W) and associated yard immediately west of the site. A pond is also visible in the area of marshland immediately west of the site.
- 9.4.3. By 2003, available aerial images show small stockpiles and possibly some construction materials across the western part of the site and by 2005, the western and central parts of the site are shown to have been stripped of vegetation, with many apparent stockpiles.
- 9.4.4. The site is shown to be clear of vegetation and stockpiles by 2011, but from 2015-2019, the western and central parts of the site are again shown to be occupied by features that may indicate the presence of stockpiles. Also, an access track is shown in the southwestern portion of the site at this time.
- 9.4.5. Between 2020 and 2021 the western and central parts of the site are shown to have been stripped of vegetation, with the western and central portions occupied by several stockpiles and localised areas of waterlogged ground. The eastern portion of the site is shown to remain vegetated.
- 9.4.6. Between 2023 and 2025, available aerial images show two stockpiles on the western portion of the site as observed during the July 2025 site walkover.

### **Geology**

- 9.4.7. The Published BGS 1:50,000 scale map (sheet no. 85), BGS 1:10,560 scale map (County Series map, Lancashire Sheet 88 SW) and BGS digital Geological Map of Great Britain indicate that the site is predominantly underlain by Superficial strata comprising Glacial Till, with Glaciofluvial Sheet Deposits and Lacustrine Deposits shown across the eastern boundary of the site. Head deposits and Glaciofluvial Ice Contact Deposit are also shown across the wider area and as such may also be expected beneath the site.
- 9.4.8. The Superficial strata are shown to be underlain by Solid strata of the Pennine Lower Coal Measures Formation.
- 9.4.9. Two geological faults trending NW-SE (both with a downthrow towards the southwest) are shown adjacent to the western site boundary, converging close to the southwestern corner of the site.
- 9.4.10. The Lower Foot Coal (with a published seam thickness of between 0.30m and 0.80m) and the Lower Mountain Coal (with a published seam thickness of between 0.20m and 1.30m), both trending SW-NE, are shown to sub-crop beneath the Superficial strata along the northern site boundary and across the centre of the site respectively. The Bassy Coal (with a published thickness of between 0.10m and 1.20m) is also shown to sub-crop beneath Superficial strata approximately 100m northwest of the northern site boundary. All three coal seams are shown to dip towards the southeast, at 10 degrees. Whilst the Lower Foot and Lower Mountain Coal seams are expected to be present directly beneath the Superficial strata, the Bassy coal may also be expected at shallow depths of less than 30m below ground level (bgl) across the site, based on a dip of 10 degrees.
- 9.4.11. The Groundsure Report (included in the Applied Geology Desk Study Report, Appendix 9.1) shows that Made Ground (artificial deposits) are likely to be present across much of the western part of the site, which is expected to be associated with the various phases of stockpiled materials identified on available historical mapping/ aerial images from 2003. The report also indicates worked ground adjacent to the western boundary of the site, associated with the existing pond.

## Hydrogeology

- 9.4.12. The Superficial strata, including Glacial Till, Glaciofluvial Sheet Deposits and Lacustrine Deposits (across the eastern and southeastern parts of the site) are designated 'Secondary (undifferentiated) Aquifers and of high vulnerability. The Solid strata of the Pennine Lower Coal Measures Formation underlying the site is a designated 'Secondary A' Aquifer and of low vulnerability.
- 9.4.13. There are no groundwater abstractions within 500m of the site and the site is not located within a Groundwater Source Protection Zone.

## Hydrology

- 9.4.14. The nearest surface water feature is an unnamed brook adjacent to the eastern site boundary.
- 9.4.15. There are two recorded pollution incidents to Controlled Waters within 250m of the site, both relating to Category 3 (minor impact to water) incidents. One incident is located 102m to the north (pollutant unknown) occurring in 2002 and the second is located 104m to the southwest (organic chemicals/products – dyes/inks) occurring in 2003.
- 9.4.16. There is a single recorded historical licensed discharge to Controlled Waters located 227m to the southeast of the site, issued to Unit K at Birch Industrial Estate (permit no. 016991177), relating to sewage discharges/ treated effluent into Whittle Brook.
- 9.4.17. The site is located in a Water Framework Directive (WFD) surface water body catchment related to Whittle Brook (Irwell).
- 9.4.18. There are no surface water abstractions within 500m of the site.

## Other Environmental Data

- 9.4.19. There are no recorded active/recent or historical landfills within 500m of the site.
- 9.4.20. There is a single historical waste site shown within 250m of the site, relating to the infilling of a redundant quarry to restore land for agricultural use and construction of an access road at 78m to the north of the site.
- 9.4.21. There are four active licensed waste sites within 500m of the site, all located at Hareshill Farm Equestrian Centre at 394m to the north of site, relating to the deposition of waste to land as a recovery operation, issued in March 2012 to P Casey Enviro Ltd and Russells South Heywood Limited.
- 9.4.22. There are twenty recorded waste exemptions within 500m of the site, eight of which are located at 150m to the west, at a farm and relates to the storage of sludge.
- 9.4.23. There are four historical industrial land uses within 250m of the site, the closest relating to an old sandstone quarry at 105m to the north.
- 9.4.24. There are ten current industrial land usages within 250m of the site. Of relevance to the site is a vehicle repair, testing and servicing building 105m to the south.
- 9.4.25. There is a single recorded pollution incident at 104m to the southwest, relating to a Category 3 (minor impact to land) from organic chemicals/products (dyes/inks) occurring in 2003.
- 9.4.26. There are no historical energy features shown within 250m of the site.
- 9.4.27. There are no current or recent petrol stations recorded within 500m of the site.

- 9.4.28. There are no Environment Agency Recorded Pollution Incidents recorded within 250m of the site.
- 9.4.29. There are no records for a Part A(1), Part A(2)/B licensed pollutant release, or current COMAH sites with 500m of the site.
- 9.4.30. There are no records of IPC Authorised Activities within 500m of the site boundary.
- 9.4.31. The site is not located within a Nitrate Vulnerable Zone.

### **Coal Mining**

- 9.4.32. Reference to the Mining Remediation Authority Interactive Map Viewer indicates that the site is located in the Mining Remediation Authority Consultation Area.
- 9.4.33. The entire site and wider areas (to the east and the west) are shown to lie in an area of probable unrecorded shallow workings and, as such, is located within the Mining Remediation Authority Designated Development High Risk Area. A Mining Remediation Authority Consultants Coal Mining Report (ref: 51003509287001), dated July 2025, was obtained for the site and is included in the Phase 1 desk study in Appendix 9.1.
- 9.4.34. The Consultants Coal Mining Report indicates that the site is not within the likely zone of influence at the surface from known/recorded underground workings, with the Interactive Map Viewer indicating the nearest recorded underground workings approximately 1450m east of the site (reported as being shallow workings, i.e. less than 30m bgl).
- 9.4.35. The site is however located in an area where the Mining Remediation Authority believe that the Lower Mountain coal seam and Lower Foot coal seam are at or close to the surface. As such, the site (and much of the surrounding area) is shown to be located in an area of probable unrecorded shallow workings and also located in the Mining Remediation Authority designated Development High Risk area.
- 9.4.36. Taking into account the identified depths and published thicknesses of coal and the presence of potential workings, the site surface is considered to be at potential risk of crown hole development in the event that localised unrecorded workings may have taken place, primarily in the Lower Mountain Coal and Lower Foot Coal seams and to a lesser extent, in the Bassy Coal, prior to records being required (circa 1872).
- 9.4.37. There are no recorded abandoned mine entries shown within 100m of the site boundary. However, currently unidentified mine entries may be present across the site which could also pose a significant risk to the proposed development.
- 9.4.38. The site is not considered to be at risk from workings in any other coal seams.

### **Radon**

- 9.4.39. The Groundsure Report (which refers to the Radon Potential dataset - the definitive map of radon affected areas, created jointly by the British Geological Survey and the UK Health Security Agency) indicates that the site is located in an area where 1–3% of buildings are affected by radon. On this basis, the Groundsure report (in accordance with the UK Health Security Agency) indicates that no radon protection measures are considered necessary for new properties at the site.

## FUTURE BASELINE

- 9.4.40. Although to be updated following Phase 2 intrusive investigation, in the absence of the Project for Assessment (or other planned development), it is anticipated that the baseline would experience limited change.

## 9.5 SENSITIVE RECEPTORS

- 9.5.1. The following sensitive receptors have been identified and assessed:

- **Human Health**

- Future Commercial/Industrial site users (workers and visitors)

- **Controlled Waters**

- Secondary 'A' Aquifer – Pennine Lower Coal Measures Formation and
- Secondary (Undifferentiated) Aquifers – Glacial Till and localised Glaciofluvial Sheet Deposits and Lacustrine Deposits;
- Surface water features (pond to west and brook/stream to the east of the site)

- **Building Fabric and Services**

- Buried Concrete Structures
- Buried supply services
- Site surface – as a result of potential historical coal workings

- 9.5.2. All key sensitive receptor locations in relation to the site are shown on the Conceptual Site Model, **Drawing AG3696-25-02, in appendix 9.1.**

## 9.6 ASSESSMENT OF POTENTIAL EFFECTS, MITIGATION AND RESIDUAL EFFECTS

### CONSTRUCTION PHASE

#### 9.6.1. Potential Effects

The Construction Phase in the context of Ground Conditions and Contamination has the potential to result in the in the following effects:

- Construction workers (Human Health) may be exposed existing contamination (hydrocarbons, vapours and asbestos) in the Made Ground soils or groundwater via direct contact, ingestion and inhalation of dusts or vapours during excavations and earthworks. However, the length of direct exposure will be limited to the duration of site works in which they are directly involved, and thus the effect will be short term. The sensitivity of construction workers is medium and the magnitude of change, prior to mitigation, is high. Therefore, there is the potential for a moderate adverse effect (significant) on construction workers prior to the implementation of mitigation measures.
- Secondary Aquifers underlying the site and adjacent Surface Water features (Controlled Waters) may be exposed to existing contamination in the Made Ground soils via leaching and/or migration through permeable soils subject to future foundation design. For example, piling or some forms of ground improvement may create preferential pathways for the migration of contamination if present in the Made Ground soils. The use of machinery and plant associated with construction activities (including the establishment of a site construction compound and storage of chemicals

or fuels) could give rise to localised contamination that may represent a risk to groundwater through accidental fuel / oil and chemical spills and leaks. There could also be a risk of contaminated runoff, including hydrocarbon contamination, associated with the operation of vehicles. This has the potential to create overland migration pathways to surface water features (pond to west and brook/stream to the east of the site). The sensitivity of Controlled Waters is considered to be medium, and the magnitude of change, prior to mitigation is medium. Therefore, there is the potential for a moderate adverse effect (significant) on Controlled Waters prior to the implementation of mitigation measures.

### Mitigation

- Phase 2 intrusive ground investigation shall be carried out to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages prior to commencement of the Construction Phase.
- Standard construction-phase supervision, health and safety risk assessment, and environmental controls to be implemented in accordance with the Construction Environmental Management Plan (CEMP). Construction workers would also be required to wear PPE such as gloves and face masks (where appropriate) to prevent dermal contact and inhalation or ingestion. Appropriate site hygiene facilities will be put in place and the presence of contaminants and the associated risks will be explained to ground workers before they begin work. Water can also be sprayed onto material being worked to damp down any potentially contaminated dust and prevent it from becoming airborne where it may affect construction workers.
- Fuel storage on-site to be carried out under best practice i.e. integrally bunded containers. Plant refuelling to be carried out using best practice techniques and any spills to be controlled with spill kit.

9.6.2. It is assumed that any surplus excavated materials from the Site will be appropriately classified and disposed to licenced facilities.

### Residual Effects

- The sensitivity of construction workers is medium to high and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a negligible effect (not significant) on construction workers following implementation of mitigation measures.
- The sensitivity of Controlled Waters is low to medium and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a direct, temporary, medium to long-term negligible effect (not significant) following the implementation of mitigation measures.

**Table 9-2 – Assessment of Potential Effects, Additional Mitigation, Residual Effects and Monitoring on Construction Workers during the Construction Phase**

|                              |                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensitive receptor</b>    | Construction workers                                                                                                                                          |
| <b>Potential effects</b>     | Exposure to potential contaminants within Made Ground soils or groundwater through dermal contact, ingestion and inhalation during excavation and earthworks. |
| <b>Additional mitigation</b> | Phase 2 Intrusive ground investigation to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages.      |

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | <p>Standard construction-phase supervision, health and safety risk assessment, and environmental controls to be implemented in accordance with the Construction Environmental Management Plan (CEMP).</p> <p>Construction workers to wear PPE such as gloves and face masks (where appropriate) to prevent dermal contact and inhalation or ingestion.</p> <p>Appropriate site hygiene facilities to be put in place and the presence of contaminants and the associated risks to be explained to ground workers before they begin work.</p> <p>Water can also be sprayed onto material being worked to damp down potentially contaminated dust and prevent it from becoming airborne.</p> |
| <b>Residual effects and monitoring</b> | The magnitude of change following mitigation is considered negligible. Therefore, there is likely to be a negligible effect (not significant).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

**Table 9-3 – Assessment of Potential Effects, Additional Mitigation, Residual Effects and Monitoring on Controlled Waters during the Construction Phase**

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensitive receptor</b>              | Secondary Aquifers underlying the site and adjacent Surface Water features (Controlled Waters)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Potential effects</b>               | <p>Exposure to potential contaminants within Made Ground soils or groundwater via leaching and/or migration through permeable soils during the construction of piled foundations or ground improvement.</p> <p>The use of machinery and plant associated with construction activities (including the establishment of a site construction compound and storage of chemicals or fuels) could also give rise to localised contamination that may represent a risk to groundwater through accidental fuel / oil and chemical spills and leaks.</p>                                                                                                                                                                   |
| <b>Additional mitigation</b>           | <p>Phase 2 Intrusive ground investigation to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages will be appropriately remediated prior to the construction phase.</p> <p>Subject to future foundation design and the findings of a Phase 2 intrusive investigation, a Piling Risk Assessment may be necessary to outline measures to protect underlying aquifers during Construction and mitigate the risk of creating preferential pathways for potential contamination.</p> <p>Fuel storage and plant refuelling on-site to be carried out under best practice i.e. integrally bunded containers and any spills to be controlled with spill kit.</p> |
| <b>Residual effects and monitoring</b> | The magnitude of change following mitigation is considered negligible. Therefore, there is likely to be a negligible effect (not significant).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## OPERATIONAL PHASE

### 9.6.3. Potential Effects

Following construction, the Operational Phase in the context of Ground Conditions and Contamination has the potential to result in the in the following effects:

- Future Site users (including visitors) may be exposed to potential contaminants in the Made Ground (and localised hotspots of possible hydrocarbon contamination) via direct contact, ingestion and inhalation of dusts. The sensitivity of future Site users is medium to high and the magnitude of change, prior to mitigation, is high. Therefore, there is the potential for a major adverse effect (significant) prior to the implementation of mitigation measures. However, given that the currently proposed end use comprises commercial/industrial warehouse units with limited

areas of soft landscaping, any plausible pathways to human health (inhalation, ingestion and dermal contact) would be mostly broken due to the presence of hardstanding across most of the site.

- Future Site users (including visitors) may be exposed to potential hazardous ground gases (CH<sub>4</sub>, CO<sub>2</sub>) from the Made Ground and localised organic natural strata via migration into buildings. The sensitivity of the future Site users is high and the magnitude of change, prior to mitigation, is high. Therefore, there is the potential for a major adverse effect (significant) prior to the implementation of mitigation measures.
- Future Site users (including visitors) may be exposed to potential hazardous ground gases (CH<sub>4</sub>, CO<sub>2</sub>, CO and H<sub>2</sub>S) associated with possible historical shallow mine workings beneath the site via inhalation and explosion. The sensitivity of the future Site users is high and the magnitude of change, prior to mitigation, is high. Therefore, there is the potential for a major adverse effect (significant) prior to the implementation of mitigation measures.
- Secondary Aquifers underlying the site and adjacent Surface Water features (Controlled Waters) may be exposed to existing contamination in the Made Ground soils via leaching and/or migration through permeable soils subject to future foundation design. For example, piling or some forms of ground improvement may create preferential pathways for the migration of contamination if present in the Made Ground soils. The sensitivity of Controlled Waters is considered to be medium, and the magnitude of change, prior to mitigation is medium. Therefore, there is the potential for a moderate adverse effect (significant) on Controlled Waters prior to the implementation of mitigation measures.
- Buried concrete (Building Fabric) may be exposed to elevated sulphates in Made Ground or natural soils via direct contact. The sensitivity of buried concrete is considered to be medium, and the magnitude of change, prior to mitigation is medium. Therefore, there is the potential for a moderate adverse effect (significant) on buried concrete prior to the implementation of mitigation measures.
- Buried water supply services may be exposed to elevated concentrations of hydrocarbons in the Made Ground via direct contact. The sensitivity of buried water supply services is considered to be medium, and the magnitude of change, prior to mitigation is medium. Therefore, there is the potential for a moderate adverse effect (significant) on buried water supply services prior to the implementation of mitigation measures.
- The site surface (Building Fabric) is considered to be at potential risk of crown hole development in the event that localised unrecorded workings may have taken place, primarily in the Lower Mountain Coal and Lower Foot Coal seams and to a lesser extent, in the Bassy Coal. In addition to this, currently unidentified mine entries may also be present across the site which could also pose a significant risk to the proposed development. The sensitivity of the site surface (building fabric) is considered to be medium, and the magnitude of change, prior to mitigation is medium. Therefore, there is the potential for a moderate adverse effect (significant) on the site surface prior to the implementation of mitigation measures.

## Mitigation

- Pre-construction Phase 2 intrusive ground investigation shall be carried out to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages. If the ground investigation identifies contaminant linkages, a Remediation Strategy and Verification Plan and/or specification for drilling and grouting will be produced for the Site to specify remedial measures.
- Where remediation is considered necessary, works shall be undertaken and validated in accordance with the remediation strategy and verification plan.
- Concrete foundations would be designed based on the Design Sulphate Class and Aggressive Chemical Environment for Concrete Class as defined by the BRE Special Digest 1, Concrete Aggressive Ground, 2005 following pre-construction Phase 2 investigation.
- Suitable buried water supply services materials would be selected (once pipe routes are known) based on the results of the pre-construction Phase 2 investigation and following completion of a United Utilities Pipeline Risk Assessment.
- Where Phase 2 investigation indicates that the site surface may be at potential risk of crown hole development/surficial instability due to the presence of shallow unrecorded coal workings beneath the site, a specification for drilling and grouting would be prepared. The specification would detail a programme of drilling and proof grouting of the shallow coal workings to ensure that any voids/broken ground are adequately filled/treated to prevent the possible formation of crown holes at surface and reduce the risk of general surficial subsidence. The necessary programme of drilling and grouting would be undertaken in accordance with the specification and validated prior to the Operational Phase.

## Residual Effects

- The sensitivity of site users is medium to high and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a negligible effect (not significant) on future site users following implementation of mitigation measures.
- The sensitivity of Controlled Waters is medium and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a negligible effect (not significant) following the implementation of mitigation measures.
- The sensitivity of buried concrete structures and water supply pipes is medium and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a negligible effect (not significant) following the implementation of mitigation measures.
- The sensitivity of the site surface is medium and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a negligible effect (not significant) following the implementation of mitigation measures.

**Table 9-4 – Assessment of Potential, Additional Mitigation, Residual Effects and Monitoring on Future Site Users during the Operational Phase**

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensitive receptor</b>              | Future site users (including visitors)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Potential effects</b>               | <p>Exposure to potential contaminants in the Made Ground (and localised hotspots of possible hydrocarbon contamination) via direct contact, ingestion and inhalation of dusts.</p> <p>Exposure to potential hazardous ground gases (CH<sub>4</sub>, CO<sub>2</sub>) from the Made Ground and localised organic natural strata via migration into buildings.</p> <p>Exposure to potential hazardous ground gases (CH<sub>4</sub>, CO<sub>2</sub>, CO and H<sub>2</sub>S) associated with possible historical shallow mine workings beneath the site via inhalation and explosion.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Additional mitigation</b>           | <p>Phase 2 Intrusive ground investigation to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages. If necessary, a Remediation Strategy and verification plan will be produced for the Site, and remedial works will be validated.</p> <p>Where the presence of buildings and hardstanding across the site are present, it also will limit the potential for dermal contact, ingestion or inhalation of potentially contaminated soils by future users.</p> <p>A Phase 2 intrusive ground investigation undertaken prior to construction will include an assessment of the ground gas regime at the Site in line with best practice (CIRIA C665).</p> <p>Should the ground gas risk assessment indicate that the buildings require ground gas mitigation measures (such as a gas resistance membrane) in line with BS8485 then this will be installed during construction of the building. The installation of any gas protection measures shall be validated by a competent and qualified person.</p> |
| <b>Residual effects and monitoring</b> | The magnitude of change following mitigation is considered negligible. Therefore, there is likely to be a negligible effect (not significant).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

**Table 9-5 – Assessment of Potential, Additional Mitigation, Residual Effects and Monitoring on Controlled Waters during the Operational Phase**

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensitive receptor</b>              | Secondary Aquifers underlying the site and adjacent Surface Water features (Controlled Waters)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Potential effects</b>               | Exposure to potential contamination in the Made Ground soils via leaching and/or migration through permeable soils.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Additional mitigation</b>           | <p>Phase 2 Intrusive ground investigation to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages. If necessary, a Remediation Strategy and verification plan will be produced for the Site, and remedial works will be appropriately validated.</p> <p>Subject to future foundation design and the findings of a Phase 2 intrusive investigation, a Piling Risk Assessment may be necessary to outline measures to protect underlying aquifers during Construction and mitigate the risk of creating preferential pathways for potential contamination.</p> |
| <b>Residual effects and monitoring</b> | The magnitude of change following mitigation is considered negligible. Therefore, there is likely to be a negligible effect (not significant).                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

**Table 9-6 – Assessment of Potential, Additional Mitigation, Residual Effects and Monitoring on Building Fabric (Concrete and Water Supply Services) during the Operational Phase**

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensitive receptor</b>              | Building Fabric (Concrete and Water Supply Services)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Potential effects</b>               | Buried concrete structures may be exposed to elevated sulphates in Made Ground or natural soils via direct contact.<br><br>Buried water supply services may be exposed to elevated concentrations of hydrocarbons in the Made Ground via direct contact.                                                                                                                                                                                                                                                                                                                |
| <b>Additional mitigation</b>           | Phase 2 Intrusive ground investigation to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages.<br><br>Concrete foundations would be designed based on the Design Sulphate Class and Aggressive Chemical Environment for Concrete Class following pre-construction Phase 2 investigation.<br><br>Suitable buried water supply services materials would be selected based on the results of the pre-construction Phase 2 investigation and following completion of a United Utilities Pipeline Risk Assessment. |
| <b>Residual effects and monitoring</b> | The magnitude of change following mitigation is considered negligible. Therefore, there is likely to be a negligible effect (not significant).                                                                                                                                                                                                                                                                                                                                                                                                                          |

**Table 9-7 – Assessment of Potential, Additional Mitigation, Residual Effects and Monitoring on Building Fabric (Site Surface) during the Operational Phase**

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensitive receptor</b>              | Building Fabric (Site Surface)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Potential effects</b>               | The site surface may be at potential risk of crown hole development in the event that localised unrecorded coal workings have taken place at shallow depth beneath the site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Additional mitigation</b>           | The pre-construction Phase 2 investigation shall prove the depth to bedrock, confirm the anticipated stratigraphy and in particular the potential presence of coal seams and/or the nature of any shallow workings to minimum depths of 35m bgl across the site. Where Phase 2 investigation indicates that the site surface may be at potential risk of crown hole development/surficial instability due to the presence of shallow unrecorded coal workings, a specification for drilling and grouting would be prepared.<br><br>The specification would detail a programme of drilling and proof grouting of the shallow coal workings to ensure that any voids/broken ground are adequately filled/treated to prevent the possible formation of crown holes at surface and reduce the risk of general surficial subsidence. |
| <b>Residual effects and monitoring</b> | The magnitude of change following mitigation is considered negligible. Therefore, there is likely to be a negligible effect (not significant).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## ASSESSMENT AGAINST FUTURE BASELINE

- 9.6.4. In the absence of the Project for Assessment (or other planned development), it is anticipated that the baseline would experience limited change.

## CUMULATIVE EFFECTS

- 9.6.5. The potential for cumulative effects relating to ground conditions and land contamination has been considered alongside other existing, consented, and reasonably foreseeable developments within the study area. Cumulative effects could arise where ground disturbance from multiple developments occurs in proximity, particularly during overlapping construction periods, with the potential to increase the risk of soil disturbance or mobilisation of any underlying contamination.

Based on the Phase 1 Desk Study, the assessment indicates that risks associated with ground conditions and contamination are localised and site-specific. No direct groundwater connectivity or shared contaminant pathways have been identified that would give rise to cumulative effects of significance. In addition, standard construction controls, future site investigation, and remediation where necessary will be secured through planning conditions for the proposed development and are also expected to apply to other schemes.

Given the limited geographical extent of potential effects, the temporary nature of construction activities, and the application of established risk management measures, no significant cumulative effects relating to ground conditions and land contamination are anticipated.

## 9.7 OPPORTUNITIES FOR ENVIRONMENTAL ENHANCEMENT

- 9.7.1. Phase 2 Intrusive ground investigation shall be undertaken prior to construction, to confirm the conceptual site model derived from the Phase 1 Desk Study/identify potential contaminant linkages. Should contamination be identified which is considered to pose a risk to sensitive receptors then remediation will be undertaken and appropriately validated which would represent an overall improvement to the existing baseline.
- 9.7.2. Beyond this, it is not considered that there are further opportunities for environmental enhancements in relation to ground conditions for the Proposed Scheme.

## 9.8 DIFFICULTIES AND UNCERTAINTIES

- 9.8.1. The assessment of ground conditions and contamination has been based on a Phase 1 Desk Study and site walkover only, with no intrusive investigation undertaken. Accordingly, uncertainties exist regarding the presence and extent of potential contamination and the variability of ground conditions, including potential shallow coal mining features across the site. Desk-based information and historical records are inherently limited and may not confirm site-specific conditions.
- 9.8.2. A precautionary approach has therefore been applied, and investigation and remediation, where required, will be secured by planning condition to manage any residual risks.
- 9.8.3. These uncertainties will be addressed through future site-specific intrusive investigation prior to construction, including sampling and laboratory analysis. Any contamination identified will be assessed and remediated where necessary in accordance with current guidance and in consultation with the relevant regulatory bodies.

## 9.9 SUMMARY

- 9.9.1. **Table 9-8** provides a summary of the findings of the assessment.

**Table 9-8 – Summary of Ground Conditions and Contamination Effects**

| Receptor                  | Potential Effects                                                                                                                                                                                       | Significance of Effects Prior to Mitigation/ Enhancement | Additional Mitigation                                                                                                                                                                                                                                                                                                     | Residual Effects                                  | Monitoring                                                                         |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Construction Phase</b> |                                                                                                                                                                                                         |                                                          |                                                                                                                                                                                                                                                                                                                           |                                                   |                                                                                    |
| Construction workers      | Exposure to potential contaminants in Made Ground soils or groundwater through dermal contact, inhalation and ingestion during excavation and earthworks.                                               | <b>Moderate Adverse (significant)</b><br>T / D / ST      | Phase 2 ground investigation to confirm CSM /identify potential contaminant linkages.<br><br>Supervision, H&S risk assessment, environmental controls implemented in accordance with CEMP.<br><br>Appropriate PPE.<br>Appropriate site hygiene facilities.<br>Water spray to damp down any potentially contaminated dust. | <b>Negligible (not significant)</b><br>T / D / ST | Routine construction-phase inspection and supervision by the Principal Contractor. |
| Controlled waters         | Mobilisation or leaching of contaminants into groundwater or surface water during piling or ground improvement and during the use of other machinery and plant associated with construction activities. | <b>Moderate Adverse (significant)</b><br>T / D / ST      | Phase 2 ground investigation to confirm CSM /identify potential contaminant linkages.<br><br>Piling Risk Assessment may be necessary to outline measures to protect underlying aquifers during Construction.<br><br>Fuel storage and plant refuelling on-site to be carried out under best practice.                      | <b>Negligible (not significant)</b><br>T / D / ST | No monitoring anticipated beyond standard construction environmental controls.     |

| Receptor                    | Potential Effects                                                                                                                                                                                   | Significance of Effects Prior to Mitigation/ Enhancement | Additional Mitigation                                                                                                                                                                                                                              | Residual Effects                                  | Monitoring              |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------|
| <b>Operational Phase</b>    |                                                                                                                                                                                                     |                                                          |                                                                                                                                                                                                                                                    |                                                   |                         |
| Future site users           | Exposure to contamination in Made Ground soils hazardous or ground/mine gases during occupation.                                                                                                    | <b>Major Adverse (significant)</b><br>P / I / LT         | Embedded design measures including buildings and hardstanding; engineered capping and ground gas protection where required.                                                                                                                        | <b>Negligible (not significant)</b><br>P / I / LT | No monitoring required. |
| Controlled waters           | Secondary Aquifers underlying the site and adjacent Surface Water features may be exposed to existing contamination in the Made Ground soils via leaching and/or migration through permeable soils. | <b>Moderate Adverse (significant)</b><br>P / I / LT      | Phase 2 ground investigation to confirm CSM /identify potential contaminant linkages.<br><br>Where remediation is considered necessary, works shall be undertaken and validated in accordance with the remediation strategy and verification plan. | <b>Negligible (not significant)</b><br>P / I / LT | No monitoring required. |
| Buried concrete foundations | Buried concrete (Building Fabric) may be exposed to elevated sulphates in Made Ground or natural soils via direct contact.                                                                          | <b>Moderate Adverse (significant)</b><br>P / D / LT      | Concrete design based on the Design Sulphate Class and Aggressive Chemical Environment for Concrete Class as defined by the BRE Special Digest 1, Concrete Aggressive Ground, 2005 following pre-construction Phase 2 investigation                | <b>Negligible (not significant)</b><br>P / D / LT | No monitoring required. |

| Receptor                     | Potential Effects                                                                                                                                                                          | Significance of Effects Prior to Mitigation/ Enhancement | Additional Mitigation                                                                                                                                                                                                                                                                                                                                                                         | Residual Effects                                  | Monitoring              |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------|
| Buried Water Supply services | Buried water supply services may be exposed to elevated concentrations of hydrocarbons in the Made Ground via direct contact                                                               | <b>Moderate Adverse (significant)</b><br>P / D / LT      | Water supply services materials selected based on the results of pre-construction Phase 2 investigation and following completion of a United Utilities Pipeline Risk Assessment.                                                                                                                                                                                                              | <b>Negligible (not significant)</b><br>P / D / LT | No monitoring required. |
| Site Surface                 | The site surface (Building Fabric) is considered to be at potential risk of crown hole development in the event that localised unrecorded coal workings have taken place beneath the site. | <b>Moderate Adverse (significant)</b><br>P / I / LT      | Phase 2 ground investigation to confirm investigate deeper stratigraphy beneath the site to depths of up to 35m bgl.<br><br>Where evidence of shallow unrecorded coal workings beneath the site are identified, a specification for drilling and grouting would be prepared. The works would be undertaken in accordance with the specification and validated prior to the Operational Phase. | <b>Negligible (not significant)</b><br>P / I / LT | No monitoring required. |

Key to table:

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

## 9.10 REFERENCES

**Reference 9.1** HM Government (2017). The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. London: The Stationery Office.

**Reference 9.2** HM Government (1990). *Environmental Protection Act 1990 (Part 2A – Contaminated Land)*. London: The Stationery Office.

**Reference 9.3** HM Government (1995). *Environment Act 1995*. London: The Stationery Office.

**Reference 9.4** HM Government (2002). *Control of Substances Hazardous to Health Regulations 2002 (as amended)*. London: The Stationery Office.

**Reference 9.5** European Parliament and Council (2008). Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation). Official Journal of the European Union.

**Reference 9.6** European Parliament and Council (2006). *Directive 2006/118/EC on the Protection of Groundwater against Pollution and Deterioration*. Official Journal of the European Union.

**Reference 9.7** HM Government (2012). *Control of Asbestos Regulations 2012*. London: The Stationery Office.

**Reference 9.8** HM Government (2012). *Contaminated Land (England) Regulations 2012*. London: The Stationery Office.

**Reference 9.9** HM Government (2015). *Construction (Design and Management) Regulations 2015*. London: The Stationery Office.

**Reference 9.10** HM Government (2019). *Environmental Damage (Prevention and Remediation) (Amendment) Regulations 2019*. London: The Stationery Office.

**Reference 9.11** HM Government (2019). *Environmental Permitting (England and Wales) Regulations 2016 (as amended)*. London: The Stationery Office.

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