ARUP

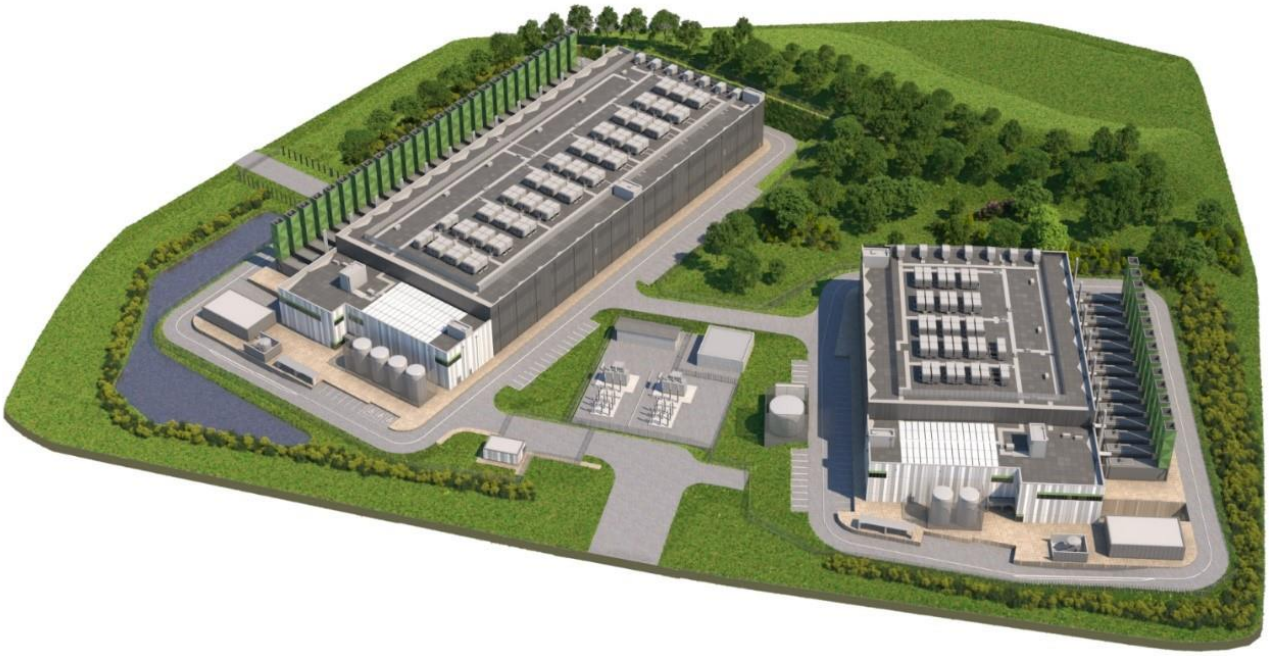
Amazon Data Services UK Limited

Linmere Island Data Centre Environmental Permit Application

Site Condition Report

Reference: 302321-ARP-XX-XX-RP-Z-1004

V3 | 20th December 2024



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		Name	Madeline Shepherd	John Hodgson	John Hodgson
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Introduction

Ove Arup & Partners Ltd (Arup) has been commissioned by Amazon Data Services UK Limited (Amazon) (henceforth known as 'the Operator') to prepare a bespoke application for an Environmental Permit for Linmere Island Data Centre – Emergency Back-Up Generation Facility only (not including the whole data centre).

The application is made by Amazon Data Services UK Limited which is the legal entity that will be responsible for operating the generating installation. The data centre will be located in Houghton Regis, Bedfordshire, UK, approximately 7 km Northwest of Luton town centre and accessed from A5505 Woodside Link off the M1 (hereafter referred to as 'the site').

The site is an island site, bounded by the Dunstable Northern Bypass to the north; the A5505 Woodside Link to the east; B5790 to the south; and Sundon Road to the west (see Figure 1). The intersections of the A5505 with the B5790 and the B5790 with Sundon Road are round-abouts. The surrounding area is characterised by a of mix of warehouse and industrial uses that are currently under development or recently built. There is a public park to the west, a supermarket and residential developments to the south, and a Lidl Distribution Centre to the east. The wider area forms part a wider network of sites that comprise a strategic mixed-use development for the area, known as 'HRN1' (Horton Regis North 1).

A lime stabilised earth bund (also referred to as a soil embankment) occupies the north side of the site, adjacent to the Dunstable Northern Bypass. The remainder of the site comprises fields, trees, the remains of an orchard associated with the demolished Charlton Cross Farm Buildings, and a former car park. The site is classified as greenfield and was agricultural land until circa 2015, after which it is assumed to have been used as a construction compound for development in the wider area. For more information about the history of the site see Section 2.2 Pollution History.

The Site will comprise 42 standby backup diesel generators for emergency use in the event there is a loss of power from the National Grid. Of the 42 generators, four are secondary back-ups ('catcher') and two are smaller ('house') generators to cover non-critical loads (e.g., office lights, office fire system) during an emergency. All will be run individually for maintenance tests and will exhaust through individual flues. It is the intent that the generators will run on diesel fuel or alternatively, Hydrogenated Vegetable Oil (HVO) if it can be sourced in the local area. In addition, there will also be one generator with a thermal input capacity of <1 MWth present in the substation.

The permitting activities on-site fall under The Environmental Permitting (England and Wales) Regulations 2016 (EPR) - Section I .1 Part)(a) burning any fuel in an appliance with a rated thermal input of 50 or more megawatts). However, because the individual combustion is below 15 MWth the installation will be permitted as an IED Chapter II installation but not a Chapter III (LCP) installation. This means the installation will not be required to meet the BAT Conclusions for the LCP. The permit will therefore follow the guidelines set out under the MCPD. Directly associated activities also considered on-site comprise the storage of diesel fuel for use in the emergency back-up generators.

This Site Condition Report (SCR) aims to record and describe the condition of the land at the site prior to the commencement of any permitted operations with particular attention paid to contamination levels in the underlying and surrounding soil and groundwater.

Figure 1 below shows the Site and surrounding area prior to any construction as a result of the proposed development.

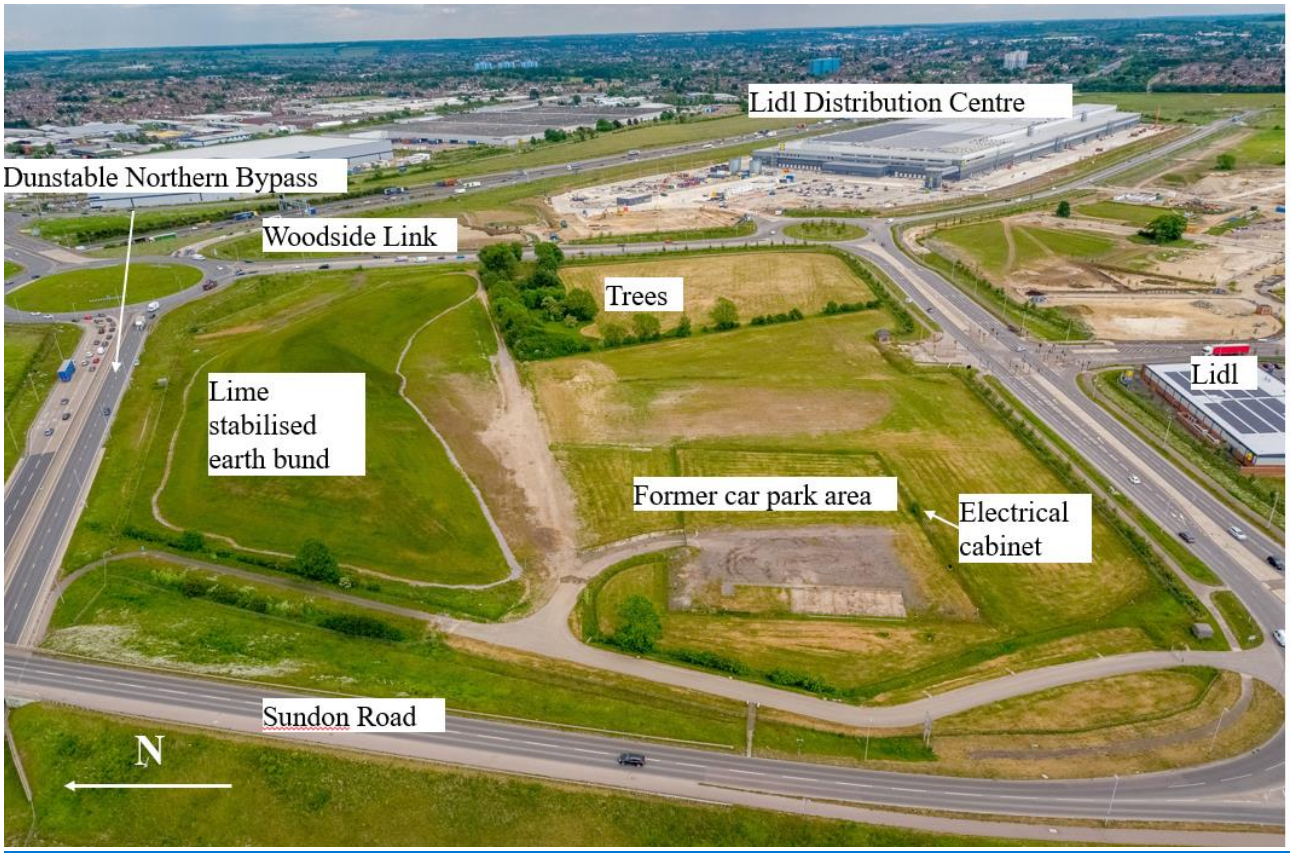
This SCR follows the Environment Agency's (EA) H5 template[1], with Section 1 to 3 populated in this

[1] EA, 2013. *Environmental Permitting: H5 Site Condition Report*. [Online]. Available at: https://www.gov.uk/government/publications/environmental-permitting-h5-site-condition-report (accessed May 2024)

report. Sections 4 to 7 of the SCR template will be maintained during the life of the EP and Sections 8 to 10 will be completed and submitted in support of the application to surrender the EP.

The H5 template is considered by the EA to satisfy[2] the 'baseline report' requirements of the European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75'EU on industrial emissions (IED)[3].

Figure 1: Photograph showing the site and the surrounding area



[2] EA, 2013. *Environmental Permitting Regulations - Site Condition Report - guidance and templates.* [Online]. Available at: https://assets.publishing.service.gov.uk/media/5a7c788040f0b62aff6c1e60/LIT_8001_38258e.pdf (accessed May 2024)

[3] EU, 2014. *Communication from the Commission — European Commission Guidance concerning baseline reports under Article 22(2,) of Directive 2010/75/EU on industrial emissions*. [Online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0506(01) (accessed May 2024).

1. Site details

1.1 Name of the applicant

Amazon Data Services UK Limited

1.2 Activity address

The closest address to the site is:

Chalton, Central Bedfordshire, England, LU5 5GX, United Kingdom

The site coordinates are:

51°55’8.5” N

0°29 ’47.42” W

https://www.google.com/maps/@51.9206298,-0.4842229,1385m/data=!3m1!1e3

1.3 National grid references

The central national grid reference for the site is TL 03503 25622

1.4 Document reference and dates for SCR at permit application and surrender

Document reference: 302321-ARP-XX-XX-RP-Z-1004

1.5 Document reference for site plans

- Photograph showing the site and the surrounding area (Figure 1)
- Exploratory Hole Location Plan 22/3706/01/01 (See Appendix 04-01 of this report)
- Application Drawings (see Appendix 04-01 of this report)
  - Installation Permit Boundary (302321-ARP-XX-XX-DR-Z-0001)
  - Point Source Emissions (302321-ARP-XX-XX-DR-Z-0002)

1.6 Key objectives

The key objectives of this report are to:

- Establish the environmental setting of the site and determine its environmental sensitivity;
- Identify activities that are currently undertaken at the site;
- Establish the extent of historical contamination in the soil and groundwater in areas where current and/or future processes may include similar potentially contaminating substances;
- Identify the Site Conditions at the site at the point of varying the permit for the facility (baseline condition) such that they may be used as a point of reference to determine whether the site has been contaminated during the site's permitted operation in line with the IED and EPR requirements; and
- Provide conclusions on whether land quality has been impacted from historical activities.

2. Condition of land at permit issue

2.1 Environmental site setting

2.1.1 Geology

The ground conditions at the site have been interpreted based on published 1:50,000 scale British Geological Survey (BGS) maps of the area[4], and two phases of ground investigation:

- Geotechnics (September 2018), Houghton Regis North 1 – Areas 1 & 2. Factual Report, Reference: PC187110. The ground investigation was interpreted in WSP (2018), Houghton Regis North 1 – Area 2 Geoenvironmental assessment report (70014321-C48-R01). The report was approved for the site area by Central Bedfordshire Council (CBC) pursuant to Condition 24 Parts 1 and 2 of the Outline Planning Permission (OPP) (CB/12/03613/OUT) (decision notice ref. CB/20/01664/DOC).
- Concept Engineering Consultants Ltd (December 2022), Ground Investigation Factual Report Issue 01, Report No: 22/3706-GIR-F01 (see Appendix 04-02).

The site is underlain by Topsoil and Made Ground. The Topsoil has a typical thickness of between 0.2m and 0.4m. Where present the Made Ground was typically between 0.3m and 0.9m thick, comprising gravelly silty sand or gravelly clayey silt, with occasional anthropogenic inclusions of asphalt, concrete, brick, clinker and rare plastic. The Made Ground was up to 1.9m thick at one location (BH2) in the south east of the site. As shown in Appendix 04-01.

Topsoil and Made Ground was underlain by Glacial Till Deposits in the east of the site but was absent in the west. Where encountered Glacial Till Deposits were typically between 0.3m and 5.6m thick.

Structureless weathered chalk (CIRIA grades Dm and Dc[5]) was present beneath Made Ground or Glacial Till Deposits typically between 0.9m and 5.0m thick, thinning from east to west. The weathered chalk was underlain by structured light grey chalk. The structured chalk was encountered at depths varying from 0.6m to 7.2m below ground level (bgl).

The depth to the top of each stratum, the range of thickness encountered, and the typical description is summarised in Table 1.

Table 1: Summary of geology underlying the site from ground investigations

Stratum	Top of stratum (mbgl)	Thickness (m)	Typical description/formation
Topsoil	0	0.2 – 0.6	Dark brown gravelly clayey silt with occasional pockets of dark brown clay and rootlets. Gravel comprises angular to subrounded fine to coarse flint and chalk.
Made Ground [2]	0	0 – 1.9	Vegetation over soft to firm, dark brown slightly gravelly sandy silty clay with occasional shell and plastic fragments. Grey gravelly silty fine to coarse sand. Gravel comprises angular to subrounded fine to coarse granite and chalk. Man-made inclusions of occasional fine to coarse gravel sized asphalt, and rare pieces of rope, plastic and a work glove. OR Dark orangish slightly sandy slightly gravelly clayey silt with occasional pockets of brown slightly sandy silty clay and rootlets. Gravel comprises angular to

[4] British Geological Survey (no date) *GeoIndex Onshore – bedrock geology*. [Online] Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.50698345.1154182254.1717081573-233619999.1717081573 (Accessed May 2024)

[5] J. Lord, C. Clayton and R Mortimore (2002) E*ngineering in chalk (C574*). CIRIA. London, UK.

Stratum	Top of stratum (mbgl)	Thickness (m)	Typical description/formation
			subangular fine to coarse flint. brick, concrete, granite and clinker fragments. Sand is fine to coarse.
Glacial Till Deposits	0.15 – 1.8	0 – 5.6	Orangish brown and white slightly clayey sandy gravel with low flint cobble content. Gravel comprises angular to rounded fine to coarse flint and chalk fragments. Brown slightly clayey very gravelly silty fine to coarse sand with occasional pockets of brown silty clay and shell fragments. Gravel comprises angular to subrounded fine to coarse flint and chalk fragments. Brown and white slightly clayey silt with occasional pockets of brown silty clay. Gravel comprises angular to subangular fine to coarse flint and chalk fragments. Light brown slightly gravelly silty clay. Gravel is angular to subangular chalk.
Weathered light grey Chalk (structureless)	0 - 7.1	0 – 5.0	Brown and white chalk recovered as: angular to subrounded fine to coarse flint and chalk gravel. Light brown and white chalk recovered as: Slightly sandy gravelly calcareous silt with occasional pockets of iron stained silt. Gravel is angular to subangular fine to coarse chalk.
Light grey Chalk	0.6 – 7.2	3.9 – 8.3	Weak, medium density light grey chalk with occasional shell fragments and brown and dark grey staining. Fractures closely to medium spaced, sub-horizontal, partly open, undulating, rough with frequent dark brown staining. Light grey chalk recovered as: gravel and cobbles. Gravel is extremely weak to very weak, low to medium density light grey fine to coarse chalk fragments with rare yellowish-brown Staining and dark grey specks. Cobbles are medium strong, high density chalk fragments with occasional dark grey and yellowish-brown discoloration. Light grey chalk recovered as: sandy gravelly calcareous silt.
Grey Chalk	6.5 – 14.8	Not proven[1]	
[1] The full depth of the grey chalk below ground level was not determined (to a maximum depth of 34m bgl). [2] Most of the Made Ground is less than 0.9m thick but was 1.9m thick at BH2 located in the southeast of the site, this does not include soil embankment located to the north of the site. The locations of the boreholes for the 2022 Ground Investigation are shown in Appendix 04-01 Exploratory Hole Location Plan 22/3706/01/01.			

2.1.1.1 Earth bund (in north of the site)

An earth bund (previously referred to as Island bund) was placed in 2021 in accordance with a Materials Management Plan (MMP) produced by WSP (April 2021) under the CL:AIRE Definition of Waste: Code of Practice (DoW CoP)[6]. The bund comprises surplus soils from wider redevelopment in the area covered by the OPP (CB/12/03613/OUT) which were stabilised and placed to an earthwork's specification. The bund was for the stated purpose of providing visual mitigation as part of the landscaping scheme.

A verification report on completion of the bund was provided by WSP (July 2022)[7]. This includes chemical testing (107 samples) which confirms that the material is suitable for use (public open space / park land use). The volume of the bund is stated as 99,225m^3. .The verification report was submitted to and approved by CBC pursuant to Condition 31 of the OPP (decision notice reference CB/22/03227/DOC). The verification report is provided in Appendix 04-03.

[6] CL:AIRE (2011) *Definition of Waste: Code of Practice*. [Online]. Available at: https://claire.co.uk/projects-and-initiatives/dow-cop (Accessed 30/07/2024)

[7] WSP (7 July 2022), HRN1- Earth bunds, Final Verification Note

2.1.2 Hydrogeology

Information from the BGS GeoIndex Onshore mapping[4] and the Environment Agency indicates that the hydrogeology of the site comprises of superficial aquifers and a bedrock aquifer, including:

- Lowestoft Formation – Diamicton which is a Secondary Undifferentiated superficial aquifer;
- Glaciofluvial Deposits, Mid Pleistocene – Sand and Gravel which is a Secondary A superficial aquifer; and
- Chalk bedrock aquifer, which is the principal aquifer on site, composed of 3 groups of Chalk. Zig Zag Chalk Formation and Melbourn Rock Member forming the bedrock in the eastern half of site, and west Melbury Marly Chalk Formation forming the bedrock in the western half of site.

Groundwater monitoring from standpipes installed during the 2022 ground investigations recorded groundwater levels from 5.81mbgl, with the typical groundwater depth between 7.49 to 10.59m bgl. Groundwater monitoring from the 2018 ground investigation recorded groundwater level within the Grey Chalk Subgroup between 2.45m bgl and 14.80m bgl.

Department for Environment, Food and Rural Affairs (Defra) MAGIC mapping[8] shows that the site is not within a Source Protection Zone (SPZ). The closest SPZ is a Zone III (total catchment), which comes within 50 m of the southeast corner of the site. The closest Zone II (outer) SPZ is approximately 1.9 km southeast of the site. The closest Zone I (inner) SPZ is approximately 3.8 km southeast of the site.

2.1.3 Surface water / hydrology

The site is located across two catchment areas. The southeast side of the site is within the Upper Lee catchment and the northwest side is within the Upper and Bedford Ouse Catchment. The nearest surface water feature is a drainage ditch which runs inside the site boundary. The final point of discharge for the drainage ditch is unknown. The site is located approximately 25 m north of the Ouzel Brook, an ordinary watercourse. The nearest main river is the Houghton Brook which is approximately 840 m to the southeast of the site. EA Flood mapping[9] for rivers and seas, and reservoirs indicates the site is not at risk of flooding from these sources.

EA Flood mapping[9] indicates that the site is located within Flood Zone 1. The annual probability of fluvial floodings is classified as less than 0.1% at this site. The risk of river flooding is therefore considered to be very low.

2.2 Pollution history

Baseline data for the site has been established based on a commercial environmental data search (Groundsure report) and previous site assessments submitted for the OPP (see Section 2.1.1). The Groundsure report (see Appendix 04-04) includes historical Ordnance Survey maps to identify previous land uses on and around the site, these are summarised in Table 2.

The site largely comprised open agricultural fields with farm buildings (Charlton Cross Farm) in the east, which were established prior to 1881. Minor expansion of farm buildings occurred in the 1970s. The site has undergone very limited development.

In 2015 there were small-scale earthworks / surface trimming across the site, and a temporary hardstanding area was constructed in the west of the site. The hardstanding area was used as a site compound and vehicle parking associated with construction works in the wider redevelopment (OPP) area until 2018.

Removal of hardstanding (road scalpings used onsite for the HRN1 site compound) suspected to be contaminated with hydrocarbons was undertaken onsite in 2022. The contaminated material was removed

[8] Department for Environment, Food and Rural Affairs (no date) MAGIC Map. [Online] Available at: https://magic.defra.gov.uk/MagicMap.aspx (Accessed May 2024)

[9] Environment Agency (2021) Flood map for planning. [Online]. Available at: https://flood-map-for-planning.service.gov.uk/ (Accessed May 2024)

and verified, including verification samples of subsoil after removal, as reported by WSP (2022)[10] and approved by CBC pursuant to Condition 31 of the OPP, (decision notice ref. CB/23/02803/DOC).

Asbestos was identified within the former farmhouse in the east of the site and was removed during demolition in 2016.

Table 2: Historical land uses in and around the site

Local land use and features	Dates
Open fields for agriculture and Charlton Cross Farmhouse (located northeast of the site)	1881 -2016
Construction of electricity transmission lines over site	1947
Construction of M1 300 m east of the site (offsite)	1960s
Small-scale earthworks/surface trimming across the site, and a temporary hardstanding area was constructed in the west of the site	2015
Development of wider area including construction Dunstable Northern Bypass 180 m north of the site (not on-site)	From 2015
Demolition of Charlton Cross Farm buildings for Woodside Link Road	2016/2017
Embankment comprised of surplus soils from the wider redevelopment was constructed	2021

Ground investigations have been undertaken to investigate the potential for ground contamination as summarised in Section 2.3. No evidence of stained or odorous soils or contamination of groundwater was identified. There is no evidence of any specific pollution incidents that may have affected the site.

Control of Major Accident Hazards (COMAH) sites are establishments that store or handle large quantities of hazardous industrial chemicals and are therefore required to comply with the COMAH Regulations 2015[11]. There are no COMAH sites within 500 m of the site, the closest is Luton Airport tank farm (lower tier) located 9.18 km southeast of the site. Based on distance this will not affect the site.

Industrial sites permitted by the Environment Agency that process, distribute, or store significant quantities of hazardous chemicals are shown in Table 3. The closest is a recycling facility 1.4km from site. Based on the permit summaries and distance from site these will not affect the site.

Table 3: Industrial facilities and waste operations with Environment Agency granted permits

Name	Activity type description	Approximate distance from site (km)
Industrial installations		
Alpheus Environmental Limited	Disposal of > 50 T/D Non-Hazardous Waste (> 100 T/D if only AD) Involving Biological. Associated Process	2.7
London Luton Airport Operations Limited	New Medium Combustion Plant	9.6
Waste operations		

[10] WSP (27/07/2022), HRN1- Compound Verification Report

[11] UK Parliament (2015) *The Control of Major Accident Hazards Regulations 2015*. [Online]. Available at: https://www.legislation.gov.uk/uksi/2015/483/contents/made (Accessed 25/07/2024).

Name	Activity type description	Approximate distance from site (km)
SKF (UK) Ltd	A17: Physico-Chemical Treatment Facility	1.4
FCC Recycling (UK) Limited	A13: Household Waste Amenity Site	1.4
X-Bert Haulage Limited	A11: Household, Commercial & Industrial Waste T Stn	1.7
Autolusso Parts Ltd	SR2011 No3: Vehicle Depollution Facility <5000 tps	2.2

A review of the Environment Agency database of historical landfills[12] shows there is one historic landfill site within 500 m of the site, located approximately 480m to the northeast. Details of the site are provided in Table 4. Based on distance from the site, the landfill will not affect the site.

Table 4: Identified landfill sites within 500 m of the site boundary.

Landfill site name and address	Waste type and details	Approximate distance from site (m)
Long Meadow Farm, Chalton Cross, Chalton	Historic landfill dataset reference: EAHLD01110 Licence issued: 03/04/1985 Licence surrendered: 10/04/1986 Waste type: inert waste Licence holder: Frederick Richard Searle	480

2.2.1 Unexploded Ordnance

A preliminary assessment on Unexploded Ordnance (UXO) risk assessment was completed at the site due diligence phase of the project. The assessment indicated that the site is an area of low potential for UXO.

2.3 Evidence of historical land contamination

The site has been subject to two phases of ground contamination investigation which has provided good coverage of the site.

No visual evidence of substantial or widespread ground contamination was noted during the ground investigations. Fragments of anthropogenic material, such as brick, concrete, asphalt and clinker, were encountered in the Made Ground. No asbestos was detected in the samples of soil submitted for analysis.

The chemical results of soil samples show low levels of contamination (see Appendix 04-03), all of which were well below human health generic assessment criteria (GAC) for a commercial land use. Furthermore, the results were mostly below more stringent GAC for a residential land use, except for two samples which contained arsenic (50mg/kg and 53mg/kg) at concentrations marginally above the residential GAC (40mg/kg), These results do not present a risk to receptors of the future data centre development.

Groundwater monitoring and sampling from standpipes recorded typically low concentrations of contaminants, indicative of background levels.

Ground gas monitoring from standpipes detected low concentrations of hazardous ground gases (carbon dioxide and methane). The monitoring is typical of Chalk geology which naturally generates low levels of carbon dioxide gas from the breakdown of carbonate minerals. New buildings onsite do not require ground gas protection measures.

[12] Environment Agency (2024) *Historic Landfill Sites.* [Online]. Available at: https://www.data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites (Accessed June 2024).

The results from the ground investigation reveal that there is no unacceptable risk from ground contamination to future site users of the data centre or to environmental receptors. No remediation is expected to be required for the future development. However appropriate action would be required if unexpected and previously unidentified contamination is encountered during development.

2.4 Relevant baseline soil and groundwater data

The site has previously been used as agricultural land. Detailed ground investigation has been undertaken for site which indicate the site to be suitable for the intended end use, with low risk from land contamination. No remediation is necessary as part of the proposed development.

3. Permitting activities

3.1 Permitting activities

The permitting activities on-site fall under the EPR 2016 - Section I .1 Part)(a) burning any fuel in an appliance with a rated thermal input of 50 or more megawatts). Directly associated activities also considered on-site comprise the storage of diesel fuel and lubrication oil for use in the emergency back-up generators

3.2 Non-permitted activities undertaken

All areas other than the generators and associated refuelling areas and fuel storage.

3.3 Document references

- Application Drawings (see Appendix 04-01 of this report)
  - Installation Permit Boundary (302321-ARP-XX-XX-DR-Z-0001)
  - Point Source Emissions (302321-ARP-XX-XX-DR-Z-0002)
- Exploratory Hole Location Plan(Drawing Number reference: Exploratory Hole Location Plan 22/3706/01/01) (Appendix 04-01)
- Ground Investigation Factual Report Issue 01, Report No: 22/3706-GIR-F01, Concept, December 2022
- WSP Earth Bun Final verification Report, 2022 (Appendix 04-03)
- Groundsure Report 2022 (Appendix 04-04)
- Soil Assessment Summary (Appendix 04-05)
- Groundwater Screening Table (Appendix 05-06)
- Gas Assessment Summary (Appendix 05-07)

Appendix 04-01 Drawings

Exploratory Hole Location Plan 22/3706/01/01

Installation Permit Boundary (302321-ARP-XX-XX-DR-Z-0001)

Point Source Emissions (302321-ARP-XX-XX-DR-Z-0002)

Appendix 04-02 Phase II Ground Investigations Report

Appendix 04-03 WSP Eart Bund Final Verification Note

Appendix 04-04 Groundsure Report 2022

Appendix 04-05 Soil assessment summary

Appendix 04-06 Groundwater screening table

Appendix 04-07 Gas assessment summary