ARUP

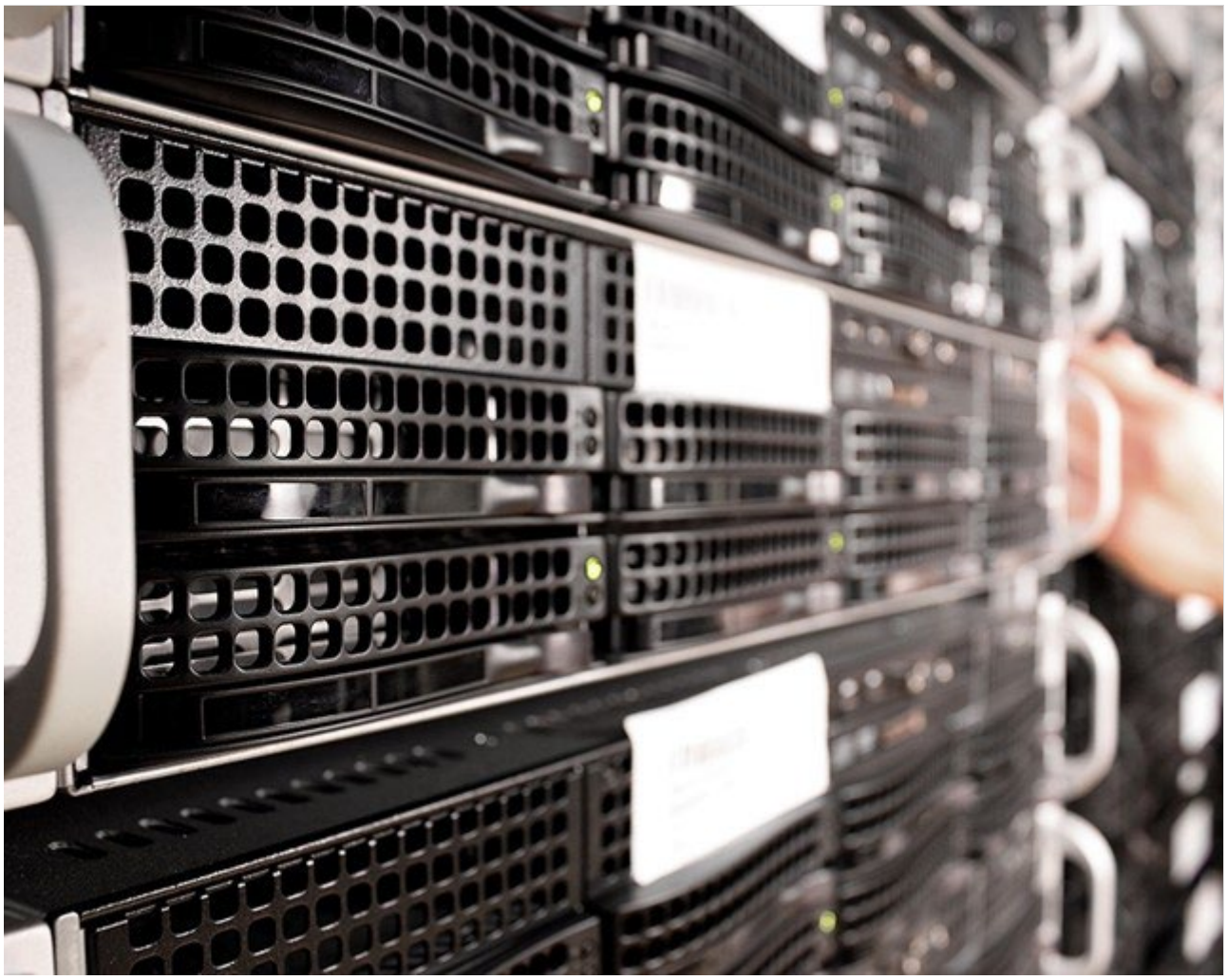
Virtus Holdco Ltd

London 14 Data Centre, Prologis Park Heathrow, Hayes

Site Condition Report - Environmental Permit Application

Reference: 294760-EP-SCR

Issue | 10 October 2023



Job number 294760

Ove Arup & Partners Limited
7th Floor
1 West Regent Street
Glasgow
G2 1RW
United Kingdom
arup.com

Contents

Tables

Figures

Appendices

1. Introduction

1.1 Background

Ove Arup & Partners Ltd (Arup) has been commissioned by VIRTUS (henceforth referred to as 'the Operator') to prepare a Site Condition Report (SCR) to accompany a bespoke application for an Environmental Permit for the London 14, or LON14 data centre.

The application is made by VIRTUS Holdco Limited which is the legal entity that will be responsible for operating the generating installation.

The data centre is located at DC6, Unit D, Plot C, Prologis Park Heathrow, Stockley Road, Hayes in the London Borough of Hillingdon.

The site comprises the redevelopment of the current Unit D commercial warehouse building to house a new data centre, complete with new utilities gantry, office and other ancillary spaces. 16 containerised stand-by backup generators (SBG) for emergency back-up purposes are proposed on-site with a combined thermal input capacity of 110 MWth.

The proposed development falls under the Permitting (England and Wales) Regulations 2016 (EPR) - Section 1.1 Part A(1)(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 for use in the emergency SBGs together with associated drainage infrastructure.

This 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.

The location of the site is illustrated in the Site Location Plan [1] and the EP boundary and site layout are illustrated in the Site Layout and Emissions Point Plan [2] [3]. These are included with the EP application as Documents 294670-EP-DR001 and 294760-EP-DR002 respectively, and copies are included in Appendix G of this Site Condition Report.

This SCR follows the Environment Agency's (EA) H5 template [4], with Section 1 to 3 populated in this 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 [5] 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) [6].

1.2 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;
- To 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 IED and EPR requirements; and
- To provide conclusions on whether land quality has been impacted from historical activities.

2. Site Details

2.1 Name of the applicant

VIRTUS Holdco Ltd

2.2 Activity address

DC6, Unit D, Plot C, Prologis Park Heathrow, Stockley Road, Hayes in the London Borough of Hillingdon

2.3 National grid reference

TQ 08045 79594

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

Document reference: 294670-EP-SCR

2.5 Document reference for site plans

- Site Location Plan [1] (Document reference 294670-EP-DR001)
- Site Layout and Emission Point Plan [2] [3] (Document reference 294670-EP-DR002)
- Environmental Site Settings [7] (Document reference 294670-EP-DR003)
- Cultural and Natural Heritage [8] (Document reference 294670-EP-DR004)
- Site Drainage Plans [9], Flood Risk Assessment and Drainage Strategy (See Appendix 03-03)
- EA Pre-Application Screening [10] (see Appendix 05-01)

The Site Location Plan shows the boundary of the Virtus London 14 data centre site, and the Site Layout Plans show the Environmental Permitting Boundary area within the Virtus site.

3. Condition of land at permit issue

3.1 Environmental Setting

3.1.1 Geology

The British Geological Survey (BGS) mapping of the geological succession at the site is as indicated in the table below, with mapped extents of outcrop as shown on the figures below. BGS Sheet 269 [11] indicates that the site is underlain by Langley Silt (a sandy clay and silt) over Lynch Hill Gravel (fourth terrace of River Thames). These superficial deposits overly London Clay.

Table 1 Summary of geology from BGS maps – Environmental Permitting Boundary and wider Prologis Park area

Strata	Location	Short description (based on BGS map)
Langley Silt	Shown by BGS maps across entirety of Virtus site	Aeolian sand and silt, possibly redeposited from water [12]
Lynch Hill Gravel	Not shown at surface within the Virtus site boundary on BGS mapping, but understood to underlie the Langley Silt across the whole site	Fluvial sand and gravel, forming beds and lenses. Locally with lenses of silt, clay or peat [13]
London Clay	Shown by BGS maps across entirety of site	Silty clay or clayey silt [14]

Made ground is also known to be present at the site, in addition to the natural geological strata listed above. A summary of the geology encountered during ground investigations at the site is shown in Table 6 of section 3.3.3.

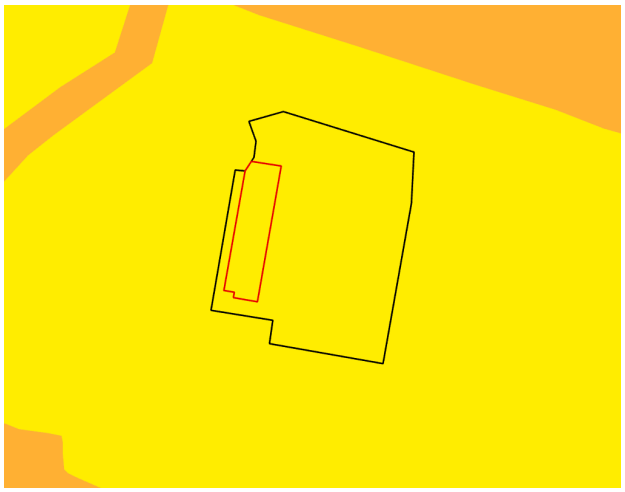


Figure 1: Superficial Geology at surface, from BGS 50K mapping - Langley Silt (yellow), Lynch Hill Gravel (orange)

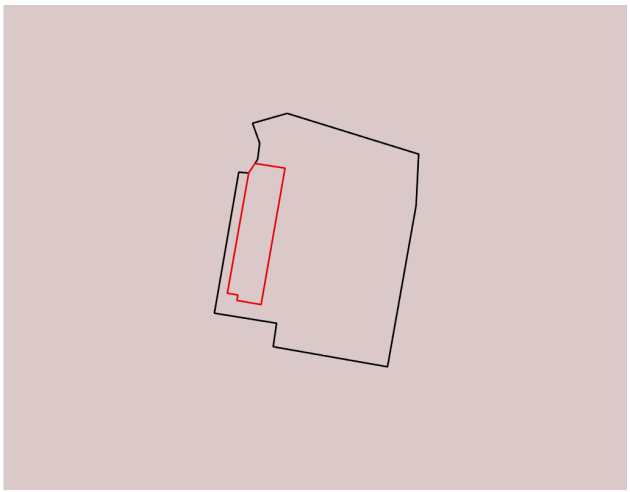


Figure 2: Bedrock Geology beneath superficial deposits, from BGS 50K mapping - London Clay Formation

Black = Virtus London 14 Data Centre site boundary, Red = Environmental Permitting Boundary

3.1.2 Previous Ground Investigations

A series of ground investigations have been undertaken within the wider Prologis Park site; Table 2 lists the exploratory holes which are within or in very close proximity to the boundary of Virtus London 14 site.

Table 2: Exploratory holes within Virtus London 14 site boundary

Ground Investigation undertaken by:	Basis for Investigation, and report reference		Date	Exploratory Holes located within Virtus London 14 site boundary
Gibb Environmental	Phase II Intrusive Survey, Land Quality	[15]	October 1998	BH2 [footnote 1] PH7, PH8, PH13
WSP	Phase II Geo-environmental Assessment	[16]	September 2003	WS01, WS02 BH04, BH08, BH09 TP11, TP12 CBR04 and CBR05 [footnote 2]
WSP	Validation of Phase 3B	[17]	October 2010	TP05, TP06, TP07, TP08, TP09, TP10
BGCL	Verification of Remediation of Phase 3	[18]	April 2014	TH3, TH4, TH5, TH6, TH7, TH8, TH9, TH14

A series of Confidential Borehole Records are shown by the British Geological Survey within the site boundary and were not accessible at the time of writing. However, the locations of these BGS records appear to tie-in with the WSP 2003 GI locations.

The Virtus London 14 Data Centre site boundary and the Environmental Permitting Boundary are shown below on Figure 3 which is a composite plan produced by Arup showing the exploratory hole locations indicated to be present within the site boundary, from available information.

[1] Borehole log for Gibb 1998 borehole BH2 not included within available information

[2] Logs for WSP 2003 CBRs not included within available information

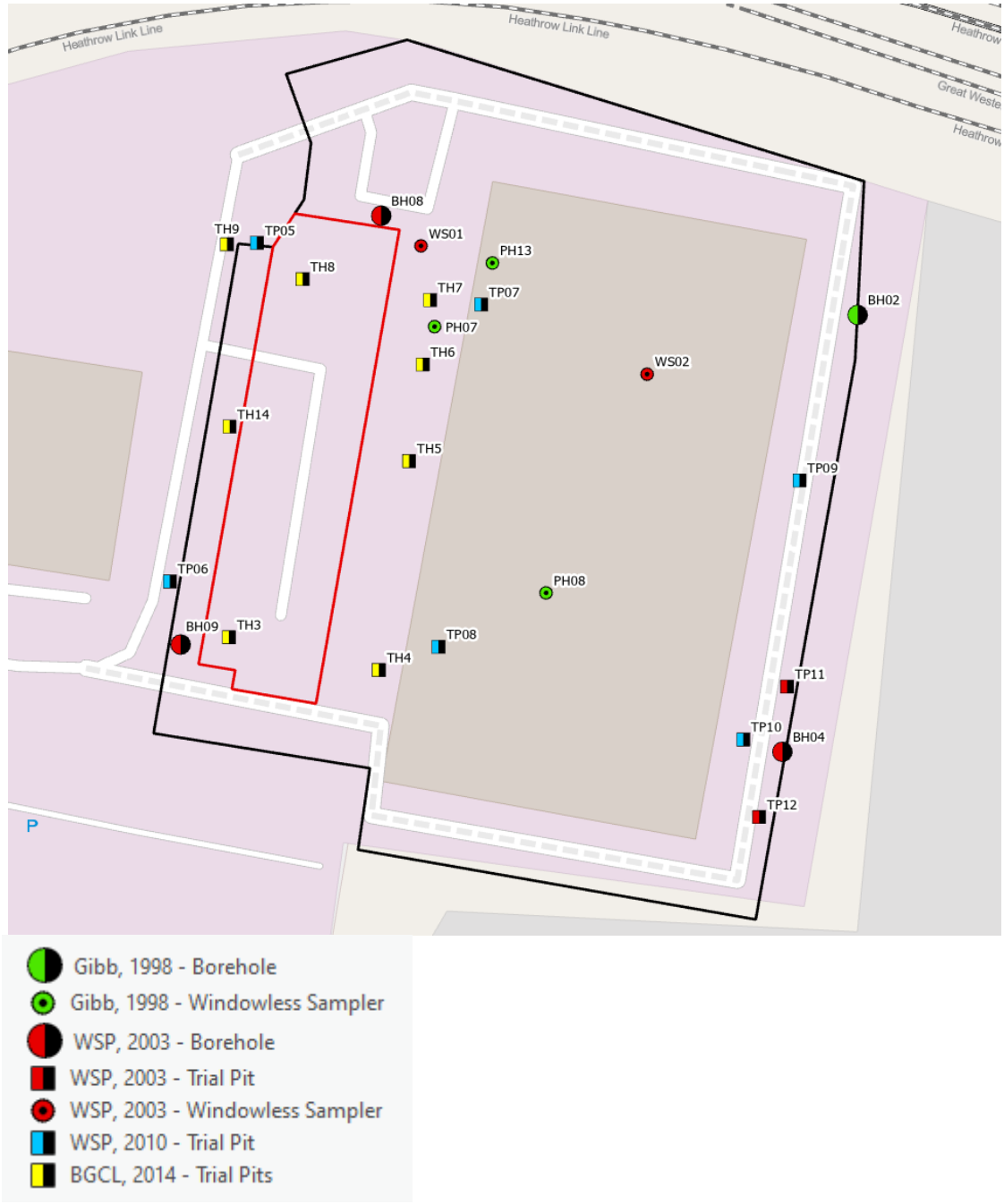


Figure 3: Historic Ground Investigation locations at Virtus London 14 Data Centre site (black line boundary), and Environmental Permitting Boundary (red line boundary).

3.1.3 Hydrogeology

Within the Virtus London 14 Data Centre site, groundwater was struck by WSP during the drilling of BH04, BH08, BH09 and WS02, at depths ranging from 1.75m to 3.70m below ground, typically within the Lynch Hill Gravels or in the case of BH04 at the boundary between the Lynch Hill Gravels and London Clay.

Subsequent post-fieldwork monitoring undertaken by WSP in 2003 [16] encountered water levels within the borehole standpipes closest to the Environmental Permitting Boundary (BH08, BH09) ranging from 1.53m to 1.86m below ground.

Statutory and non-statutory designation information pertaining to groundwater has been reviewed on DEFRA's MagicMap [19]:

- Bedrock (London Clay) at the site is classed as a non-aquifer.
- Superficial deposits at the site are classed as a non-aquifer.
- Groundwater vulnerability mapping shows the site as Unproductive strata.
- The site is not within a Drinking Water Safeguard Zone for groundwater.
- The site is not located within any Source Protection Zones (SPZ).
- The site is not located within a Nitrate Vulnerable Zone.

In consideration of the above, the site setting can be considered to be of low sensitivity with regards to groundwater, due to the presence of unproductive strata and absence of abstractions or protection zones affecting the site.

WSPs previous reporting from 2013 states that the Lynch Hill Gravels comprised a Principal Aquifer, however review of current aquifer mapping [19] in 2023 suggests that this aquifer classification does not apply as superficial strata are now classed as a non-aquifer.

3.1.4 Surface water / hydrology

DEFRA catchment planning mapping [20] shows the site is within the River Crane catchment. The River Crane is located approximately 2.4km east of the site and is a tributary to the River Thames.

The (EA) Flood Map [21] indicates that the site is located within Flood Zone 1. This means that the annual probability of flooding from a river or the sea is less than 1 in 1000, i.e. there is less than 0.1% annual probability that the site will suffer from river or sea flooding in a given year.

Regarding groundwater flooding risk, the London Borough of Hillingdon Strategic Flood Risk Assessment (SFRA) highlights two artificial waterbodies within the vicinity of the site, namely the Grand Union Canal to the north and a lake to the west.

The SFRA does not identify the site as being at risk from groundwater flooding and does not note any historical flooding occurring within the site. Taking account of all sources, the site is concluded to be at low risk of flooding.

Non-statutory designation information pertaining to surface water abstractions has been reviewed on DEFRA's MagicMap [19]:

- The site is not within a Drinking Water Protected Area for surface water.
- The site is not within a Drinking Water Safeguard Zone for surface water however the safeguard zone for *Thames_SWSGZ4015, 4016_Cookham Teddington & Wey* is located to the immediate north and west of the site boundary.

3.2 Pollution History

The history of the wider Prologis park area is summarised within the previous Land Quality Statement produced by WSP in 2013 [22]. This summary of the wider site history has been verified, as far as is reasonably practicable, by Arup using publicly available historic mapping and aerial imagery from the National Library of Scotland [23], GoogleEarth and Historic England [24].

In relation to the Virtus London 14 Data Centre site and Environmental Permitting Boundary areas, key stages of the site history can be summarised as follows:

- pre-1939: Site comprises agricultural land.
- 1939-1946: Site is part of a Royal Ordnance Factory producing armaments.
- 1946-1950: Factory closed, site retained as a storage depot by Ministry of Supply.
- 1950: Site taken over by the Public Records Office and used as Ministry of Defence archive.
- 2006 to 2013: Site demolished and remediated.
- 2014: Construction of Prologis industrial units D/G.

Further details on potentially contaminative historic land uses, pollution incidents and evidence of contamination during the above periods of site history is provided in the following sections, specifically with regards to the current Virtus London 14 site boundary.

3.2.1 Site History, pre-world war 2

The first available Ordnance mapping in 1868 shows the Virtus 14 site as open fields, with a pond in the southeast corner of site. Surrounding land uses include the Great Western Railway (on northern boundary of site), Grand Junction Canal (130m north), a stream connected to the canal (150m west), and areas labelled as Brick Field (150m northeast and 380m west) understood to relate to the extraction of material from the Langley Silt Member for use in brick-making.

1900 mapping shows no significant changes, although the pond in the southeast of site is now shown to be connected to a ditch or stream in the south, and a new Brick Field is now shown to the north of the site beyond the railway line.

There are no changes shown on site and no significant changes in the surrounding area after this point, until the second world war (discussed below).

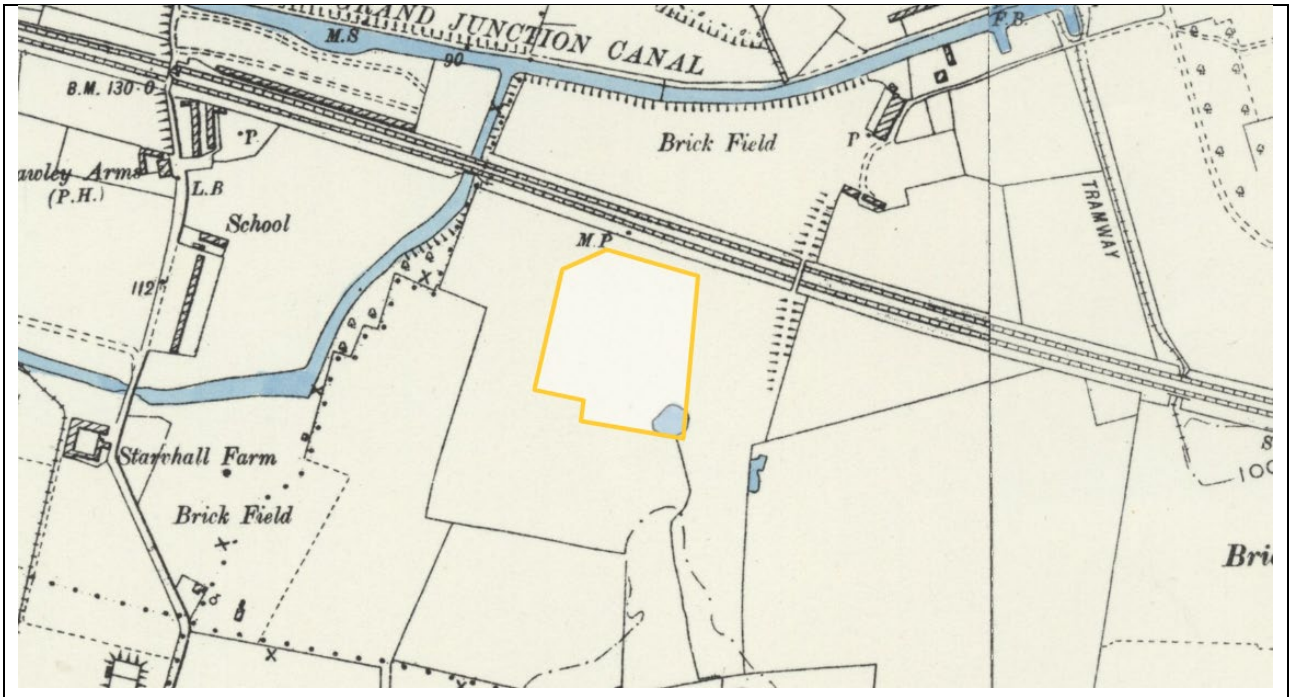


Figure 4: OS 1:10,000 map, 1900s (extract reproduced from National Library of Scotland map viewer [23]) – approximate site boundary indicated in orange. Pond feature visible in southeast.

3.2.2 Site History, 1939 to 1950

The publicly available historic ordnance survey maps from the 1930s onwards do not show any activities or land-uses at the site; This is understood to be a deliberate omission of information due to sensitive or strategic military land-use, and the site history from the 1930s until present day has therefore been interpreted from previous reports supplied by Virtus, reports and plans obtained from searches of the Hillingdon Council Planning Applications database [25], along with aerial imagery and resources obtained through web research.

The site is understood to have been developed into a Royal Ordnance Factory between 1939 and 1941 [26] for the production of armaments [16], specifically guns and Sherman Firefly tanks [27] [28].

Aerial imagery available from Historic England dated April 1944 [29] shows a large shed structure in the centre of the Virtus London 14 site, which is understood to be the main ordnance factory building. The pond in the southeast of the Virtus London 14 site is also shown, along with a series of eight small structures/buildings along the northern and eastern boundaries of the Virtus London 14 site. The purpose of these structures is not confirmed by the available information, but the HER entry for the ordnance factory suggests these may comprise air raid shelters [27].

Aerial imagery from June 1945 [30] shows a large number of vehicles stored outdoors in the northeast of the Virtus London 14 site, and imagery from August 1947 [31] also shows many vehicles in the northeast and south of the Virtus London 14 site.

Following closure of the Ordnance Factory in 1946, the site was retained as a Ministry of Supply Storage Depot, before being taken over by the Public Records Office in 1950 [27].

3.2.3 Site History, 1950 to 2004

The Public Records Office (PRO) acquired the site in 1950 and installed large amounts of metal archiving racks in the former machine sheds between 1950 and 1954. Air raid shelters and adjoining sheds (possibly the small structures present on the north and east boundaries of the Virtus London 14 site) were retained on site and converted to offices [27].

The site was primarily used as an Army Records Office, and from 1959 the photographic and film archive of the Imperial War Museum was stored on site. In 1996, management of the records site was handed over from

the PRO to the Military of Defence (MoD) who were the principal user of the site, although some PRO records remained on site [32]. All records were removed from the site in 2004.

Due the nature of the activities and land-use at the site post-1950, no significant contamination is predicted in relation to this period of the site's history. Pre-existing contamination from the site's historic use as an ordnance factory is likely to have remained untreated within the site during its ~50 years in operation as a records office. Aerial imagery from 1999 until 2004 shows the area of the former pond in the southeast of Virtus London 14 site to be overgrown/vegetated, and it is known from other reports [16] that this pond was backfilled with waste material. This backfilled pond is however not within the footprint of the Environmental Permitting Boundary, and is located some 75m to the east of the Environmental Permitting Boundary.

3.2.4 Site History, 2004 to 2014

Aerial imagery from late-2006 shows the archive/former factory building within the Virtus London 14 site remains in place, although the smaller buildings (possible air raid shelters) on the northern and eastern boundaries have been demolished, and groundworks have started in the open areas of site surrounding the factory. The late-2006 shows a large bund or stockpile along the eastern boundary of the Virtus London 14 site. This stockpile was not located within the footprint of the Environmental Permitting Boundary.

WSP's 2013 Land Quality Report states that the backfilled pond was excavated and replaced with clean fill materials during remediation, circa 2006.

Aerial imagery from 2008 shows the former archive/factory building has been demolished, the stockpile on the eastern boundary has been removed, and a new stockpile is present in the north of the Virtus London 14 site. By 2010, an additional stockpile is shown in the southeast of the site. WSPs 2010 Remediation Validation report [17] identifies these as Stockpiles 3B1 and 3B2, and states no evidence of deleterious or contaminated materials was evident within the stockpiles. Overall, between 2007 and early 2014, aerial imagery shows the site to be vacant, other than for the stockpiles described above. The stockpiles were not located within the footprint of the Environmental Permitting Boundary.

In summary, following closure of the records office in 2004, demolition of the former Ordnance Works began across the wider Prologis site area, however the Virtus London 14 site was the last area to be developed and the structures within this site were demolished in 2006/2007. Demolition was undertaken by Fitzpatrick Contractors. Remediation was also undertaken during 2006, including excavation and removal of materials from the backfilled pond.

Planning permission was granted in August 2005 from the Council of the London Borough of Hillingdon, for the wider Prologis Park site for the following:

> *18399/APP/2004/2284 Redevelopment of the site for a mixed-use development comprising (Use Classes B1(a) & (c), B2 and B8) Employment Uses and C3 Residential Use (up to a maximum of 101 units) with associated access, parking and landscaping (outline application)*

The above planning permission was granted subject to various conditions, including one condition relating to contamination. Further details on the planning history of the site and contamination-related planning conditions is provided in section 3.3.1.

The development layout and proposals shown by this planning application were refined prior to construction, and a new planning application was submitted in 2013 (described in section 3.2.5 below).

Various investigations and remedial activities relating to contamination took place during this time when the site was vacant, and these are described in detail in section 3.3.

3.2.5 Site History, 2014 to present (2023)

Planning permission was applied for in April 2013 with the Council of the London Borough of Hillingdon, for the following:

> *18399/APP/2013/1019 (Erection of distribution warehouse units (Use Class B8) with ancillary offices, associated car parking, access and associated landscape works within the existing Prologis Park development)*

Consent was granted, subject to planning conditions, in July 2013.

Several planning conditions were discharged on 1st August 2014 through provision of additional details including a Remediation Method Statement [33] under planning submission *18399/APP/2013/3449:*

> *Details pursuant to conditions 5 (suds), 6 (contamination), 7 (air quality), 10 (Travel Plan), 12 (energy), 13 (Cross rail), 15 (surface water drainage) of permission 18399/APP/2013/1019 (Erection of distribution warehouse units (Use Class B8) with ancillary offices, associated car parking, access and associated landscape works within the existing Prologis Park development)*

A further planning condition relating to contamination was also discharged in 13th January 2016 through provision of a Remediation Completion Report [18] under planning submission *18399/APP/2015/4257:*

> *Details pursuant to condition 6(iii) (remediation scheme verification report) of Planning Permission Ref: 18399/APP/2013/1019 (Erection of distribution warehouse units (use class B8) with ancillary offices, associated car parking, access and associated landscape works within the existing Prologis Park development)*

Further details on the planning history of the site and contamination-related conditions is provided in section 3.3.1, including details on activities undertaken to discharge planning conditions.

Construction works commenced in Spring/Summer of 2014. From historic aerial imagery, the warehouse building had been completed by late September 2014, with external hardstandings installed around the site by April 2015, including within the Environmental Permitting Boundary. The warehouses were constructed by Buckingham Group Contracting Limited.

Following construction in 2014, the warehouse has been used as a distribution centre. Site plans and floor plans from *18399/APP/2013/1019* show that the building on the Virtus London 14 site (Unit D/G) comprises a rectangular warehouse building with a footprint of 69m x 131m and total gross internal floorspace of 14,383m^2. Ground floor slab level is at 32.4mAOD, and roof-ridge level at 47.8mAOD. The building includes two-storey offices in the northwest and southwest corners. The northern part of the Virtus London 14 site comprises car parking, and the western area, including the Environmental Permitting Boundary, comprises an access yard for HGVs.

Virtus have indicated that no hazardous materials are understood to have been stored on the Prologis Unit D/G site since the development in 2014.

The As-Built Drainage Layout TRC 2607-51 shows rainwater is collected from the roof and hardstandings and is transferred to two buried soakaway tanks beneath the HGV turning area. The surface water drainage system includes “conder class 1 by-pass petrol interceptors” prior to the input of water to the soakaways, and it is understood that they discharge water directly into the Lynch Hill Gravels. Both soakaways are located within the footprint of the Environmental Permitting Boundary.

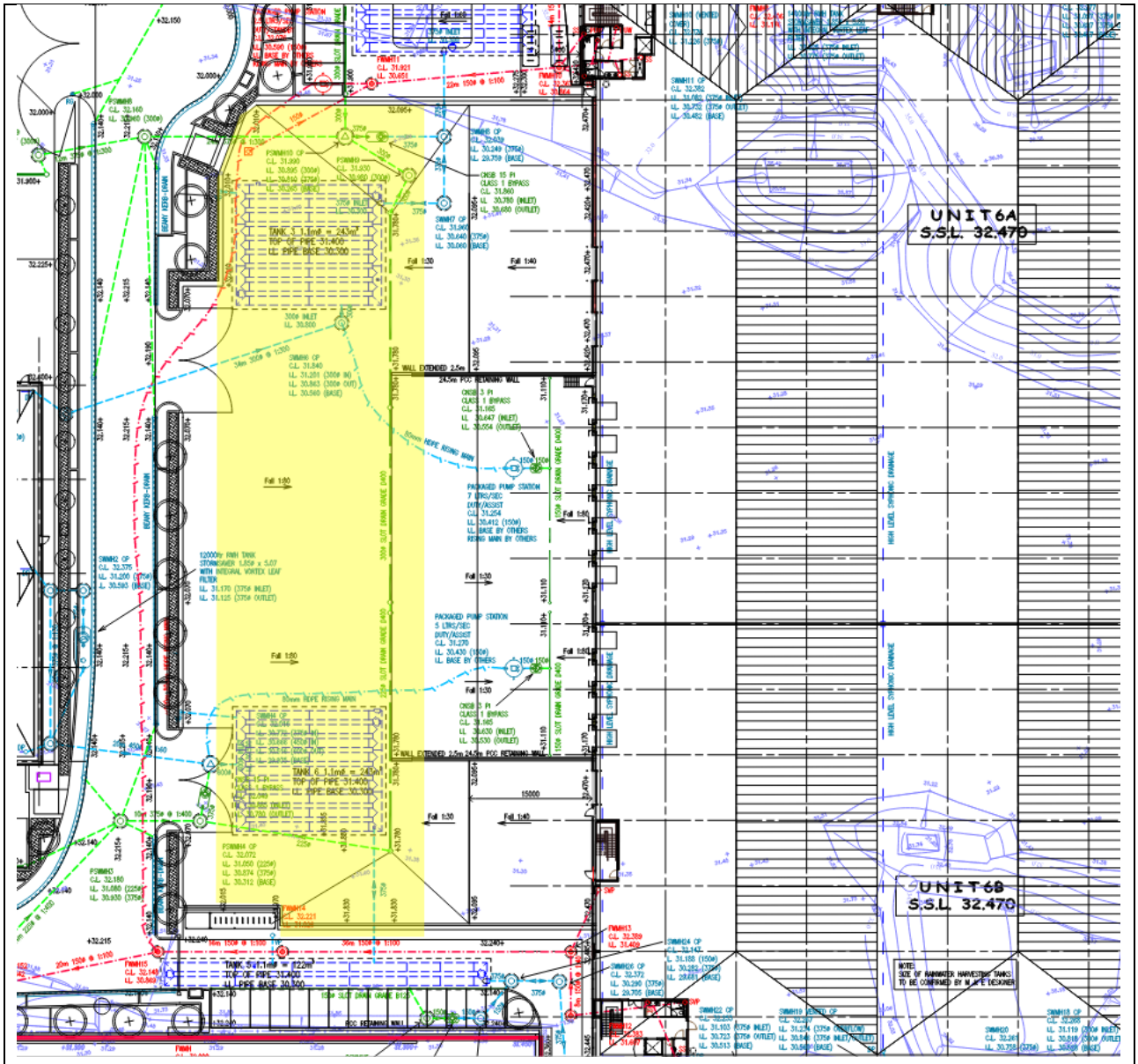


Figure 5: Environmental Permitting Boundary (yellow) shown in context to as-built Drainage Layout. Soakaways in dark blue beneath EPB

A copy of this as-built drainage plan is included as Appendix F.

Activities taking place on site during the operational period of the current warehouse are generally not considered to be a significant source of soil or groundwater contamination due to the site being covered by hardstandings and due to the inclusion of petrol interceptors within the drainage system, however at the time of writing no information on the current condition or maintenance of the drainage system and interceptors was available – It is recommended that this information should be obtained to confirm that the pollution prevention system currently in place at the site has worked effectively throughout its operation.

3.2.6 Proposed future site activity

Planning permission was applied for in February 2022 with the Council of the London Borough of Hillingdon, for the following:

> *18399/APP/2022/411 (Installation of plant and equipment to unit DC6 including external plant equipment, external louvres and associated security fencing and landscaping, to facilitate use of the building as a data centre)*

This is the current planning application for the redevelopment of the site, including the storage of fuel which is the basis of the current Environmental Permit Application, of which this Site Condition Report forms a part. Consent was granted, subject to planning conditions, in May 2023. None of the planning conditions relate to contamination, land quality, or investigation of pollution to soils or groundwater.

3.3 Evidence of Historic Contamination

A number of phases of investigations, risk assessments, remediation and validation have been undertaken across the wider Prologis Park area. In relation to the Virtus London 14 Data Centre site area, the following timeline of activities have been undertaken [22]:

- 1997: UXO Clearance and Radiological Assessment (completed by MOD and DEFRA) (*not made available to Arup or reviewed by Arup in the production of this SCR)*
- 1997-1998: Phase 1 Land Quality Assessment, Intrusive Investigation, and Phase 2 Land Quality Assessment (completed by Gibb Environmental) (*not made available to Arup or reviewed by Arup in the production of this SCR)*
- 2003: Intrusive Investigation and Phase 2 Geo-Environmental Assessment (completed by WSP)
- Undated - Demolition and Remediation strategy (completed by Burks Green) (*not made available to Arup or reviewed by Arup in the production of this SCR)*
- 2006: Demolition and Remediation (completed by Fitzpatrick Contractors)
- November 2010: Ground investigation and validation of "Phase 3B" (completed by WSP)
- October 2013: Remediation Method Statement produced by WSP
- April 2014: Pre-start trial pit investigation in area of proposed soakaways, by Buckingham Group Contracting Limited (BGCL)
- 2014: Construction of warehouse and associated infrastructure including buried soakaways, and excavations inspected by BGCL's site manager for evidence of previously unrecorded contamination
- November 2015: Remediation Completion/Verification Report completed by BGCL

A review table of all reports and studies undertaken at the wider Prologis Park site up to the year 2013 is included in the WSP Land Quality Statement [22] (appended), and summary information has been incorporated into this SCR where applicable.

Further details on activities undertaken to address contaminated land issues are provided in the following sections, specifically in relation to the area of the proposed Virtus London 14 data centre and Environmental Permitting Boundary.

3.3.1 History of Planning applications/submissions and conditions relating to Contaminated Land

A summary of planning conditions and objections relating to Contaminated Land is presented below, to give context to the ground investigations, geoenvironmental assessment and remedial work described in the following sections.

Table 3: Timeline of Planning Submissions

Application/submission reference and purpose	Link to Planning Portal
18399/APP/ 2004/2284 Planning Application - granted subject to conditions Submission includes Environmental Statement	https://planning.hillingdon.gov.uk/OcellaWeb/showDocuments?reference=18399/APP/2004/2284&module=pl
18399/APP/2013/1019 Planning Application - granted subject to conditions Submission includes Land Quality Statement	https://planning.hillingdon.gov.uk/OcellaWeb/showDocuments?reference=18399/APP/2013/1019&module=pl

Application/submission reference and purpose	Link to Planning Portal
18399/APP/2013/3449 Approval of details submitted pursuant to planning conditions on 18399/APP/2013/1019 – includes Remediation Method Statement	https://planning.hillingdon.gov.uk/OcellaWeb/showDocuments?reference=18399/APP/2013/3449&module=pl
18399/APP/2015/4257 Approval of details submitted pursuant to planning conditions on 18399/APP/2013/1019 – includes Remediation Completion Report	https://planning.hillingdon.gov.uk/OcellaWeb/showDocuments?reference=18399/APP/2015/4257&module=pl
18399/APP/2022/411 New / current Planning Application – granted subject to conditions	https://planning.hillingdon.gov.uk/OcellaWeb/showDocuments?reference=18399/APP/2022/411&module=pl
Conditions and submissions associated with **18399/APP/ 2005/3415** (*Variation to conditions in 18399/APP/ 2004/2284*), **18399/APP/2010/545** (*Reserved matters in compliance with condition 3 of 18399/APP/ 2005/3415*) and **18399/APP/2010/2814** (*Variation of conditions 2, 4, 5, 6, 7, 9, 12, 13, 14, 15, 16, 17, 18 and 19 (to allow the phased development of the overflow car park and Units C and D) of planning permission ref: 18399/APP/ 2010/545*) are planning submissions relevant to the current site area, but are not relevant to contamination / land quality	
Additional planning submissions (18399/APP/2009/423, 18399/APP/2009/1552) relate to other areas of the Prologis Park site and not to the Virtus London 14 Site or Environmental Permitting Boundary.	

Table 4: Summary of relevant planning conditions

Submission	planning condition in relation to contamination/pollution	
18399/APP/ 2004/2284	13	CONDITION: The construction of the site foundations shall be carried out in accordance with details submitted to and approved in writing by the Local Planning Authority before the development commences REASON: To prevent pollution of groundwater
18399/APP/ 2004/2284	14	CONDITION: No soakaways shall be constructed in contaminated ground REASON: To prevent pollution of groundwater
18399/APP/ 2013/1019	6	CONDITIONS: (i) The development hereby permitted shall not commence until a scheme to deal with contamination has been submitted in accordance with the Supplementary Planning Guidance on Land Contamination and approved by the Local Planning Authority (LPA). The scheme shall include all of the following measures unless the LPA dispenses with any such requirement specifically and in writing: (a) A desk-top study carried out by a competent person to characterise the site and provide information on the history of the site/surrounding area and to identify and evaluate all potential sources of contamination and impacts on land and water and all other identified receptors relevant to the site; (b) A site investigation, including where relevant soil, soil gas, surface and groundwater sampling, together with the results of analysis and risk assessment shall be carried out by a suitably qualified and accredited consultant/contractor. The report should also clearly identify all risks, limitations and recommendations for remedial measures to make the site suitable for the proposed use. (c) A written method statement providing details of the remediation scheme and how the completion of the remedial works will be verified shall be agreed in writing with the LPA prior to commencement. (ii) If during development or works contamination not addressed in the submitted remediation scheme is identified, an addendum to the remediation scheme must be agreed with the LPA prior to implementation; and (iii) All works which form part of the remediation scheme shall be completed and a verification report submitted to the Council's Environmental Protection Unit before any part of the development is occupied or brought into use unless the LPA dispenses with any such requirement specifically and in writing. REASON: To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems and the development can be carried out safely without unacceptable risks to workers, neighbours and other

Submission	planning condition in relation to contamination/pollution	
		offsite receptors in accordance with policy OE11 Hillingdon Local Plan: Part Two Saved UDP Policies (November 2012).
18399/APP/ 2013/1019	9	CONDITION: Before any part of the development is occupied, site derived soils and imported soils shall be tested for chemical contamination. All soils used for gardens and/or landscaping purposes shall be clean and free of contamination. REASON: To ensure that the occupants of the development are not subject to any risks from soil contamination
18399/APP/ 2013/1019	17	CONDITION: If, during development, contamination not previously identified is found to be present at the site then no further development (unless otherwise agreed in writing with the Local Planning Authority) shall be carried out until the developer has submitted a remediation strategy to the Local Planning Authority detailing how this unsuspected contamination shall be dealt with and obtained written approval from the Local Planning Authority. The remediation strategy shall be implemented as approved. This condition has been recommended as no investigation can completely characterise a site, some areas are less well characterised than others. National Planning Policy Framework (NPPF) paragraph 109 states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of water pollution. Government policy also states that planning policies and decisions should ensure that adequate site investigation information, prepared by a competent person, is presented (NPPF, paragraph 121). REASON: 1. To protect and prevent the pollution of controlled waters from potential pollutants associated with current and previous land uses ***[Inclusion of this condition was requested by the Environment Agency in formal response NE/2013/117668/01 and a previous objection was subsequently removed, as stated in NE/2013/117668/02-L01]***
18399/APP/ 2013/1019	-	Advice on Groundwater and Contaminated Land 15. The Land Quality Statement with regards to the Phase 3 development at Prologis Park, Hayes gives a summary of previous site investigation and remediation/validation works carried out at this location. We note that although some remediation and validation has been done for this section of the site, remedial targets used generic soil criteria (residential/commercial), which is not tailored to groundwater protection. 16. The Lynch Hill Gravels underlying the site is classed as a Principal Aquifer. Infiltration of surface water would provide potential pathway for contamination at the surface to migrate into the underlying Principal Aquifer. The design of SuDS and other infiltration systems should include appropriate pollution prevention measures. If contamination is present in areas proposed for infiltration, we will require the removal of all contaminated material and provision of satisfactory evidence of its removal, the point of discharge should be kept as shallow as possible. Deep bored infiltration techniques are not acceptable; only clean, uncontaminated water should be discharged into the ground. ***[Inclusion of the above advice was requested by the Environment Agency in formal response NE/2013/117668/01 and a previous objection was subsequently removed, as stated in NE/2013/117668/02-L01]***
18399/APP/ 2022/411	-	*There are no planning conditions relating to contamination, land quality, or investigation of pollution to soils or groundwater as part of current planning application for data centre site.*

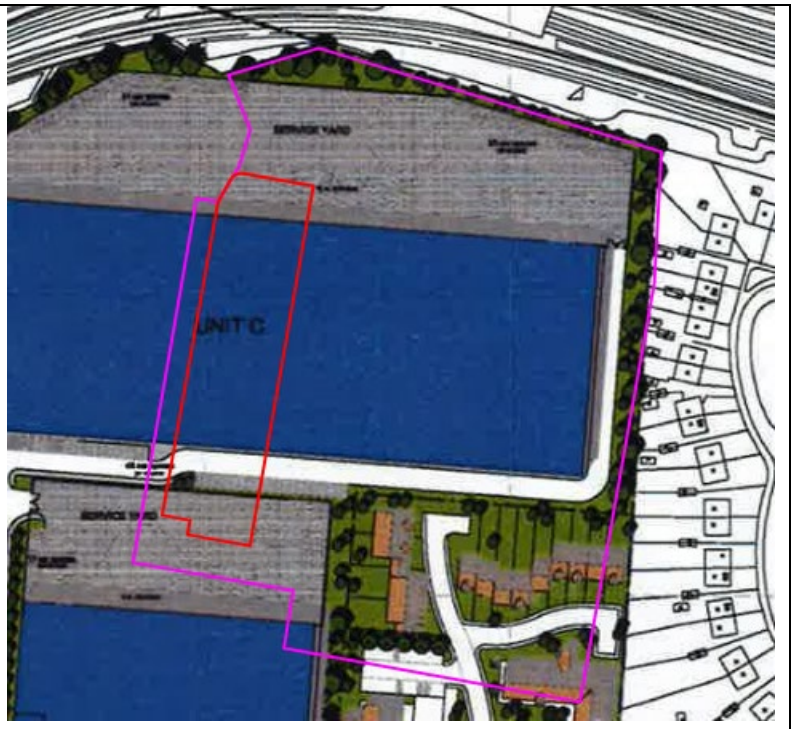
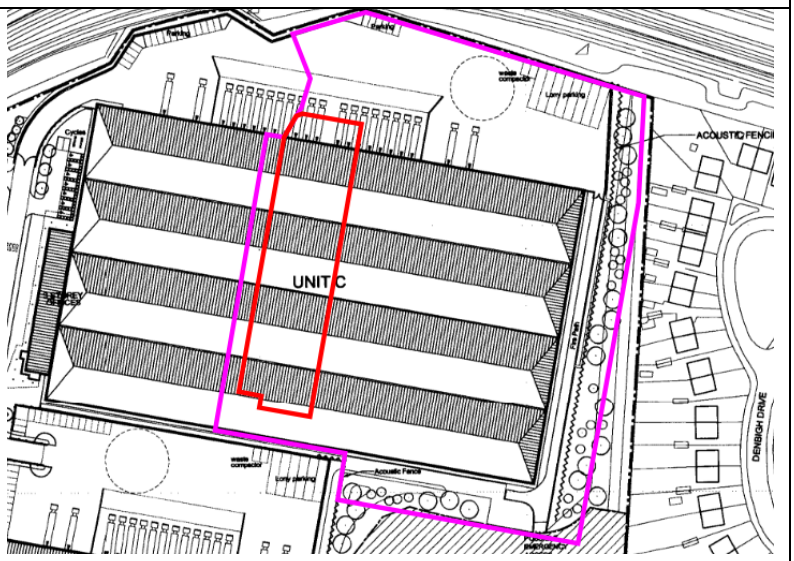
Section 3.3.11 includes discussion of the extent to which planning conditions have been discharged or superseded by the historic investigations, remediation and validation which has been completed.

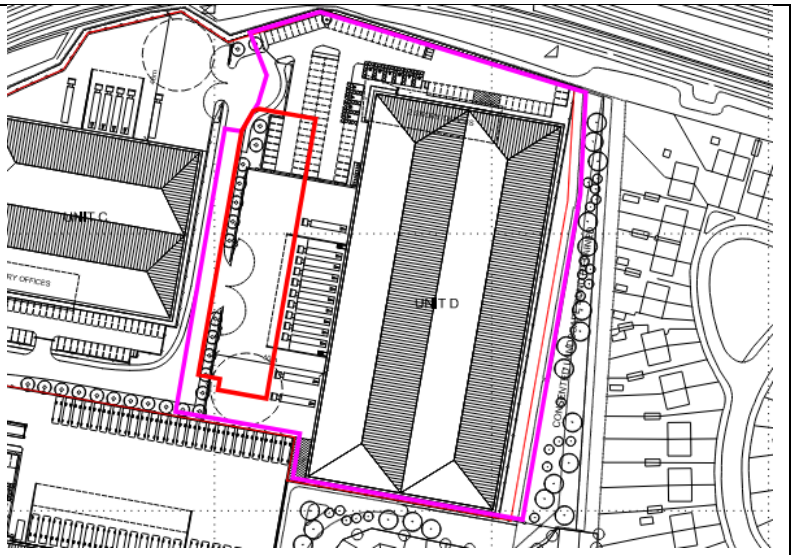
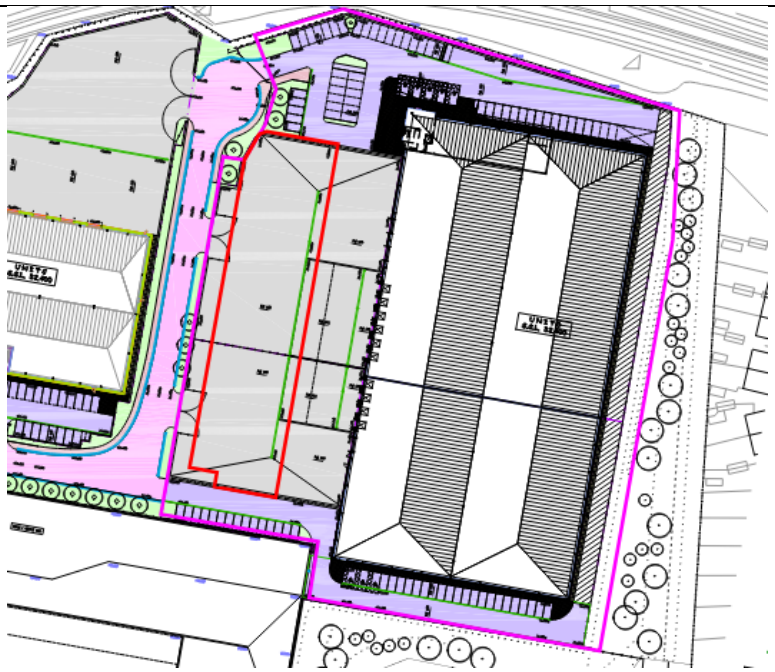
3.3.2 History of Development Proposals

From the information reviewed, the proposals for the Prologis site evolved between the years of 2004 when the first planning application was submitted, and 2014 when the current warehouse Unit D/G was constructed. This includes the removal of proposed residential housing from the footprint of the Virtus London 14 site, and various stages of changes to the warehouse footprint, drainage design and external site layout.

A summary of changes to development proposals through time is presented below, to give context to the ground investigations, geoenvironmental assessment and remedial work described in the following sections of this report. The Virtus London 14 Data Centre site is shown in pink overlay on the historic site plans, and the Environmental Permitting Boundary is shown in red.

Table 5: Site development proposals (previous)

Layout 1 (2003) Extract of Proposed Development Plan forming the basis of WSP's 2003 Geoenvironmental investigation. Proposals within the Virtus London 14 site area include a warehouse "Unit C" and residential housing in the southeast. The Environmental Permitting Boundary includes Unit C and associated external areas associated with the commercial land use. WSPs ground investigation was completed in support of this layout, including targeted geoenvironmental investigations appropriate to sensitive residential land-use in the southeast of site. Virtus London 14 site and the Environmental Permitting Boundary are within "Phase 3" of the Prologis Development.	
Layout 2 (2004) Extract of Site Layout Plan which was included in planning submission 18399/APP/2004/2284. Proposals within the Virtus London 14 site area include a larger warehouse "Unit C" and a reduced footprint of residential housing in the southeast. The Environmental Permitting Boundary includes Unit C and part of the HGV yard. Virtus London 14 site is within "Phase 3" of the Prologis Development.	

Layout 3 (2013) Extract of Site Layout Plan which was included in planning submission 18399/APP/2013/1019. Proposals within the Virtus London 14 site area now comprise a large warehouse "Unit D". Residential housing is no longer proposed within the footprint of the Virtus site. The Environmental Permitting Boundary includes the HGV yard and an area of car parking. Virtus London 14 site is referred to as "Phase 3B" of the Prologis Development.	
Layout 4 (2013) Extract of External Works Layout which was included in planning submission 18399/APP/2013/3349 Changes to site layout, with Unit D having a slightly smaller footprint, and an area of car parking is now included in the south of the site. The Environmental Permitting Boundary is within the HGV yard. This is understood to be the "as built" site layout. Virtus London 14 site is referred to as "Phase 3B" of the Prologis Development	

3.3.3 Ground Investigations – general

A number of phases of investigation have been undertaken across the wider Prologis park site between 1998 and 2010. Specifically within the Virtus London 14 data centre site, four phases of ground investigation have been completed [footnote 3]:

- 1998: Initial investigation completed by Gibb Environmental.
- 2003: Supplementary Geoenvironmental Investigation undertaken by WSP, targeting areas of concern, including areas of concern within the boundary of the Virtus 14 site, specifically the backfilled pond in the southeast of site and an area in the north of site where oily materials had historically been encountered in services. This investigation was completed in support of planning application 18399/APP/2004/2284, where the proposals for the area now included within the Virtus London 14 site included a mixture of commercial and residential developments.

[3] The 2006 validation phase undertaken by Crossfield Consulting is understood (according to WSP's 2010 Validation report [17]) to relate to land located south of the "Phase 3" area, ie. to the south of the Virtus London 14 site and south of the Environmental Permitting Boundary

- 2010: Validation of "Phase 3B" site area by WSP. Scope of investigation works designed in accordance with the Demolition and Remediation Strategy.
- 2014: Verification of "Phase 3" site by Buckingham Group Contracting Limited.

Overall the investigations provide adequate coverage of the Virtus London 14 site, with additional focus having been given to higher risk areas. Soil samples have been collected from within the Environmental Permitting Boundary, however no groundwater sampling has been undertaken within the Environmental Permitting Boundary.

Table 6 presents a summary of the strata encountered during the above ground investigations. In summary, ground investigations at the site have identified limited deposits of made ground overlying a natural sequence of Langley Silt, Lynch Hill Gravel and London Clay. Made ground in the southeast of the Virtus site area included infill to a former pond, which is understood to have been remediated and is no longer present.

Table 6: Summary of strata encountered during ground investigations

Strata	Location	Remarks based on data from GIs	Recorded depth and thickness (m)
Made Ground (general)	Encountered in majority of GI points	Soft sandy clay and loose sandy gravel with fragments of brick, cement, concrete, ceramic and metal [16]	Relatively limited deposits, average of 0.6m thick [16]
Made Ground (former backfilled pond)	Local to southeast of Virtus site area – removed during remediation in 2006 (see section 3.3.6)	Fill materials comprising brick, wood, metal, asbestos sheeting, cables, breeze block, plastics, glass and concrete [16]	1.5m [16]
Langley Silt	Locally absent in GI points.	Soft to firm friable orange brown sandy silty clay with gravel [16]	Where present in boreholes, average thickness of 0.9m [16]
Lynch Hill Gravel	Across whole site	Medium dense to dense orange brown gravelly sand [16]	Variable thickness. Average of 2.5m [16]
London Clay	Not encountered at all locations due to depth of exploratory holes, but present across entirety of site at depth	Firm to stiff grey mottled brown gravelly clay [16]	Within Virtus site area, London clay was encountered in historic boreholes at 7.5mbGL in the north of the site, 3.5mbGL in the southwest of site, and 2.4mbGL to 3.7mbGL in the southeast of site

3.3.4 1998 Ground Investigation

The 1998 Ground Investigation Report produced by Gibb Environmental was not made available to Arup or reviewed by Arup in the production of this SCR, however the findings of the 1998 investigation are summarised and referenced in subsequent (available) reports produced by WSP.

The WSP 2003 report [16] states that the geoenvironmental assessment undertaken by Gibb Environmental in 1998 reported relatively low concentrations of inorganic and organic contaminants were recorded across the wider Prologis site area (including the current Virtus site), and that no significantly elevated concentrations of explosives chemicals were identified in areas of ordnance production.

However, the 1998 investigation identified a hot spot of Total Petroleum Hydrocarbon (TPH) contamination in an area where oily materials had been previously encountered within services. In relation to the Virtus London 14 site, this hot spot was within the north of the site within "PH13" shown on Figure 3.

3.3.5 2003 Ground Investigation

WSP's 2003 report [16] identified a number of "areas of potential concern" or APCs across the wider Prologis site, including two APCs which are specific to the Virtus London 14 site, but are not within the Environmental Permitting boundary:

- APC 8: "Area where oily material encountered within services"
- APC 13: "Overgrown possibly infilled pond"

Targeted investigation of these APCs was undertaken in addition to general site-wide investigation of the proposed development area, including laboratory analysis of soil and groundwater, and ground gas monitoring.

APC 8

In relation to APC 8, the area of "oily material" in the north of the site where the 1998 PH13 had detected elevated TPH, WS01 was drilled in vicinity but was terminated at 0.9m depth, and no laboratory TPH analysis was undertaken. WSP stated that their investigation had been inconclusive and highlighted that there was a slight risk of encountering these materials during demolition.

APC 13

The geoenvironmental assessment undertaken by WSP in 2003 included a trial pit (TP12) dug within APC 13 (the backfilled pond). TP12 encountered fill materials comprising brick, wood, metal, asbestos sheeting, cables, breeze block, plastics, glass and concrete, to a depth of 1.5mbgl [1]. The extents of the pond were estimated at approximately 28m by 31m.

Laboratory analyses of material from TP12 detected TPH concentrations of 3,455mg/kg which exceeded the screening threshold used by WSP in 2003. In association with this TPH hot-spot, ten different PAHs were detected within TP12.

Lead (13,650 mg/kg), nickel (566 mg/kg) and zinc (1,225 mg/kg) concentrations within TP12 exceeded the SGV screening thresholds, and high levels of chromium (170 mg/kg) and copper (204 mg/kg) were also encountered here.

Asbestos sheeting was encountered within this pond, however geoenvironmental testing of soils from this area did not encounter asbestos.

The TPH, PAH and metal concentrations were described as an isolated issue and not considered representative of the site as a whole. This hot-spot of contamination was located in the southeast of the Virtus London 14 site, as shown on Figure 3, but is not within the Environmental Permitting Boundary.

WSP recommended that as part of the proposed residential development the backfilled pond should be excavated and the waste materials removed to a suitable waste disposal facility. On site treatment was not considered feasible given the nature of the materials and the nature of contamination encountered.

Groundwater

Groundwater analyses was undertaken across the wider Prologis Park site by WSP. Across the wider site, six slight exceedances of screening levels for arsenic were detected in groundwater, including a sample from BH04 (which is within the Virtus 14 site boundary). The exceedances were not considered significant as they were only marginal. Concentrations of organic contaminants were generally low, with one elevated concentration of TPH within a sample taken from the wider Prologis site (not from within the Virtus 14 site boundary). WSP states that water quality indicators such as ammoniacal nitrogen, electrical conductivity and COD indicated a low contaminant loading in groundwater.

Groundwater results are included in Appendix A2.

Conclusions

The 2003 geoenvironmental assessment report makes the following conclusions which are considered applicable to the Virtus London 14 site and Environmental Permitting Boundary:

- no widespread contamination was identified within the site overall, but distinct areas of contamination were present and required further delineation, including the backfilled pond (within the Virtus London 14 site), however no areas requiring further delineation were located within the Environmental Permitting Boundary.
- no contamination issues had been identified within the proposed commercial area (which includes the area shown as "Unit C" within Layout 1, above, which includes the Environmental Permitting Boundary). The soils analysis indicated the site is suitable for commercial end use without further mitigation.
- Site activities have not impacted upon groundwater quality.
- The ground gas regime identified at the site is considered to represent a low risk to residential or commercial properties, and gas protection measures are not required.
- *"it will be necessary to prevent future occupants of the site residential area from coming into contact with contamination identified in the backfilled pond area by breaking the pollution linkage. This will prevent direct contact, ingestion or inhalation of contaminants. The materials in the backfilled pond should be treated as contaminated and an appropriate classification should be sought from a nearby landfill operator".* This is applicable to the southeast area of the Virtus London 14 Site but does not apply to the Environmental Permitting Boundary forming the subject of this Site Condition report.

WSP's 2003 Phase 2 Geoenvironmental Assessment [16] covering the wider Prologis Park area, is included in Appendix E, and includes extracts of the previous 1998 Gibb investigation.

3.3.6 2006 Demolition and Remediation

The WSP Land Quality report [22] includes summaries of a Demolition and Remediation Strategy (produced by Burks Green) and a Site Validation Report (produced by Crossfield Consulting) around the year 2006.

The Demolition and Remediation strategy produced by Burks Green (date unknown) was not available at the time of producing the current Site Condition Report, however a summary is provided within WSP's Land Quality Statement [22]:

- *"The remediation scope of works was suggested to include delineation, excavation and off-site disposal of contaminated soils (including backfilled pond and heating tanks areas) in excess of provided re-mediation criteria (using a cellular grid manner of excavation), completion of validation investigations across the Site to eliminate the presence of contamination hotspots (and subsequent treatment if ap-propriate) and provision of completion reports by the remediation contractor."*
- *"Other proposed works included demolition of buildings and above ground structures, disconnection of services, removal of slabs, foundations and hard standing, backfill of excavations, removal of tanks and site re-profiling."*

The remediation criteria from the Burks Green strategy are included within WSP's 2010 validation report [17], and are shown below:

Table 7: Soil Remediation Criteria (Burks Green)

Contaminant	TTV (mg/kg)		Basis
	Commercial	Residential	
TPH	5000	1000	WSP Tier 1 Screening Value
Naphthalene	-	50	Toxic Equivalency to BaP
Acenaphthylene	-	1300	Toxic Equivalency to BaP
Acenaphthene	-	1300	Toxic Equivalency to BaP
Fluorene	-	1300	Toxic Equivalency to BaP
Phenanthrene	-	1300	Toxic Equivalency to BaP
Anthracene	-	1300	Toxic Equivalency to BaP
Fluoranthene	-	1300	Toxic Equivalency to BaP
Pyrene	-	1300	Toxic Equivalency to BaP
Benzo(a)anthracene	-	13	Toxic Equivalency to BaP
Chrysene	-	13	Toxic Equivalency to BaP
Benzo(b)fluoranthene	-	13	Toxic Equivalency to BaP
Benzo(k)fluoranthene	-	13	Toxic Equivalency to BaP

Contaminant	TTV (mg/kg)		Basis
	Commercial	Residential	
Benzo(a)pyrene	-	1.3	Toxic Equivalency to BaP
Indeno(1,2,3-cd)pyrene	-	13	Toxic Equivalency to BaP
Dibenz(a,h)anthracene	-	1.3	Toxic Equivalency to BaP
Benzo(ghi)perylene	-	13	Toxic Equivalency to BaP
PAH sum	500	n/a	Calculated TTV using BP RISC 4
PCBs	12	0.32	Calculated TTV using BP RISC 4
Asbestos	0.01%	Not detected	Special Waste
Arsenic	500	20	CLEA
Cadmium	1400	2 (pH dependant)	CLEA
Chromium	5000	130	CLEA
Lead	750	450	CLEA
Nickel	5000	50	CLEA
Selenium	8000	35	CLEA
Mercury	480	8	CLEA
Copper	2600	2600	WSP Calculated TTV using BP RISC 4
Zinc	1200	1200	WSP Calculated TTV using BP RISC 4

The Site Validation completed by Crossfield Consulting in 2006 is understood (according to WSP's 2010 Validation report [17]) to relate to land located south of the "Phase 3" area, ie. to the south of the Virtus London 14 site and south of the Environmental Permitting Boundary, and excluded the two relevant APCs identified by WSP in 2003.

3.3.7 2010 Validation Ground Investigation

Following a change to site layout, in which residential land was no longer included in the proposals for this area of site, an additional phase of validation investigation was undertaken in relation to the new land-use proposals for "Phase 3B" comprising a solely commercial development. This investigation was undertaken by WSP following demolition of the former ordnance factory buildings and subsequent remediation of the site.

A scope of works was developed by WSP in line with the Burks Green demolition and remediation strategy. This comprised:

- Sampling of soils on 50m spacing to assess the presence of further previously unidentified hotspots and confirm the absence of contamination in the footprint of the former MOD building.
- Collection of samples from representative strata within 600mm of the final development levels (which are assumed to be the current site levels).
- Soil samples recovered from the validation investigations submitted for chemical testing: pH, metals (arsenic, cadmium, copper, selenium, chromium, nickel, mercury, lead, zinc), TPH, PAH, phenols, sulphate, asbestos.
- Two stockpiles present on site were sampled and tested for asbestos and PSD – Results of this testing were provided to Prologis under a separate cover, and are not included in the Phase 3B validation report.

As part of this validation investigation, as shown on Figure 3, six trial pits were excavated within the Virtus London 14 site boundary, although none were located within the current Environmental Permitting Boundary.

The ground conditions encountered in this investigation are included in the summaries presented in section 3.3.3.

Chemical testing was completed on six samples obtained from within the Virtus London 14 site, the results of which are included in Appendix A1.

In relation to the Virtus London 14 site and Environmental Permitting Boundary, asbestos was encountered in TP9 (on the eastern boundary of the site) and in TP10 (at the backfilled pond). Previous 2003 investigation in the backfilled pond had encountered elevated TPH, PAH and metals in addition to the asbestos, however the samples obtained in 2010 did not encounter similarly elevated levels of TPH, PAH or metals, proving the remedial works had been effective with respect to these contaminants.

TP7, dug in vicinity of APC8 where "oily materials" and a hot-spot of TPH contamination had been encountered previously, also did not detect any evidence of TPH contamination.

The validation report made the following recommendations:

- WSP stated that the hard surfacing installed as part of the commercial end use would serve to prevent direct contact with potentially asbestos contaminated materials at the site.
- WSP stated that the site poses a Low Risk in relation to environmental liabilities.
- WSP recommended that the potential pathway to residual contamination (asbestos in soils) was broken by the incorporation of hardstanding / buildings in these locations.
- WSP recommended that whilst not technically required, it would be prudent to remove the identified asbestos containing materials in order to avoid issues being raised by prospective purchasers or tenants of the completed development.

The Validation Report is included as Appendix C3. The Decision Notice associated with this planning submission (18399/APP/2013/1019) is included as Appendix C1.

3.3.8 April 2013 Land quality report

In support of the initial submission of planning application 18399/APP/2013/1019, WSP undertook a review of historical information for the wider Prologis Park site, and compiled this to produce a Land Quality Statement for the "Phase 3" area. Phase 3 includes/covers the current Virtus London 14 site area.

The report presents a summary of site conditions and a Timeline of Previous Works from 1997 until 2013, including summaries of the investigation and remediation work undertaken.

The conclusions and recommendations section of the report identifies the following, which are considered applicable to the Virtus London 14 site and the Environmental Permitting Boundary:

- WSP state that further contaminated land assessment work is not considered necessary for the redevelopment of the site into a commercial/industrial end use, in keeping with the wider Prologis Park Area.
- Consistent with the recommendations in 2010, WSP state that the installation of hardstanding and concrete floor slab is considered sufficient to provide sufficient mitigation from any residual contamination.
- WSP recommend that a contamination watching brief be undertaken during development (construction), with a method statement to address contamination in the event that it is encountered during excavations.
- WSP recommended that a capping layer be installed in soft landscaped areas to break the direct contact and inhalation pathways of any residual contamination (including the asbestos described in the 2010 validation report). WSP stated that the depths of capping layers should be agreed with regulating authorities.
- WSP recommended that agreements made with regulators should be kept on file.

The Land Quality Statement is included as Appendix C2. The Decision Notice associated with this planning submission (18399/APP/2013/1019) is included as Appendix C1.

3.3.9 October 2013 Remediation Method Statement

To meet the pre-commencement requirements of Condition 6 of 18399/APP/2013/1019, WSP produced a remediation method statement (RMS) to support the proposed redevelopment of the "Phase 3" area for commercial warehousing – This includes Units D/G which currently occupy the Virtus London 14 data centre site, and the HGV turning yard which currently occupies the Environmental Permitting Boundary area.

WSP state that their RMS aimed to satisfy pre-commencement condition 6i(c), with the requirements of conditions 6i(a) and 6i(b) considered to be satisfied by their Land Quality Statement [22].

In summary - the scope of the RMS comprises:

- ***A methodology for advance investigation of the proposed soakaway locations*** **-** WSP proposed that two trial pits be excavated at each of the proposed soakaway locations and extended at least 1m into the natural stratum, including chemical testing of soil samples – It is understood [18] that this pre-start investigation was requested by the Environment Agency.

- ***A methodology for completion of a watching brief during construction*** – WSP proposed that a suitably qualified environmental consultant attend site to inspect the formation and base of the of the soakaway excavation, and recover samples for verification laboratory testing –WSP also proposed that schedule of site inspections was agreed in advance and that an independent watching brief be maintained during the removal of slabs and obstructions from the ground, and construction of foundations and services for the new warehouses. It is understood [18] that this watching brief was requested by the Environment Agency.

- ***Proposals for management and reporting of unexpected contamination encountered during construction*** – WSP considered is unlikely that unexpected contamination would be encountered, but stated that as a minimum any visual or olfactory evidence of contamination would be subject to delineation, laboratory testing, and verification reporting, along with notification to the Planning Authority.

- ***Recommendations for management of contamination impacts during and post construction*** – WSP advised that procedures were put in place during construction to manage general contamination risks, including tool box talks and briefings, use of appropriate PPE, and management of dust during groundworks.

- ***Verification testing and acceptance criteria*** – A validation testing strategy is provided by WSP within the RMS, including suites of laboratory testing based on relevant contaminants of concern applicable to different elements of the proposed groundworks and to different materials – this is included as Table 8 below, WSP also recommended that a photo-ionisation detector was used in the field for volatile hydrocarbon vapours.

- ***Capping*** – regarding capping / clean cover in landscaped verges, the RMS refers back to the recommendations made in the 2010 Land Quality Statement.

- ***Imported Soils*** – if additional materials are required for completion of the groundworks, WSP stated that soils should be obtained from a suitable source and verification completed.

- ***Verification reporting*** - WSP state that on completion of the works a verification report should be produced, including material management information, records of ground investigation works completed during construction/validation, backfill records, chemical analysis results, in-situ test results, daily inspection records from the watching brief, and supplier records for imported materials.

Table 8: Validation Testing Strategy (from WSP's 2013 RMS)

Activity	Testing Frequency	Testing Suite
Soakaway investigation.	At least 2 no. samples will be tested per additional exploratory hole.	Soil testing suite to include TPH, asbestos, metals (plus leachable analysis), Polycyclic Aromatic Hydrocarbons and Volatile Organic Compounds.
Soakaway Dig Validation	One sample every 10m from the base and sides.	Soil testing suite to include TPH, asbestos, metals (plus leachable analysis), Polycyclic Aromatic Hydrocarbons and Volatile Organic Compounds.
Site won soils used to create Site levels and infill voids (including materials dug from soakaways).	One sample will be analysed per 1,000m^3 of material generated.	Suite including TPH, asbestos, metals, PAH and Volatile Organic Compounds.
Site-won demolition material used to create Site levels and infill voids.	One sample will be analysed per 1,000m^3 of material (crushed brick and concrete; limited testing required).	Asbestos, Hydrocarbons
Landscape verge	One sample per 25m of landscaped verge	Suite including TPH, asbestos, metals, PAH and Volatile Organic Compounds.

The Remediation Method Statement is included in full in Appendix D2.

The Remediation Method Statement was submitted as part of 18399/APP/2013/3449, and was approved by the Planning Authority in the decision notice dated 1st August 2014. This Decision Notice is included as Appendix D1.

3.3.10 October 2015 – Remediation Completion Report

Buckingham Group Contracting Limited (BGCL) were commissioned to construct the commercial units across the Phase 3 site (including the current warehouses within Virtus London 14 site), and as part of the commission were required to present evidence of remediation.

BGCL produced a Remediation Completion Report [18] to achieve the requirements of the remediation strategy, including advanced trial pit investigations and a watching brief during soakaway construction.

In relation to the Virtus London 14 site and the Environmental Permitting Boundary, the following works were completed:

- A pre-start trial pit investigation at the proposed soakaway locations, including trial pits dug in the locations of the two soakaways which are currently within the Environmental Permitting Boundary. No evidence of contamination was observed in the trial pits within the Virtus London 14 site or Environmental Permitting Boundary. No laboratory analysis is stated to have been undertaken as part of the pre-start trial pit investigation.
- During soakaway construction, the site manager observed the excavations; No contaminated materials were noted at the base of the excavations.
- Materials obtained from the soakaway excavations were stockpiled, and samples were collected from the stockpiles and sent for laboratory WAC analysis. No samples are stated to have been taken from the base and sides of the soakaway excavations, and no soil testing or leachability testing was completed.
- During earthworks, the soil conditions at the site were observed by the site manager. No unexpected contamination was recorded.

- The Remediation Completion Report does not mention the installation of any clean capping within landscape areas, management of impacts during construction (eg. dust control), or any details on whether soils were imported onto site.

BGCL acknowledge in the Remediation Completion Report that some of the activities in the remediation method statement, such as laboratory analysis of soils surrounding the soakaway, were not completed; BGCL subsequently completed an assessment of risk posed to groundwater by potential hydrocarbon contaminated soils using Environment Agency P20 methodology and worksheets.

Their assessment considers the target concentrations for hydrocarbons in groundwater (Environmental Quality Standards), the fractions and concentrations of hydrocarbons recorded within soils, rates of hydrocarbon degradation, the size of the soakaways, direction of groundwater, and results of soil infiltration testing.

The results showed that in the modelled conditions, the maximum recorded concentrations of hydrocarbons in soil are well below the concentrations that would present an unacceptable risk to groundwater.

The Remediation Completion Report, including groundwater risk modelling, is included in Appendix B2.

3.3.11 Summary of evidence of historic contamination

Historic ground investigations (1998 and 2003) detected generally low levels of contamination within soils across the Virtus London 14 data centre site, expect for within discrete hot-spots such as the backfilled pond. Remedial works were undertaken (2006) including the excavation and removal of material from the backfilled pond. Validation investigations were undertaken (2010) to verify the remediation had been completed, although some residual contamination was encountered in the east of the Virtus site, outside of the Environmental Permitting Boundary, and additional remediation Verification during construction (2014) did not encounter any evidence of contamination and demonstrated there were no unacceptable risks to groundwater.

The Remediation Completion Report [18] was submitted in relation to planning condition 6(iii) of 18399/APP/2013/1019 in November 2015, and was approved by the Local Planning Authority in the decision notice 13th January 2016. This is included in Appendix B2.

It is therefore concluded that all of the 2013 planning conditions relating to contaminated land have been discharged through the various assessments undertaken and reports submitted to the Local Planning Authority, principally the 2010 Land Quality Statement, 2013 Remediation Method Statement, and 2014 Remediation Completion Report.

3.4 Relevant Baseline Soil and Groundwater Data

Contamination at the Virtus London 14 site was investigated, delineated, remediated and validated between the years 1998 and 2014. In relation to the proposed generators and associated fuel storage within the Environmental Permitting Boundary, from the information reviewed in this SCR there is no evidence of pre-existing hydrocarbon contamination within soils or groundwater in the area of the new replacement soakaway.

Historic sampling and analysis within the Prologis Park area has detected generally low levels of contamination, except for in discrete hot-spots attributed to specific sources such as the backfilled pond, and have been remediated.

It is noted that to date only two of the historic ground investigation locations are specifically located within the footprint of the Environmental Permitting Boundary - Neither of these locations (TH3 and TH8 from 2013) included laboratory analysis of soils.

Although a large amount of ground investigation work has historically been undertaken within the Virtus London 14 area and across the wider Prologis Park site, there is a degree of uncertainty in the ground conditions and on the presence of soil and groundwater contamination specifically within the Environmental Permitting Boundary. It cannot be discounted that previously undetected contamination may be present within the Environmental Permitting Boundary. As such, it may be prudent for additional targeted investigation of soils and groundwater to be completed prior to commencement of operations.

As laboratory analysis was not completed during the 2014 verification works, the most recent test data for soils across the wider Virtus site relates to the 2010 validation investigation completed by WSP. The most recent groundwater data was obtained pre-remediation in 2003. These results specifically include the results of Total Petroleum Hydrocarbon analysis, which are considered applicable to the proposed storage of fuels at the site within the Environmental Permitting Boundary.

In the absence of information to the contrary, it is assumed the “residual contamination” associated with asbestos which was identified in TP9 and TP10 in 2010 remains in place in the east of Virtus London 14 site, however this is not within the Environmental Permitting Boundary.

The results of the 2010 soil testing and the 2003 groundwater analysis are appended to this report (Appendix A) as the most recent available data pertaining to the Environmental Permitting Boundary, and in the absence of more recent information, can be used as the baseline condition for the site.

4. Permitting Activities

4.1 Permitting activities

The proposed development falls under the Permitting (England and Wales) Regulations 2016 (EPR) - Section 1.1 Part A(1)(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 for use in the emergency SBGs together with associated drainage infrastructure.

4.2 Non-permitted activities undertaken

All areas other than the diesel fired generators and the associated diesel storage.

5. References

[1] Arup, “Site Location Plan - VIRTUS London 14 Data Centre - LON14-ARP-00-XX-DR-EP-001,” 2023.

[2] Arup, “Site Layout and Air Emissions Point Plan - VIRTUS London 14 Data Centre - LON14-ARP-00-XX-DR-EP-002A,” 2023.

[3] Arup, “Site Layout and Water Emissions Point Plan - VIRTUS London 14 Data Centre - LON14-ARP-00-XX-DR-EP-002B,” 2023.

[4] Environment Agency, “Environmental permitting: H5 Site condition report,” 2013. [Online]. Available: https://www.gov.uk/government/publications/environmental-permitting-h5-site-condition-report . [Accessed 08 2023].

[5] Environment Agency, “Site Condition report – guidance and templates – Environmental Permitting Regulations,” 2013. [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/298106/LIT_8001_38258e.pdf. [Accessed 08 2023].

[6] European Union, “European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions,” 6 5 2013. [Online]. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0506(01)&from=EN. [Accessed 08 2023].

[7] Arup, “Environmental Site Settings - VIRTUS London 14 Data Centre - LON14-ARP-00-XX-DR-EP-003,” 2023.

[8] Arup, “Cultural and Natura Heritage - VIRTUS London 14 Data Centre - LON14-ARP-00-XX-DR-EP-004,” 2023.

[9] Arup, “App 03-03 - Drainage - VIRTUS London 14 Data Centre,” 2023.

[10] Environment Agency, “Nature and Heritage Conservation Screening Report – Preapplication Screening - EPR/CP3825SU/P001,” 2023.

[11] British Geological Survey, “Geological Survey of England and Wales 1:63,360/1:50,000 geological map series, Sheet 269 Windsor, Solid and Drift,” 1998. [Online]. Available: https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=1003337. [Accessed 09 2023].

[12] British Geological Survey, “BGS Lexicon of Named Rock Units - Langley Silt Member,” BGS, [Online]. Available: https://webapps.bgs.ac.uk/lexicon/lexicon.cfm?pub=LASI. [Accessed 22 09 2023].

[13] British Geological Survey, “BGS Lexicon of Named Rock Units - Lynch Hill Gravel Member,” [Online]. Available: https://webapps.bgs.ac.uk/lexicon/lexicon.cfm?pub=LHGR. [Accessed 22 09 2023].

[14] British Geological Survey, “BGS Lexicon of Named Rock Units - London Clay Formation,” [Online]. Available: https://webapps.bgs.ac.uk/lexicon/lexicon.cfm?pub=LC. [Accessed 22 09 2023].

[15] Gibb Environmental, “Records Office, Bourne Avenue, Land Quality Statement Phase II: Intrusive Survey,” October 1998.

[16] WSP Environmental UK Limited, “MOD Records Office, Hayes, Middlesex - Phase II Geo-Environmental Assessment (12170423),” 2003.

[17] WSP, “Validation Report Phase 3B ProLogis Park, Hayes,” November 2010.

[18] Buckingham Group Contracting Limited , “18399/APP/2015/4257 - Remediation Completion Report,” 10 2015. [Online]. Available: https://planning.hillingdon.gov.uk/OcellaWeb/showDocuments?reference=18399/APP/2015/4257&module=pl. [Accessed 04 10 2023].

[19] DEFRA, “MagicMap,” [Online]. Available: https://magic.defra.gov.uk/MagicMap.aspx. [Accessed 26 09 2023].

[20] DEFRA, “Catchment Planning - Crane Water Body,” [Online]. Available: https://environment.data.gov.uk/catchment-planning/WaterBody/GB106039023030. [Accessed 26 09 2023].

[21] Environment Agency, “Flood Map for Planning.,” [Online]. Available: https://flood-map-for-planning.service.gov.uk/. [Accessed 08 2023].

[22] WSP, “Land Quality Statement : Phase 3 Prologis Park, Hayes,” 2013.

[23] National Library of Scotland, “Georeferenced Maps,” [Online]. Available: https://maps.nls.uk/geo/explore/#zoom=5.0&lat=56.00000&lon=-4.00000&layers=1&b=1. [Accessed 26 09 2023].

[24] Historic England, “Aerial Photo Explorer,” [Online]. Available: https://historicengland.org.uk/images-books/archive/collections/aerial-photos/. [Accessed 26 09 2023].

[25] Hillingdon Council, “Planning Applications Search,” [Online]. Available: https://planning.hillingdon.gov.uk/OcellaWeb/planningSearch. [Accessed 09 2023].

[26] National Archives, “Public Record Office: Maps, Plans and Photographs of the Hayes Site,” [Online]. Available: https://discovery.nationalarchives.gov.uk/details/r/C12094. [Accessed 26 09 2023].

[27] Greater London Historic Environment Record, “[119113] Royal Ordanance Factory (Mid 20th Century Royal Ordnance Factory),” [Online]. Available: https://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=6de777b0-b256-48cc-bda8-b36ae66818a5&resourceID=191993. [Accessed 26 09 2023].

[28] Museum of London Archaeology, “The Royal Ordnance Factory at Hayes: the story of a World War II gun and tank factory at Hayes in the London Borough of Hillingdon,” MOLA, 2011. [Online]. Available: https://www.mola.org.uk/royal-ordnance-factory-hayes-story-world-war-ii-gun-and-tank-factory-hayes-london-borough-hillingdon. [Accessed 26 09 2023].

[29] Historic England, “USAAF Aerial Photo - US_7PH_GP_LOC304_STBD_14008,” 22 04 1944. [Online]. Available: https://historicengland.org.uk/images-books/archive/collections/aerial-photos/record/US_7PH_GP_LOC304_STBD_14008. [Accessed 26 09 2023].

[30] Historic England, “RAF Aerial Photo - RAF_106G_UK_400_FP_1059,” 17 06 1945. [Online]. Available: https://historicengland.org.uk/images-books/archive/collections/aerial-photos/record/RAF_106G_UK_400_FP_1059. [Accessed 26 09 2023].

[31] Historic England , “RAF Aerial Photo - RAF_CPE_UK_2202_V_5093,” 08 08 1947. [Online]. Available: https://historicengland.org.uk/images-books/archive/collections/aerial-photos/record/RAF_CPE_UK_2202_V_5093. [Accessed 26 09 2023].

[32] V. Carr, “A History of the Public Records Office,” National Archives, 8 10 2010. [Online]. Available: https://media.nationalarchives.gov.uk/index.php/a-history-of-the-public-records-office/. [Accessed 26 09 2023].

[33] WSP, “Remediation Method Statement - Phase 3, Prologis Park, Hayes,” 2013.

[34] Arup, “Environmental Risk Assessment - Environmental Permit Application - London 14 Data Centre, Prologis Park Heathrow, Hayes,” 2023.

Appendix A

Baseline Contamination Data

A.1 WSP 2010 Soil Results

A.2 WSP 2003 Groundwater Results

Appendix B

Remediation Completion Report (2015)

B.1 Decision Notice 13th January 2016 - 18399/APP/2015/4257

B.2 Remediation Completion Report (2015) – Buckingham Group Contracting Limited

Appendix C

Land Quality Statement (2013)

C.1 Decision Notice 23rd July 2013 - 18399/APP/2013/1019

C.2 Land Quality Statement (2013) - WSP

C.3 Validation Report – Phase 3B (2013) - WSP

Appendix D

Remediation Method Statement (2013)

D.1 Decision Notice 1st August 2014 - 18399/APP/2013/3449

D.2 Remediation Method Statement (2013) - WSP

Appendix E

GeoEnvironmental Assessment (2003)

Appendix F

As Built Drainage Layout TRC 2607-51

Appendix G

Copies of Site Plans