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WSP

REMEDIATION METHOD STATEMENT

PHASE 3, PROLOGIS PARK, HAYES

29 October 2013

Quality Management

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks				
Date	October 2013			
Prepared by	Richard Clayton			
Signature				
Checked by	Elizabeth Beers			
Signature				
Authorised by	Richard Clayton			
Signature				
Project number	00038063-005			
File reference	G:\#Soil and Groundwater\DELTEK Projects\00038063 - Prologis Park, Hayes Planning Support\005 Contamination Planning Conditions\(10) Reporting			

REMEDIATION METHOD STATEMENT

29 October 2013

Clients

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London
W1S 2ES

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Consultant

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Richard Clayton
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Table of Contents

1 Introduction

1.1 Instruction

WSP Environmental (WSP) was instructed by Turley Associates (Turley) on behalf of Prologis Developments Limited (Prologis) to provide a remediation method statement (RMS) to support the proposed redevelopment of the Phase 3 area of the Site for commercial warehousing.

1.2 Planning Permission & Discharge of Planning Conditions

The report has been prepared in consultation with the Environment Agency and Hillingdon Borough Council and is designed to meet the pre-commencement requirements of Condition 6 of the planning permission reference 18399/APP/2013/1019.

Condition 6, states the following:

> 6 · (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 offsite receptors in accordance with policy OE11 Hillingdon Local Plan: Part Two Saved UDP Policies (November 2012).

A significant amount of assessment has previously been undertaken on the Phase 3 area of Prologis Park, Hayes for general investigation of ground conditions and more recently for delineation and validation of potentially contaminated soils.

As part of the planning submission WSP prepared a Land Quality Statement for Phase 3 (reference 38063-R01, dated April 2013). This document summarised the previous desk studies, investigations, risk assessments and remediation works that have been carried out on the wider Prologis Park Site together with Site specific information relating to Phase 3. This document is considered sufficient to meet the requirements of Pre-Commencement Condition 6ia and 6ib.

During regulatory consultation, the Environment Agency raised an objection to the proposed development of the grounds of on-site contamination and the proposed use of soakaway drainage on the Site and the potential risks this may cause to groundwater quality. Following consultation with the Environment Agency, WSP prepared a further detailed assessment of ground conditions on the Site and the proposed soakaway locations and reported this to the Environment Agency within a letter report dated 04 July 2013 (reference 38036-004 L01, dated July 2013). Following consideration of the information provided within this document, the objection was withdrawn by the Environment Agency. This letter report and the Environment Agency correspondence are included in **Appendix A**.

1.3 Report Aims

The aim of this report is to satisfy the requirements of Pre-Commencement Condition 6ic and present a methodology for satisfying the requirements of Condition 6ii and 6iii. It should be noted that this report is also designed to address the requirements of Condition 17, which duplicates the requirements of Condition 6ii.

1.4 Scope

The scope of this document includes:

- A proposed methodology for advance investigation of proposed soakaway locations including a scope of testing;
- A proposed methodology for completion of a watching brief during the construction process;
- Proposals for the management and reporting of unexpected contamination during the development works; and,
- Recommendations for management of contamination impacts during and post construction.

1.5 Reliance

This report is addressed to and may be relied upon by the following parties:

Turley Associates
25 Savile Row
London
W1S 2ES

Prologis Developments Ltd
Bond Street House,
14 Clifford Street
London W1S 4JU

This assessment has been prepared for the sole use and reliance of the above named parties. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WSP and under the terms agreed with the Appointment agreed between WSP and Prologis. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party without the agreed reliance as stated above.

2 Site Information

2.1 Site Details

The following Table 2.1 provides a summary of the Site setting and historical land use from current data sources and including information from historical reports.

Table 2.1: Site Setting

Site Address	Phase 3, Prologis Park, off Stockley Road, Hayes UB7 9BN
National Grid Coordinates	508022, 179596 (from approximate centre of Site)
Approximate Size of Site	3.5 hectares
Site Location	The Site is located in the north of Prologis Park, Hayes approximately 1.6 miles north of Heathrow Airport, 0.5 miles north of the M4 motorway (junction 4), 2.5 miles east of the M25 motorway (junction 15) and 1.6 miles south of Hayes. A Site location plan is presented as **Figure 1**.
Current Site Use	The Site is currently open land in the north of the wider Prologis Park which supports commercial properties currently leased to City Sprint, Gate Gourmet and HAL and an untenanted unit in the southeast corner.
Surrounding Area	Phase 3 is bounded to the south by the Prologis Park units noted above, with Bourne Farm recreation ground beyond, to the north by railway lines (Hayes and Harlington line) with commercial and light industrial properties beyond and to the west by Stockley Road Lake and Stockley Road beyond. Residential properties are present to the east.
Site History	The Site comprised agricultural land until the Second World War when the Site was used as a Royal Ordnance Factory for the production of armaments. In the 1950s the Site was taken over by the Public Records Office and used as an MOD archive store. The Site has been progressively developed for commercial storage and distribution warehouses since c. 2006 and Phase 3 is the last remaining development phase.
Geology and Hydrogeology	British Geological Survey (BGS) map Sheet 269, Windsor, scale 1:50,000, Solid and Drift edition and third party investigation data show the following underlying geological sequence: ■ Made Ground (no aquifer designation); ■ Langley Silt – clay and silt (Unproductive Strata); ■ Lynch Hill Gravels - medium to coarse gravelly sand; and, ■ London Clay – clay, silt and sand (Unproductive Strata). Areas to the west and south of the Site are shown as in-filled which coincide with areas of historic landfilling, shown on the EA website. The EA website indicates that the Site is not located in a Source Protection Zone and that current groundwater quality (under the River Basin Management Plan scheme) has been quantitatively assessed as good with poor chemical quality (Lower Thames Gravels).
Hydrology	The EA website indicates that the Site has not been assessed for risk of flooding by rivers and

	the sea however no at-risk areas, extents of extreme flooding, water storage areas or flood defences are shown in the vicinity of the Site. Surface water features in the vicinity of the Site include Stockley Road Lake approximately 70m to the west, the Grand Union Canal 175m to the north and a number of ornamental ponds on a commercial/industrial estate beyond the railway lines to the north. All of the noted surface water features are likely to be lined and therefore not in hydraulic continuity with underlying aquifers at the Site.
Environmental Sensitivity	Residential properties are located adjacent to the east of the Site. The Multi-Agency Geographical Information for the Countryside (MAGIC) website is a web-based interactive mapping service that displays ecological and archaeological information from a wide variety of sources. No designated ecologically sensitive features were identified within 1km of the Site on the MAGIC website (http://magic.defra.gov.uk, accessed on 29 October 2013) with the exception of a Nitrate Vulnerable Zone adjacent to the north and west of the Site. WSP consider that the environmental sensitivity of the Site setting is low to moderate due to residential properties adjacent.

3 Remediation Method Statement

3.1 Current Status

The Site characterisation works summarised in the Land Quality Statement have not identified any material land contamination risks provided adequate Site procedures are in place during construction.

Previous works on the Site and experience of development works on the surrounding Prologis Park site indicate there is a potential risk of localised hydrocarbon contamination within shallow soil deposits together with a potential for asbestos cement fragments within the sub-base of existing concrete slabs.

3.2 Proposed Methodology for Soil Management

Subject to any unexpected contamination encountered during the works, it is considered that the soils on the Site can be retained within the development footprint, provided that soils are retained under buildings and hard standing and capping is provided for landscaped areas.

This proposal meets with the principles of materials management in line with guidance provided within; '*The Definition of Waste: Development Industry Code of Practice*', CL:AIRE (2008). However, prior to commencement on-site, the main contractor should prepare an independently verified materials management plan in line with this method statement.

3.3 Advanced Characterisation

3.3.1 Trial Pit Investigation

To ensure that Site construction works are not impeded by unexpected contamination, it is proposed the advanced trial pitting is carried out at the locations of the proposed soakaways (see **Figure 2**). A minimum of 2 no. trial pits should be excavated at each location and be extended to at least 1m into the natural stratum beneath the Site.

The trial pits should be carried out under the supervision and/or presence of an experienced environmental engineer. Where evidence of contamination is noted, the trial pits should be extended to define, where practicable, the extent of any contamination impacts and further chemical verification tests should be carried out.

During investigation, representative testing of field samples should be carried out using a photo-ionisation detector for evidence of volatile hydrocarbon vapours.

3.3.2 Chemical Verification Testing

As part of the advanced trial pitting works, a minimum of 2 samples from the Made Ground and the underlying natural ground should be submitted for chemical verification testing at a suitably accredited chemical laboratory. Testing should be in accordance with the verification suite presented in Section 3.8.

3.4 Watching Brief

3.4.1 Soakaway Construction

During the construction of the soakaways, a suitably qualified environmental consultant should attend Site to inspect the proposed formation level/base of the excavation and recover verification samples from the base and sides of the soakaway excavations.

During the inspection, the excavated materials should be inspected and subject to confirmatory testing in line with the requirements of Section 3.8.

3.4.2 General Inspections

During general construction activities, it is recommended that an independent watching brief is maintained by an experienced environmental consultant until the majority of the construction works are “out of the ground”; primarily removal of slabs and obstructions, excavations of soakaways (see Section 3.4.1), foundation construction and installation of services and infrastructure.

A schedule of Site inspections should be agreed in advance of the works. Inspections should include a visual assessment of formation levels and any open excavations for evidence of contamination, inspection and sampling as required of any excavated materials, and recording of locations where excavated soils are reused.

A record of all inspections and observations made during the inspections should be maintained and included within the verification report.

3.5 Dealing with Site Conditions

Site investigations have established the presence of low level contamination within the made ground on the site. Previous construction phases have encountered localised areas of asbestos contamination within sub-base beneath existing slabs and on this basis it will be necessary to have procedures in place to ensure that general contamination risks are appropriately managed during the construction process. These should include:

- Tool box talks and briefings for construction workers to raise awareness of the potential for contamination on the site and procedures for notifying the finds.
- Use of appropriate levels of PPE during groundworks.
- Management of dust during groundwork.

In the event that asbestos or other contamination impacts are recorded through the watching brief or by construction workers the procedures identified in Section 3.6 should be followed.

3.6 Dealing with Unexpected Finds

During the course of the works, it is unlikely but not discounted that previously unidentified contamination will be encountered.

As a minimum, if any visual or olfactory evidence of contamination is encountered at any stage of the works, any such incidents will be subject to delineation and characterisation testing by the independent environmental consultant and the Planning Authority will be notified, immediately, of the findings of this work along with a proposed course of action.

All actions taken will be recorded and included within the verification report.

3.7 Capping in Landscaped Areas

The Land Quality Statement identifies the requirement for clean cover within landscaped verges to manage future exposure risks. It is possible that Site generated materials may meet the clean cover requirements presented in Section 3.8 and **Appendix B**.

3.8 Imported Soils

In the event that additional materials are required for completion of the works, it will be necessary to ensure that soils are sourced from a verifiable supply. Any such materials should be supported by an appropriate level of verification testing, in accordance with Section 3.8, and a clear record of the former use of the “donor” site to demonstrate that the verification testing is appropriate for given potential sources of contamination that may have impacted soil quality and suitability for use on the project Site.

3.9 Chemical Verification Testing

3.9.1 Testing Frequency

Table 3.1 presents the details of the frequency of chemical testing to be undertaken during the construction works.

Table 3.1: Proposed Validation Testing Strategy

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.

3.9.2 Verification and Acceptance Criteria

Remediation Criteria were previously agreed for the Site. These have been updated to reflect current legislation and guidance and are presented as **Appendix B**.

3.10 Environmental Management during Construction

The contractor will be responsible for the identification and mitigation of risks from the works to the wider environment. Such risks and procedures should be presented within the construction phase environmental management plan. Industry best guidance should be followed and this can be accessed from the following:

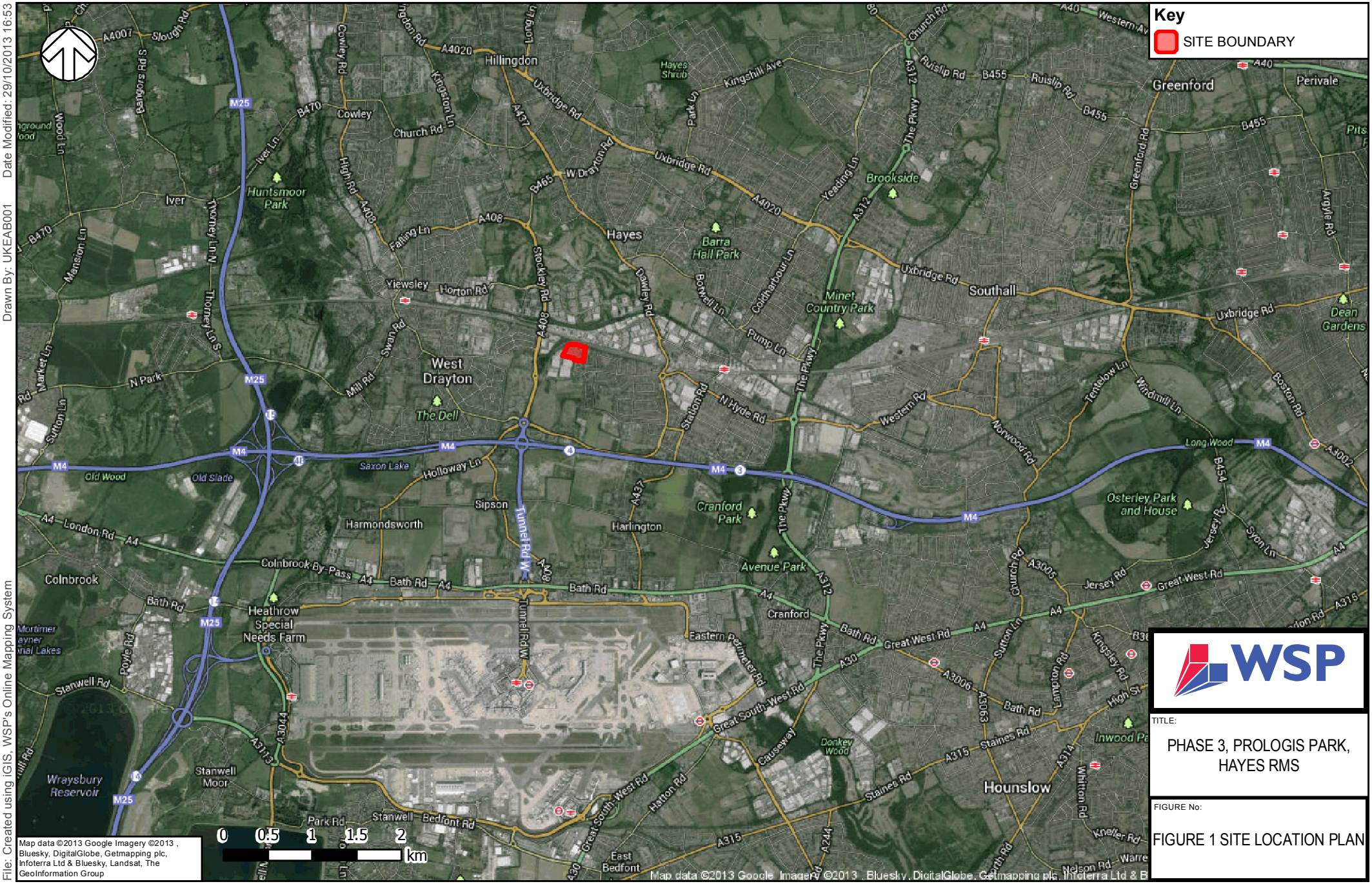
Working at Demolition and Construction Sites: PPG Pollution Prevention Guidelines, 2012 (http://www.environment-agency.gov.uk/business/sectors/136250.asp).

3.11 Verification Reporting

Throughout the works there will be liaison between all parties including the exchange of factual information such as laboratory test data. On completion of the works, a verification report will be produced covering the following:

- A co-ordinated drawing showing the final depth, level, location and extent of all excavations of material that has been re-located on-site. The drawing will be annotated or cross-referenced such that the original and final location of relocated material on the Site can be identified;
- Records of any ground investigations carried out during the works, including trial pit records;
- Backfill records, including the following, as applicable:
  - Chemical analysis for Site derived fill materials; and,
  - Chemical analysis for imported fill materials (if applicable).
- A record of the location and depth of all tests carried out on-site and samples taken from the Site. Samples will be described such that the location on-site where a sample was collected can be easily identified;
- A record of all tests carried out (both laboratory and in-situ) including the range of tests carried out, the test results, and a clear description of the sample tested. Tests will be described such that the sample tested can be easily identified. In- situ tests will be described such that the location of the test can be easily identified;
- A sample of supplier records from each source of imported fill material used (if material is imported);
- A photographic record (in digital format) of the works; and,
- Daily inspection records from the watching brief.

Figures



WSP

TITLE:

PHASE 3, PROLOGIS PARK, HAYES RMS

FIGURE No:

FIGURE 1 SITE LOCATION PLAN

File: Created using iGIS, WSP's Online Mapping System Drawn By: UKEAB001 Date Modified: 29/10/2013 16:53

DO NOT SCALE

KEY

- PHASE 3 BOUNDARY (FORMERLY PHASE 3B)
- PHASE 3A BOUNDARY (OFF-SITE)
- FORMER AREA OF CONCERN
- WATER FEATURE
- RAILWAY LINES
- PROPOSED SOAKAWAY LOCATIONS
- PHG06 GIBB ENVIRONMENTAL OCTOBER 1998 (ITEM
- CBR06 WSP DECEMBER 2003 (ITEM 8)
- TP8 WSP NOVEMBER 2010 (ITEM 12)
- BHNH07 NORWEST HOLST FEBRUARY 2001 (ITEM 13)
- TP5 WSP MARCH 2005 (ITEM 14)
- TP1 WSP NOVEMBER 2010 (ITEM 15)
- BH4 WSP FEBRUARY 2012 (ITEM 16)
- TT04 WSP MARCH 2012 (ITEM 17)
- TP106 WSP JUNE 2012 (ITEM 19)
- UNKNOWN BOREHOLE
- NOTE: LOCATIONS ARE APPROXIMATE

REV	DATE	BY	DESCRIPTION	CHK	APD

DRAWING STATUS: FINAL

WSP
One Queens Drive, Birmingham B5 4PJ
Tel: +44 (0) 121 352 4700 Fax: +44 (0) 121 352 4701
http://www.wspgroup.com

CLIENT: PROLOGIS DEVELOPMENTS LTD

ARCHITECT: -

PROJECT: PHASE 3 PROLOGIS PARK, HAYES

TITLE: EXPLORATORY HOLE AND PROPOSED SOAKAWAY LOCATION PLAN

SCALE@SIZE:	CHECKED:	APPROVED:
1:1,000	RC	RC
CAD FILE: -	DESIGN/DRAWN: EAB	DATE: OCTOBER 2013
PROJECT No: 00038063-005	DRAWING No: FIGURE 2	REV: -

PHASE 3A

PHASE 3
(FORMERLY PHASE 3B)

CITY LINK

GATE GOURMET

N

PHG05 PHG06 PHG07 PHG08 PHG09 PHG10 PHG11 PHG13 PHG01 PHG02 PHG02A PHG03 BHG02 BHG03

BH07 BH08 BH09 BHNH01 BHNH02 BHNH03 BHNH04 BHNH05 BHNH07 TPNH01 TPNH02 BH04

CBR04 CBR05 CBR06 CBR07 CBR 08

WS01 WS02 WS08 WS14

HSA1101 HSA1102 HSA1103

TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10 TP11 TP12 TP13

TP101 TP102 TP103 TP104 TP105 TP106 TP107 TP108 TP109 TP110

TT01 TT02 TT03 TT04 TT05

1 2 3 4 5 6

Appendices

Appendix A WSP Letter Assessment 04 July 2013 & Environment Agency Response

Your ref: NE/2013/117668/01-L01
Our ref: 00038063-004 L01

04 July 2013

Jane Wilkin
Environment Agency Planning Liaison Department
Apollo Court
2 Bishops Square Business Park
St Albans Road West
Hatfield
AL10 9EX

WSP Environmental Limited
One Queens Drive
Birmingham
B5 4PJ
UK

Tel: +44 (0)12 1352 4784
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Dear Jane,

Former MOD Document Records Office, Bourne Avenue, Hayes

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 to your letter dated 17th May 2013 (reference NE/2013/117668/01-L01) and a telephone conversation with your colleague Ben Llewellyn on Wednesday 26th June 2013, it is understood that the Environment Agency (EA) are currently objecting to the above planning application submitted for the above site on the grounds that the contamination on the site presents a potential risk to the water environment through the use of soakaway/infiltration based drainage.

This letter aims to address the concerns raised by the EA with regards to the mobilisation of site contamination in to the water environment through the installation of soakaways.

1. Background

WSP Environment and Energy (WSP) recently produced a land quality statement (LQS) to provide a baseline summary assessment of any potential risks from contaminated land which may impact the Site and affect proposals for redevelopment as a commercial distribution site:

- Land Quality Statement: Phase 3 Prologis Park, Hayes by WSP Environmental for Prologis Developments Ltd, reference 00038063-001 R01, dated 17th May 2013.

The LQS comprised a review of previous land quality information relating to the subject site dating from between 1997 and 2010 completed by WSP and third parties.

Ground conditions underlying the Site have previously been encountered as Made Ground overlying Langley Silt, Lynch Hill Gravels and the London Clay Formation. Groundwater has been recorded within the Lynch Hill Gravels superficial stratum and is considered to flow generally towards the south.

Previous investigation indicated an area of potential concern comprising a former backfilled pond in the east of the Site which recorded localised asbestos, hydrocarbon and metal contamination. The wider Prologis Park Site was remediated and subsequently validated by Birse supported by Crossfield Consulting by 2006.

Assessment and validation undertaken by WSP in 2010 indicated that residual levels of hydrocarbon contamination in soils were at concentrations considered appropriate for a commercial/industrial end use.

Asbestos impacted materials were considered appropriate for reuse on-site provided they were placed beneath hard standing and robust health and safety procedures were adopted during construction.

2. Additional Assessment

Further to receiving the abovementioned response to the LQS by the EA via the Prologis planning application, WSP have given further consideration to residual on-site contamination and the proposed drainage strategy for the site, provided as **Figure 1**.

The drainage layout drawing indicates that six soakaways are proposed to be installed on-site (annotated by WSP on **Figure 1**) to the north, east and south of the proposed Unit C in the west of the site.

The anticipated ground conditions at each soakaway location have been assessed through comparison of the proposed soakaway locations and the proximal ground investigation exploratory hole locations. This assessment is provided in **Appendix A** and the approximate locations of the soakways are shown on an exploratory hole location plan presented as **Figure 2.**

The information provided in **Appendix A** and on **Figure 2** confirms that recorded contaminant concentrations exist in the approximate proposed location of Soakaway 6, albeit at shallow levels. There is limited investigation information in the *close* proximity to the remaining soakaway locations, although there is nothing to suggest from the previous investigations or land use that further significant contamination should be expected.

The base of the proposed soakaways are shown on the drainage strategy (**Figure 1**) at elevations of 29.9 metres Above Ordnance Datum (m AOD) to 30.1m AOD with proposed finished external levels at approximately between 31.8m AOD and 32m AOD. Current ground levels are at approximately 31.5m AOD indicating that the soakaways will extend to approximately 1.5m below current levels.

Typically the site is underlain by 0.3m to 0.6m of Made Ground in turn underlain by natural ground (the Langley Silt or Lynch Hill Gravel Formations). The contamination recorded on site, has been present within the Made Ground only and substantially above the depth of the infiltration drainage.

Based on the levels provided in the drainage strategy (**Figure 1**) excavation of the soakaways should remove the impacted Made Ground (presumably for re-use elsewhere on site away from the areas of infiltration), removing the potential for infiltration through contaminated soils.

WSP conclude that the soakaways should not be affected by low level site contamination previously recorded on the site and any such risks will be mitigated through the construction of the infiltration drainage system.

3. Recommendations

Based on the above assessment, WSP do not consider the site contamination to present a constraint to the adoption of infiltration based drainage. However, recommendations for construction phase on the Site, to ensure that previously unidentified contamination, does not present an unacceptable risk, include (as previously noted in the LQS):

- Completion of a watching brief with method statement to address contamination in the event that it is encountered during excavations, this should include a specific inspection of the formation level for the soakaway structures and confirmatory testing of the formation level;
- Adoption of robust health and safety assessment to ensure that residual contamination risks are mitigated or managed, especially with regards to asbestos;

- Installation of capping layer in soft landscaped areas to break the direct contact and inhalation pathways of any residual contamination. Depths should be agreed with the regulating authorities; and,
- Agreements made with the regulators should be kept on file.

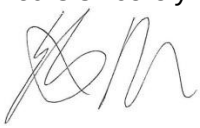
Based on the updated additional assessment completed WSP would also recommend that Made Ground excavated for the installation of the proposed soakaways and intended for re-use on-site should be placed beneath areas of hard standing and subject to confirmatory testing prior to re-use.

4. Closing

WSP trust that the above meets with your requirements and you are able to remove your objection to the adoption of infiltration based drainage on the grounds of contamination.

Should you require any clarification or additional information to that provided, please do not hesitate in contacting me directly.

Yours sincerely



Elizabeth Beers
Senior Consultant, Land Restoration and Ground Engineering
WSP Environmental Limited
DD: 0121 352 4781

CC: File, Prologis, Turley Associates

Encs	Figure 1	Phase 3 (Units C, D & G) Prologis Park, Hayes: Drainage Strategy Drawing by T. R Collier & Associates, reference 2607-51 Rev P1, dated March 2010
	Figure 2	Exploratory Hole Location Plan (reference 38063-004 L01, dated July 2013
	Appendix A	Comparison of Proposed Soakaway Locations and Approximate Previous Exploratory Hole Locations

Authorised by: Richard Clayton, Director 04/07/2013

DRAINAGE NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
2. ALL DRAINAGE WORK TO BE CARRIED OUT IN ACCORDANCE WITH BS 8301, BS 8005 AND THE BUILDING REGULATIONS.
3. ALL PIPES ARE TO HAVE SURROUND IN ACCORDANCE DRAINAGE DETAILS, UNLESS NOTED OTHERWISE.
4. FOR EXACT LOCATION OF RAIN WATER AND FOUL WATER OUTLETS, REFER TO ARCHITECTS DRAWINGS.
5. SURFACE WATER DRAINS SHALL BE EITHER
H.D.P.E. RIDGIDRAIN TWINWALL CARRIER PIPE BY 'POLYPIPE PLC' (OR SIMILAR APPROVED) TO B.S EN 1401–1
OR P.C.C. PIPES TO B.S 5911 (PART 100)
OR VITRIFIED CLAY TO B.S 65
6. FOUL WATER DRAINS SHALL BE EITHER
P.V.C. PIPEWORK BY 'POLYPIPE PLC' (OR SIMILAR APPROVED) TO B.S. EN 1401–01
OR VITRIFIED CLAY TO B.S. EN 295
7. ALL GRP UNDERGROUND TANKS ARE TO BE BEDDED ON AND ENCASED IN 250mm GEN 3 20mm AGG. CONCRETE STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS.
8. ROAD GULLY OUTLET & KERBDRAIN PIPE INVERT LEVELS TO BE 600mm BELOW TOP OF GRATING LEVEL.
9. ALL MANHOLE AND INSPECTION CHAMBER COVERS, FRAMES AND SLOT TYPE DRAINS IN TRAFFICKED AREAS SHALL COMPLY TO EITHER B.S. 497 : PART 1 HEAVY DUTY COVERS TO MA60. OR B.S. EN 124 GRADE D400 (11.5 TONNE WHEEL LOADING) SYPHONIC DRAINAGE TO HAVE VENTED COVERS
10. FOR DRAINAGE CONSTRUCTION AND PIPE BED DETAILS REFER TO DRAWING No.
11. ALL DRAINAGE BRANCHES TO BE 100mm FOR FOUL WATER & 150mm FOR SURFACE WATER UNLESS MARKED OTHERWISE.
12. ALL SOIL & VENT STACKS TO HAVE RODDABLE ACCESS 150mm ABOVE GROUND FLOOR SLAB LEVEL WITH REMOVABLE ACCESS PLATES.
13. ALL DRAINAGE CHANNELS TO HAVE ACCESS CHAMBER AT ENDS OF RUNS & EVERY 30m THEREAFTER.
14. ALL KERB DRAINAGE TO HAVE SUMP UNITS AT OUTLETS OF RUNS & HAVE RODDING ACCESS POINTS EVERY 30m THEREAFTER.
15. ALL SHALLOW DRAINAGE (<900mm COVER) AND DRAINAGE BELOW SLAB TO BE INCASED IN MIN 150mm CONCRETE SURROUND.
16. ALL CONCRETE SURROUNDS FOR THE DRAINAGE TO BE CLASS DC4Z (SULPHATE RESISTING)

LEGEND.

- 1200mm# MANHOLE & DRAIN RUN — FOUL WATER – RED; CLEAN SURFACE WATER – BLUE; DIRTY SURFACE WATER – GREEN
- 1500mm# MANHOLE & DRAIN RUN — CLEAN SURFACE WATER – BLUE; DIRTY SURFACE WATER – GREEN
- 1800mm# MANHOLE & DRAIN RUN — CLEAN SURFACE WATER – BLUE; DIRTY SURFACE WATER – GREEN
- EXISTING FOUL WATER DRAINAGE RUN & MANHOLE
- EXISTING CLEAN SURFACE WATER DRAINAGE RUN & MANHOLE
- HIGH LEVEL SYPHONIC DRAINAGE PRIMARY/SECONDARY SYSTEM
- PACKAGED PUMP STATION WITH RISING MAIN
- SLOTDRAIN (200mm C40 CONCRETE SURROUND)
- ACCESS CHAMBER/OUTLET
- BEANY TYPE KERB DRAIN (150mm C20 BED & HAUNCH)
- RODDABLE TRAPPED FLOOR GULLY
- SOIL & VENT PIPE
- SOIL STUB STACK INCL AAV
- PRESSURISED SYPHONIC DOWNPIPE
- GRAVITY RAINWATER DOWNPIPE
- CONDER CLASS 1 BY–PASS PETROL INTERCEPTOR
- PROPOSED NEW SURFACE LEVELS
- EXISTING SURFACE LEVELS

DRAINAGE LAYOUT
(Ref: 30587)

Scale 1:300

1:300 0 6m 12m 18m 24m 30m

1:1 0 10 20 30 40 50 60 70 80 90 100

REV	DATE	DESCRIPTION	CHK	DRN
P1	18.12.12	PRELIMINARY ISSUE	TC	CE

NOTE: Where a "P" revision applies, this drawing is NOT to be used for construction

T. R. COLLIER & ASSOCIATES.
CONSULTING ENGINEERS
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Telephone 01245 500360
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PROJECT
PHASE 3 (Units C,D & G)
PROLOGIS PARK, HAYES

TITLE
DRAINAGE LAYOUT
Ref: Michael Sparks Associates 30587

ARCHITECT
MICHAEL SPARKS Associates

DRAWN	DESIGNED	CHECKED
CE	TC	TC

DATE	SCALE	STATUS
Mar 2010	1:300	Preliminary

2607-51 P1

CIV QTS — ISO 9001 REGISTERED FIRM — Certificate No. GB08/8850
IAB — INTERNATIONAL ACCREDITATION BOARD — Registration No. 004671

A0 SHEET

DO NOT SCALE

KEY

- PHASE 3 BOUNDARY (FORMERLY PHASE 3B)
- PHASE 3A BOUNDARY (OFF-SITE)
- UNIT DC2 (DATA CENTRE) BOUNDARY (OFF-SITE)
- PHASE A BOUNDARY (OFF-SITE)
- FORMER AREA OF CONCERN
- WATER FEATURE
- RAILWAY LINES
- 1 PROPOSED SOAKAWAY LOCATIONS

NOTE: LOCATIONS ARE APPROXIMATE

PHG06 GIBB ENVIRONMENTAL OCTOBER 1998 (ITEM 5)

CBR06 WSP DECEMBER 2003 (ITEM 8)

TP8 WSP NOVEMBER 2010 (ITEM 12)

BHNH07 NORWEST HOLST FEBRUARY 2001 (ITEM 13)

TP5 WSP MARCH 2005 (ITEM 14)

TP1 WSP NOVEMBER 2010 (ITEM 15)

BH4 WSP FEBRUARY 2012 (ITEM 16)

TT04 WSP MARCH 2012 (ITEM 17)

TP106 WSP JUNE 2012 (ITEM 19)

A UNKNOWN BOREHOLE

NOTE: LOCATIONS ARE APPROXIMATE

REV	DATE	BY	DESCRIPTION	CHK	APD

DRAWING STATUS: FINAL

WSP

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CLIENT: PROLOGIS DEVELOPMENTS LTD

ARCHITECT: -

PROJECT: PHASE 3 PROLOGIS PARK, HAYES

TITLE: EXPLORATORY HOLE AND PROPOSED SOAKAWAY LOCATION PLAN

SCALE@SIZE:	CHECKED:	APPROVED:
1:2,000@ A2	EAB	RC
CAD FILE: -	DESIGN/DRAWN: EAB	DATE: JULY 2013

PROJECT No:	DRAWING No:	REV:
38063-004L01	FIGURE 2	-

Appendix A: Comparison of Proposed Soakaway Locations and Approximate Previous Exploratory Hole Locations

Soakaway Reference	Exploratory Hole Locations in Proposed Soakaway	Depth of Sample	Contaminant concentrations	Depth to base of Made Ground
Soakaway 1	PHG05	Information not available (third party ground investigation data)		
Soakaway 2	None, closest are PHG06 and TP5	PHG06	Information not available (third party ground investigation data)	N/A
		TP5 at 0.5m	■ Arsenic: 3.5mg/kg ■ Chromium: 28mg/kg ■ Copper: 14mg/kg ■ Nickel: 28mg/kg ■ Lead: 3.8mg/kg ■ Zinc: 58mg/kg ■ Phenanthrene: 0.2mg/kg ■ Pyrene: 0.3mg/kg ■ Total TPH: 270mg/kg ■ All other speciated PAH, selenium, mercury, cadmium, BTEX, PRO (C5-10): at or below LOD	N/A
Soakaways 3 & 4 & 5	None, closest are BH9, TP4, TP6, TP8	BH9 at 1.0m bgl	■ Arsenic: 10mg/kg ■ Chromium: 40mg/kg ■ Copper: 60mg/kg ■ Nickel: 27mg/kg ■ Lead: 22mg/kg ■ Zinc: 51mg/kg ■ Cadmium, mercury, selenium, monohydric phenols, cyanide, sulphate and speciated PAH in soils: <LOD	N/A
		BH9 groundwater	■ Metals, monohydric phenols, cyanide, VOC and SVOC: <LOD ■ Ammonia: 0.18mg/l ■ Sulphate: 60mg/l	

N/A – Not Applicable
<LOD – less than laboratory limit of detection
M bgl – metres below ground level
VOC – Volatile Organic Compound Suite
SVOC – Semi-Volatile Organic Compound Suite
TPH – Total Petroleum Hydrocarbons Suite
PAH – Polycyclic Aromatic Hydrocarbon Suite
PRO – Petrol Range Organics

Appendix A: Comparison of Proposed Soakaway Locations and Approximate Previous Exploratory Hole Locations

Soakaway Reference	Exploratory Hole Locations in Proposed Soakaway	Depth of Sample	Contaminant concentrations	Depth to base of Made Ground
		TP4 at 0.1m bgl	■ Arsenic: 4.1mg/kg ■ Chromium: 56mg/kg ■ Copper: 17mg/kg ■ Nickel: 35mg/kg ■ Zinc: 72mg/kg ■ Total PAH: 3.0mg/kg ■ Total TPH, BTEX, selenium, mercury, cadmium, lead and PRO (C5-10): < LOD	
		TP6 at 0.5m bgl	■ Chromium: 13mg/kg ■ Copper: 20mg/kg ■ Nickel: 40mg/kg ■ Zinc: 81mg/kg ■ Total TPH, BTEX, PRO (C5-10), Total PAH, selenium, mercury, arsenic, cadmium and lead: <LOD	
		TP9 at 0.3m bgl	■ Total PAH: 6.0mg/kg ■ Total TPH: 290mg/kg ■ Arsenic: 3.3mg/kg ■ Cadmium: 0.32mg/kg ■ Chromium: 59mg/kg ■ Copper: 27mg/kg ■ Nickel: 33mg/kg ■ Lead: 29mg/kg ■ BTEX, PRO (C5-10), selenium and mercury : <LOD	
Soakaway 6	BH08 (WSP - December 2003)	1.5m bgl	■ VOC: <LOD	0.1m bgl
		Groundwater	■ Sulphate: 65mg/l ■ Ammonia: 0.2mg/l	

N/A – Not Applicable
<LOD – less than laboratory limit of detection
M bgl – metres below ground level
00038063-004 L01 Appendix A

VOC – Volatile Organic Compound Suite
SVOC – Semi-Volatile Organic Compound Suite
TPH – Total Petroleum Hydrocarbons Suite

PAH – Polycyclic Aromatic Hydrocarbon Suite
PRO – Petrol Range Organics

Appendix A: Comparison of Proposed Soakaway Locations and Approximate Previous Exploratory Hole Locations

Soakaway Reference	Exploratory Hole Locations in Proposed Soakaway	Depth of Sample	Contaminant concentrations	Depth to base of Made Ground
			■ Total cyanide and metals: <LOD ■ VOC: <LOD ■ SVOC: <LOD ■ Petrol Range Organics (C6-10): <LOD	
	WS01 (WSP – December 2003)	0.4-0.6m bgl	■ Arsenic: 11mg/kg ■ Chromium: 30mg/kg ■ Copper: 57mg/kg ■ Nickel: 20mg/kg ■ Lead: 21mg/kg ■ Zinc: 44mg/kg ■ Cadmium, mercury, selenium, monohydric phenols, cyanide (total) and sulphate: <LOD ■ Speciated PAH: <LOD	0.9m bgl
		Leachate 0.4-0.6m bgl	■ Monohydric phenol, hydrocarbon oil and selenium: <LOD ■ Speciated PAH: below or at LOD (total PAH: 0.0028mg/l)	
	PHG07	Information not available (third party ground investigation data)		
	PHG13	0.5m bgl	■ TPH: 3,078mg/kg ■ Dark grey discolouration, hydrocarbon odour and 14ppm	Information not available
	TP7 (WSP - November 2010)	0.2m bgl	■ Arsenic: 4.2mg/kg ■ Chromium: 23mg/kg ■ Copper: 6.5mg/kg ■ Nickel: 17mg/kg ■ Lead: 2.6mg/kg ■ Zinc: 35mg/kg ■ Phenanthrene: 0.1mg/kg	0.34m bgl

N/A – Not Applicable
<LOD – less than laboratory limit of detection
M bgl – metres below ground level
00038063-004 L01 Appendix A

VOC – Volatile Organic Compound Suite
SVOC – Semi-Volatile Organic Compound Suite
TPH – Total Petroleum Hydrocarbons Suite

PAH – Polycyclic Aromatic Hydrocarbon Suite
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Appendix A: Comparison of Proposed Soakaway Locations and Approximate Previous Exploratory Hole Locations

Soakaway Reference	Exploratory Hole Locations in Proposed Soakaway	Depth of Sample	Contaminant concentrations	Depth to base of Made Ground
			■ Fluoranthene: 0.2mg/kg ■ Pyrene: 0.2mg/kg ■ Aliphatic hydrocarbons C21-35: 6.2mg/kg ■ Aromatic hydrocarbons C12-16: 3.2mg/kg ■ Aromatic hydrocarbons C16-21: 5.7mg/kg ■ Aromatic hydrocarbons C21-35: 8.9mg/kg ■ All other metals, BTEX, speciated PAH and speciated TPH: below or at LOD	

N/A – Not Applicable
<LOD – less than laboratory limit of detection
M bgl – metres below ground level
00038063-004 L01 Appendix A

VOC – Volatile Organic Compound Suite
SVOC – Semi-Volatile Organic Compound Suite
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PAH – Polycyclic Aromatic Hydrocarbon Suite
PRO – Petrol Range Organics

creating a better place

Environment Agency

Mr Matt Kolaszewski
London Borough of Hillingdon
Development Control

By email:
PlanningeConsult@hillingdon.gov.uk

Our ref: NE/2013/117668/02-L01
Your ref: 18399/APP/2013/1019

Date: 16 July 2013

Dear Matt

Former MOD Document Record Office, Bourne Avenue, Hayes

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.

Thank you for consulting us on the above application. Further to our formal response dated 17 May 2013, reference NE/2013/117668/01 we have received the following additional information from Elizabeth Beers at WSP:

- Letter dated 4 July 2013 detailing the previous history, additional assessment and recommendations in terms of site contamination.
- Email dated 16 July 2013 with groundwater levels near the soakaway locations

As discussed on the phone on Monday 15 July 2013, we have not previously been consulted under the application made in 2004 (18399/APP/2004/2284) or the subsequent applications made in 2010 (18399/APP/2010/2814 and 18399/APP/2010/545). As such we were not aware of the previous history of the site when consulted on this application. On initial consultation we did not have sufficient evidence for us to be assured that there would be any risk to controlled waters or increased flood risk arising from the proposed development.

The letter from WSP states that the contamination in the made ground will be removed in the six locations for the proposed soakaways, thereby reducing the risk of mobilising contaminants. The groundwater levels show the groundwater to be very shallow and we therefore had concerns that infiltrative techniques for drainage may not be effective.

Having looked at the previous history for other planning applications at this site we found that infiltration testing has been done previously for the whole site (under planning application reference 18399/APP/2009/1552), sent to us by Paul Wahba at MSA Architects on 2 September 2009. These infiltration tests demonstrate that infiltration will be possible, and that the assumptions made within the Flood Risk Assessment by WSP for this application are appropriate. When there is no opportunity for a secondary drainage strategy it is important to ensure that the reliance on infiltration is proven prior to determination to prevent an un-implementable planning permission/risk of flooding.

Cont/d..

We are therefore now satisfied that we have sufficient evidence upon which to remove our objection and request that the following conditions are included in the decision notice. Without the inclusion of these conditions we consider the development to pose an unacceptable risk to the environment.

Condition 1
Development shall not begin until a detailed surface water drainage scheme for the site, based on the agreed Flood Risk Assessment (FRA) dated 10/04/2013, by WSP, reference 11012721, has been submitted to and approved in writing by the Local Planning Authority. The scheme shall subsequently be implemented in accordance with the approved details before the development is completed.

The scheme shall include a restriction in run-off to greenfield rates and surface water storage on site as outlined in the FRA.

Reason
To prevent the increased risk of flooding, to improve and protect water quality, and improve habitat and amenity.

Condition 2
No infiltration of surface water drainage into the ground at this location is permitted other than with the express written consent of the Local Planning Authority, which may be given for those parts of the site where it has been demonstrated that there is no resultant unacceptable risk to controlled waters. The development shall be carried out in accordance with the approval details.

Reasons
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.

Condition 3
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.

Reasons
1. To protect and prevent the pollution of controlled waters from potential pollutants associated with current and previous land uses in line with National Planning Policy Framework (NPPF; paragraphs 109, 120, 121), EU Water Framework Directive and Environment Agency Groundwater Protection (GP3:2012) position statements A4 to A6, D1 to D4 and N7.

2. 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).

Advice on Surface Water

The applicant has demonstrated that surface water can be dealt with on site by using infiltration and a greenfield run off rate. As part of the surface water strategy, the applicant should demonstrate to the Local Planning Authority that the requirements of any local surface water drainage planning policies have been met and the recommendations of the relevant Strategic Flood Risk Assessment and Surface Water Management Plan have been considered.

We note that there is very shallow perched groundwater on this site which should be taken into consideration to ensure that an appropriate drainage strategy is designed to minimise the risk of flooding.

In order to discharge the surface water condition, the following information must be provided based on the agreed drainage strategy:

a) A clearly labelled drainage layout plan showing pipe networks and any attenuation ponds, soakaways and drainage storage tanks. This plan should show any pipe 'node numbers' that have been referred to in network calculations and it should also show invert and cover levels of manholes.
b) Confirmation of the critical storm duration.
c) Where infiltration forms part of the proposed stormwater system such as infiltration trenches and soakaways, soakage test results and test locations are to be submitted in accordance with BRE digest 365.
d) Where on site attenuation is achieved through attenuation ponds or tanks, calculations showing the volume of these are also required.
e) Where an outfall discharge control device is to be used such as a hydrobrake or twin orifice, this should be shown on the plan with the rate of discharge stated.
f) Calculations should demonstrate how the system operates during a 1 in 100 chance in any year critical duration storm event, including an allowance for climate change in line with the National Planning Policy Framework Technical Guidance. If overland flooding occurs in this event, a plan should also be submitted detailing the location of overland flow paths and the extent and depth of ponding.

Advice on Groundwater and Contaminated Land

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.

I hope the above comments are helpful. Please contact me if you wish to discuss this application further.

Yours sincerely

Ms Jane Wilkin
Planning Advisor

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Based at:	Ergon House, Horseferry Road, London, SW1P 2AL
Postal address:	FAO Planning Liaison, London Team, Apollo Court, 2 Bishops Square Business Park, St Albans Road West, Hatfield, AL10 9EX

Cc Elizabeth Beers, WSP
Victoria Boorman, LB Hillingdon

End

Appendix B Proposed Site Screening Criteria

1) All testing shall be presented to the independent environmental consultant for approval and additional assessment, remediation removal works and testing scheduled as appropriate.
2) Concentrations of contaminants recorded in soils, sediments and demolition material shall be assessed and compared to the Limit Values in Tables 1, 2 and 3.
3) Materials containing concentrations of contaminants in excess of the Limit Values in Table 1 and / or 3 shall be removed from Site as Unacceptable Material.
4) All contamination testing shall be carried out in a UKAS and MCerts accredited laboratory, in accordance with the standards and procedures defined by MCerts.
5) The soil limit values are based on published Soil Guideline Values (SGV) or WSP Generic Assessment Criteria (GAC) for a commercial land use unless stated otherwise.
6) The materials will be inspected for visual and olfactory evidence of contamination. No hydrocarbon saturated soils will be reused on-Site.
7) The values of <1,000mg/kg and <5,000 mg/kg for total TPH are nominal values to be protective of soil quality and Controlled Waters respectively.
8) Full GAC for Volatile Organic Compounds and Semi Volatile Organic Compounds will be applied to analysis results where testing is warranted by historical land use and / or elevated concentrations previously identified, and have not been provided in full here.

Table 1 : Acceptance Criteria for Landscaped Areas (150mm), Imported Soils and Verification of Soakaway Formation Levels

Determinand	Trigger Concentration (mg/kg)	Basis
Asbestos	NFD	No asbestos fibres detected*
Arsenic	51	Public Parks - appropriate for local parks and open areas typically located adjacent to residential housing and more frequently used than in an Open Spaces scenario.
Cadmium	35	As above
Chromium (III)	21500	As above
Chromium (VI) (Hexavalent)	102	As above
Copper	15250	As above
Cyanide (Free)	60	As above
Lead	694	As above
Elemental Mercury	26	As above
Inorganic Mercury	379	As above
Methyl Mercury	24	As above
Nickel	1149	As above
Selenium	869	As above
Zinc	58880	As above
Total PAHs	50	Proposed arbitrary limit to ensure soil quality is maintained and risks to controlled waters are managed.
Benzo[a]anthracene	8.8	Public Parks - appropriate for local parks and open areas typically located adjacent to residential housing and more frequently used

Determinand	Trigger Concentration (mg/kg)	Basis
		than in an Open Spaces scenario.
Benzo[b]fluoranthene	9.9	As above
Benzo[k]fluoranthene	15	As above
Benzo[ghi]perylene	79	As above
Benzo[a]pyrene	1.4	As above
Chrysene	12	As above
Dibenz[ah]anthracene	1.4	As above
Fluoranthene	1480	Concentration limited by 50mg/kg arbitrary limit
Indeno[123-cd]pyrene	5.8	Public Parks - appropriate for local parks and open areas typically located adjacent to residential housing and more frequently used than in an Open Spaces scenario.
Naphthalene	462	Concentration limited by 50mg/kg arbitrary PAH limit
Pyrene	3550	Concentration limited by 50mg/kg arbitrary PAH limit
Fluorene	4670	Concentration limited by 50mg/kg arbitrary PAH limit
Anthracene	35370	Concentration limited by 50mg/kg arbitrary PAH limit
Phenanthrene	1460	Concentration limited by 50mg/kg arbitrary PAH limit
Acenaphthylene	6950	Concentration limited by 50mg/kg arbitrary PAH limit
Acenaphthene	6950	Concentration limited by 50mg/kg arbitrary PAH limit
BTEX (based on 100% benzene)	1	Arbitrary limit on imported soils and shallow soils
Total TPH (Sum)	500	A conservative and qualitative screening value for assessing hydrocarbon impacted soils

Leaching Criteria for Pollution of Controlled Waters (Inorganic Contaminants) (Verification of Soakaway Formation Levels

1. The Limit Values in Table 2 apply to materials subjected to leaching tests.
2. Any material which exhibits gross visual evidence of hydrocarbon contamination (e.g. visible evidence of hydrocarbons such as free product) shall not be re-used on-Site.
3. The leaching limit values are based on standards stated in the source column. Consideration shall be given to any future legislative changes.
4. Testing requirements as in the main body of the report.

Table 2 Contamination Criteria (Controlled Waters)

Contaminant	Limit Value (µg/l)	Source
Arsenic	10	Drinking Water Standards England & Wales (2000) (amended)
Cadmium	5	Drinking Water Standards England & Wales (2000) (amended)
Chromium	50	Guidelines for Drinking Water Quality, Second Addendum to the Third Edition, Volume 1, World Health Organisation, 2008
Copper	2,000	Drinking Water Standards England & Wales (2000) (amended)

Contaminant	Limit Value (µg/l)	Source
Lead	25	Drinking Water Standards England & Wales (2000) (amended)
Mercury	1	Drinking Water Standards England & Wales (2000) (amended)
Nickel	20	Drinking Water Standards England & Wales (2000) (amended)
Selenium	10	Drinking Water Standards England & Wales (2000) (amended)
Zinc	5,000	Scotland Private Water Supply Regulations 2006
Cyanide	50	Drinking Water Standards England & Wales (2000) (amended)

Table 3: Criteria for Protection of Human Health and the Environment below 150mm in landscaping and below areas of hardstanding etc Outside of Soakaways.

Determinand	Trigger Concentration (mg/kg)	Basis
Asbestos	<0.01% w/w	<0.01% or no visible asbestos containing materials.
Arsenic	640	WSP Generic Acceptance Criteria for Commercial end use
Cadmium	230	As above
Chromium (III)	30,000	As above
Chromium (VI) (Hexavalent)	35	As above
Copper	72,000	As above
Cyanide (free)	60	As above
Lead	6,000	As above
Mercury, inorganic	3,600	As above
Nickel	1,800	As above
Selenium	13,000	As above
Zinc	660,000	As above
Total PAH	500	Arbitrary control on soil quality*
Benzo[a]anthracene	89	WSP Generic Acceptance Criteria for Commercial end use
Benzo[b]fluoranthene	100	As above
Benzo[k]fluoranthene	140	As above
Benzo[ghi]perylene	650	As above
Benzo[a]pyrene	14	As above
Chrysene	140	As above
Dibenz[ah]anthracene	13	As above
Fluoranthene	5	Although modelled concentrations at this SSTL indicate that the maximum possible concentrations at the compliance point exceed the WQS, source areas were modelled as 'non-declining', as such this value is considered conservative and practicably achievable

Determinand	Trigger Concentration (mg/kg)	Basis
		from a remedial perspective
Indeno[123-cd]pyrene	60	WSP Generic Acceptance Criteria for Commercial end use
Naphthalene	40	Site specific based on protection of Controlled Waters
Pyrene	54,000*	WSP Generic Acceptance Criteria for Commercial end use
Fluorene	64,000*	WSP Generic Acceptance Criteria for Commercial end use
Anthracene	520,000*	WSP Generic Acceptance Criteria for Commercial end use
Phenanthrene	22,000*	WSP Generic Acceptance Criteria for Commercial end use
Acenaphthylene	84,000*	WSP Generic Acceptance Criteria for Commercial end use
Acenaphthene	85,000*	Pub WSP Generic Acceptance Criteria for Commercial end use
BTEX (based on 100% benzene)	10	Arbitrary limit on soil quality
Total TPH (Sum)	5,000	Previously accepted threshold concentration

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