Preliminary Environmental Risk Assessment

Phoenix Place Site, Mount Pleasant, London

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This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
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Comments

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Objectives

The Livemore Partnership LLP, on behalf of Royal Mail Group, instructed Waterman Infrastructure & Environment Limited ('Waterman') to update the Preliminary Environmental Risk Assessment (PERA) undertaken in 2013 that accompanied a suite of planning applications for the redevelopment of land adjacent to, and forming part of, the existing Mount Pleasant Sorting Office in Farringdon. This updated PERA presents the findings for Phoenix Place site only, which is located in the London Borough of Camden.

Site Setting

Current Use	Royal Mail use the Phoenix Place site for staff car parking. .
History	Rich history of industrial use, with numerous garages, a print works, a food factory, a foundry and residential properties on the Phoenix place site. The Phoenix Place site was cleared of buildings during the mid-1970 and Mail Rail House (Petrone House) was demolished in 2014/2015.
Ground Conditions	Extensive depths of Made Ground (1.5 to 5.2m below ground level (bgl)) underlain by shallow depths of Hackney Gravel Member (0.9 to 1.2m in thickness). The Hackney Gravel Formation is underlain by the London Clay Formation (5.4 to 9.4m in thickness). The Lambeth Group, Thanet Sand Formation, and Upper Chalk Formation underlie the London Clay Formation.
Controlled Waters	The Hackney Gravel Member, Lambeth Group and Thanet Sand Formation are Secondary A Aquifers. The London Clay Formation is classed as Unproductive Strata. The Upper Chalk Formation is a Principal Aquifer. Groundwater samples recovered from the Secondary A Aquifer within the Hackney Gravel Member during the 2005 Site Investigation were not found to be grossly contaminated.

Conclusions

Based on the proposed land uses of the Phoenix Place Development, as defined by the planning permission granted in 2015 (2013/3807/P), together with data reported from the 2005 Site Investigation and the known current contamination sources identified within this PERA, the overall contamination risk rating for the Phoenix Place site is **Medium.** In the absence of recommendations set out in this PERA, the following potential pollutant linkages have been identified for the Phoenix Place site:

- Construction workers may come into direct contact with potentially contaminated soils and material, being exposed to ground gases and vapours in confined spaces;
- Off-site users/residents may inhale potentially contaminated soils and dust during construction works; and
- Buried foundations, structures, or services may come into direct contact with contaminated soils and groundwater.

Recommendations

The recommendations below outline preliminary remedial and mitigation measures that require confirmation through an additional Site Investigation on the Phoenix Place site. Based on the successful implementation of these measures, the contamination risks are anticipated to be **Low** and therefore it is unlikely that the Phoenix Place site would be capable of being classified as Contaminated Land under Part IIA of the Environmental Protection Act 1990; thus meeting the requirements of paragraphs 120 to 122 of the National Planning Policy Framework.

- A Site Investigation encompassing the Phoenix Place Development (Plot P1 and Plot P2) to further establish the underlying ground conditions, contamination status of the soils, the Secondary A Aquifer within the Hackney Gravel Member, together with the ground gas and vapour regime;
- Based upon the results of the Site Investigation, a Generic Quantitative Environmental Risk Assessment (GQRA) should be prepared encompassing Phoenix Place Development (Plot P1 and Plot P2) in which the pollutant pathway linkages are quantified where possible and assessed;
- A Remediation Strategy encompassing Phoenix Place Development (Plot P1 and Plot P2) should be prepared detailing the remedial strategy required to prevent the active pollutant pathway linkages identified from the GQRA;

- Following completion of the Sections, Validation Reports encompassing Phoenix Place Development Plot P1 and Plot P2 should be prepared, detailing the remedial measures taken and confirming all active pollutant pathways have been mitigated; and
- Since piles are considered likely to penetrate the London Clay Formation, Foundation Works Risk Assessments (FWRA) should be prepared for the Sections, encompassing the Phoenix Place Development Plot P1 and Plot P2 and details the required measures to prevent preferential pathways.

Actions required prior to, and during construction, are as follows;

- The validity and status of the groundwater abstraction well on the Phoenix Place site should be determined prior to construction works. If located, the well should be decommissioned in accordance with Environment Agency guidance;
- Following completion of the Site Investigation, boreholes progressed and installed below the London Clay Formation (including any historical wells discovered) should be appropriately decommissioned so as not to act as a preferential pathway in the future;
- A Construction Environmental Management Plan (CEMP) should be prepared detailing the measures for managing waste/stockpiling during construction and techniques for suppressing dust;
- As part of the Phoenix Place Development, Made Ground would be removed. A Preliminary Waste Classification Assessment (PWCA) should be undertaken prior to the removal of material to determine the most appropriate disposal options;
- The Phoenix Place site is considered to be at risk from unexploded ordnance (UXO). Measures recommended within the appropriate UXO reports should be followed throughout the investigatory and construction phases;
- During construction, potentially contaminative substances should be stored and handled in accordance with the Control of Substances Hazardous to Health (COSHH) Regulations 2002 to prevent fugitive emissions migrating to the Made Ground and underlying groundwater; and
- Construction workers should wear the appropriate Personal Protective Equipment (PPE), adhere to good practice hygiene and safety measures, the Confined Space Regulations 1997 and the Control of Asbestos Regulations 2012.

1. Introduction

1.1 Objectives

The Livemore Partnership LLP, on behalf of Royal Mail Group (RMG), instructed Waterman Infrastructure & Environment Limited (Waterman) to update the Preliminary Environmental Risk Assessment (PERA) undertaken in 2013 that accompanied a suite of planning applications for the redevelopment of land adjacent to, and forming part of, the existing Mount Pleasant Sorting Office in Farringdon. This updated PERA presents the findings for Phoenix Place site only, which is located in the London Borough of Camden. A separate PERA has been prepared for the adjacent Calthorpe Street site, which is located in the London Borough of Islington.

The objective of this PERA is to create a preliminary Conceptual Model for the Phoenix Place site, whereby the potential pollutant pathway linkages are identified in relation to ground contamination. This PERA has been submitted to the London Borough of Camden to support the approval of Planning Condition 6(a) of the Phoenix Place Development planning permission (ref. 2013/3807/P). The findings of this PERA will also be used to inform the scope of the further Site Investigation, as required by Planning Condition 6(b).

1.2 Current Site

The Phoenix Place site is located at National Grid Reference 530945, 182264, located within the Clerkenwell area of London and within the administrative boundary of the London Borough of Camden. The location of the Phoenix Place site is shown on Figure A1 and Figure A2 of Appendix A.

The topography of the Phoenix Place site falls from north-west to south-east with four distinct levels present as a result of historical buildings, all of which have now been demolished. The lowest part of the Phoenix Place site is in the eastern corner.

Access to the Phoenix Place site is from Calthorpe Street to the north or Mount Pleasant to the south both of which lead on to Phoenix Place. With the exception of Phoenix Place (road) the remainder of the Phoenix Place site is in use as a Royal Mail staff car park. The surface of the car park comprises compacted fill material and concrete, although where present the concrete surface is often in poor condition. No buildings are present on the Phoenix Place site, with Mail Rail House (Petrone House) demolished to ground level in 2014/2015.

The culverted Fleet River Sewer passes beneath Phoenix Place (road) and flows in a southerly direction, outfalling in the River Thames.

1.3 Proposed Development

Planning permission for the Phoenix Place Development was granted in March 2015 for the following;

Comprehensive redevelopment, following the demolition of existing buildings, to construct four new buildings ranging from 5 to 15 storeys (above basement level) in height, to provide 38,724sqm. (GIA) of residential floorspace (345 dwellings) (Class C3), 823sqm (GIA) of flexible retail and community floorspace (Use Classes A1, A2, A3,D1, or D2) with associated energy centre, waste and storage areas, basement level residential car parking (54 spaces), the re-provision of Royal Mail staff car parking (approx. 196 spaces) cycle parking , residential cycle parking (431 residential spaces) hard and soft landscaping to provide public and private areas of open space, alterations to the public highway and all other necessary excavation and enabling works.

The Phoenix Place Development is split into two areas known as Plot P1 and Plot P2, as shown in Figure A3 of Appendix A, comprising four separate buildings known as Buildings A, B, C and D, also shown on Figure A3. A description of the Phoenix Place Development (Plot P1 and Plot P2) is given below.

Building A, a 'U' shaped building located in the southern part of the Phoenix Place Development forms Plot P1, which closely follows the alignment of Gough Street, Mount Pleasant and Phoenix Place. Building A, which would be between five and 15 storeys in height, would accommodate residential, retail and community uses. The two-storey basement beneath Building A, which also extends under a public square, would provide Royal Mail staff parking, residential car parking, bike storage, water storage, plant rooms and a ground source heat pump.

The northern part of the Phoenix Place Development, which forms Plot P2, would comprise Buildings B, C and D separated above ground by a communal garden, a courtyard and public open space. Buildings B, C and D, which would be between five and 10 storeys in height, would accommodate residential, retail and community uses. A separate basement would be created beneath Buildings B and C, and below the courtyard to accommodate car parking, plant rooms, lobby, residential and commercial uses.

Public and private communal amenity space provided within the Phoenix Place Development at ground level would comprise a combination of hard and soft landscaped areas. Soft landscaped areas within public open space would comprise lawn, planting and raised planting beds. Trees would be planted throughout the Phoenix Place Development, particularly along Mount Pleasant and within the public open space.

1.4 Planning Context

Condition 6 of the Phoenix Place Development planning permission (ref. 2013/3807/P) relates to contaminated land and seeks that prior to the commencement of work for each Section or stage in development that the following components are undertaken, submitted, and approved by the London Borough of Camden:

- Condition 6(a): PERA;
- Condition 6(b): Site Investigation Strategy, accompanying Site investigation and Geo-environmental interpretative report;
- Condition 6(c): Remediation strategy;
- Condition 6(d): Verification plan; and
- Condition 6(e): UXO and any further mitigation measures required.

This PERA is intended to be submitted to the London Borough of Camden for approval in accordance with Planning Condition 6(a) of the Phoenix Place Development planning permission (ref. 2013/3807/P). The PERA sets out the potential pollutant pathway linkages that are identified in relation to ground contamination, which will be used to inform the scope of the further Site Investigation, as required by Planning Condition 6(b).

1.5 Regulatory Context

The National Planning Policy Framework (NPPF) sets out Government planning policy for England and how this is expected to be applied to development. Paragraphs 120 to 122 of Section 11 – Conserving and Enhancing the Natural Environment of the NPPF relate to contaminated land matters and state the following:

"To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

Planning policies and decisions should ensure that:

- *the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
- *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*
- *adequate site investigation information, prepared by a competent person, is presented.*

In doing so, local planning authorities should focus on whether the development itself is an acceptable use of the land and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

In order to assess the contamination status of the Phoenix Place site, with respect to the proposed end use of the Phoenix Place Development, it is necessary to assess whether the Phoenix Place site could potentially be classified as 'Contaminated Land', as defined in Part IIA of the Environmental Protection Act 1990 and Contaminated Land Statutory Guidance 2012. This is assessed by the identification and assessment of potential pollutant linkages. The linkage between the potential sources and potential receptors identified needs to be established and evaluated.

To fall within this definition, it is necessary that, as a result of the condition of the land, substances may be present in, on or under the land such that:

a) significant harm is being caused or there is a significant possibility of such harm being caused; or

b) significant pollution of controlled waters is being caused, or there is significant possibility of such pollution being caused.

It should be noted that DEFRA has advised (Section 4, DEFRA Contaminated Land Statutory Guidance 2012) Local Authorities that land should not be designated as 'Contaminated Land' where:

a) the relevant substance(s) are already present in controlled waters;

b) entry into controlled waters of the substance(s) from land has ceased; and

c) it is not likely that that further entry will take place.

These exclusions do not necessarily preclude regulatory action under the Environmental Permitting (England and Wales) Regulations 2010, which make it a criminal offence to cause or knowingly permit a water discharge of any poisonous, noxious or polluting matter to controlled waters. In England, under The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009, a works notice may be served by the regulator requiring appropriate investigation and clean-up.

1.6 Constraints

This report is produced under the terms of, and in accordance with Royal Mail Group, and may be relied upon in accordance with the terms and conditions of the Appointment.

The information contained in this PERA is based on a review of available historical, geological, and hydrogeological sources, consultation with the regulatory authorities and observations made during a walkover of the Phoenix Place site on 9 June 2016.

Waterman has endeavoured to assess all information provided to them during the preparation of this PERA, but makes no guarantees or warranties as to the accuracy or completeness of this information.

The scope of this PERA includes an assessment of the presence of asbestos containing materials in the ground but not within buildings, structures or below ground structures (basements, buried service ducts and the like).

The conclusions resulting from this PERA are not necessarily indicative of future conditions or operating practices at, or adjacent to, the Phoenix Place site.

2. Methodology

This PERA has been undertaken in general accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11 – Environment Agency, September 2004).

The PERA is based on, and includes, the following:

- Collation of available documentary information;
- Site walkover undertaken on 9 June 2016;
- Hazard identification;
- Formulation of a preliminary Conceptual Model;
- Hazard assessment for the identification of potentially unacceptable risks; and
- Recommendations for further action.

3. Hazard Identification

3.1 Site Description and Reconnaissance

During the walkover on 9 June 2016, the Phoenix Place site was used as a car park by staff at Royal Mail. Cars were parked in unmarked spaces set across the distinct levels, accessible by ramps. The car park surface comprised compacted fill material and hardstanding in poor condition. A number of small metal tracks were identifiable within the hardstanding and are likely associated with the historical industrial use of the Phoenix Place site.

Evidence of historical buildings was present across the Phoenix Place site, notably in the south-eastern part (Plot P1) with walls, metal tracks, and buttresses present. The southern corner of the Phoenix Place site is underlain by a series of vaults, which were inaccessible during the walkover. Observations from outside the vaults noted the presence of a series of rooms and extensive fly tipping, which included demolition material, wood and metal.

Anecdotal information from RMG management suggests a groundwater abstraction well is located towards the centre of Phoenix Place site, although this was not observed during the walkover. British Geological Survey (BGS) borehole records identify a series of boreholes founded within the London Clay Formation marked as wells on the plan; however, their use as groundwater abstraction wells has not been confirmed.

Potential contaminant sources identified on the Phoenix Place site during the walkover are detailed in Table 1 and a selection of photographs taken during the walkover are provided in Appendix B.

Table 1: Summary of Potentially Contaminative Activities on the Phoenix Place Site

Potential Issue	Description	Condition
Vehicle parking	Vehicle parking across the Phoenix Place site	Vehicles parked across the Phoenix Place site. Hardstanding, where present, was in poor condition, infiltration of contaminants into the underlying soil or groundwater is likely to be unrestricted.
Fly tipping	Fly tipping noted in vaults present	Material including wood, soil, metal and pipes were noted to have been fly tipped within vaults present in the southern corner.
Made ground	Made Ground across the Phoenix Place site	Made Ground exposed to infiltration.

The following Pollution, Prevention and Control licenses, discharge consents, licensed waste management facilities and registered radioactive substances are now covered by Environmental Permits:

- Integrated Pollution, Prevention and Controls (IPPC): Environmental Permit for a Part A(1) Activity;
- Local Authority IPPC (LA-IPPC): Environmental Permit for a Part A(2) Activity;
- Local Authority Pollution, Prevention and Controls (LAPPC): Environmental Permit for a Part B Activity;
- Licensed Waste Management Facilities: Environmental Permit for waste activities;
- Registered Radioactive Substances: Environmental Permit relating to radioactive substances;
- Discharge Consents: Environmental Permit for discharges to groundwater/surface water; and

The Envirocheck Report (see Appendix C) has not identified any Environmental Permits relevant to the Phoenix Place site.

3.1.1 Site Surroundings

A summary of the current land uses surrounding the Phoenix Place site is shown in Table 2.

Table 2: Summary of Surrounding Land Uses

Location	Description
North west	Residential properties
North east	Mount Pleasant Sorting Office and Calthorpe Street site
South east	Commercial and residential properties
South west	Commercial and residential properties

The Envirocheck Report obtained for the Phoenix Place site and included in Appendix C indicates that the following entries are within proximity to the Phoenix Place site:

- Six currently active Environmental Permits (formerly known as Local Authority Pollution Prevention and Controls) are located within 500m of the Phoenix Place site; the closest of which is a petrol station located 200m north-west;
- Twelve Environmental Permits for radioactive substances are located within 500m of the Phoenix Place site. The closest active Registered Radioactive Substances site is located 207m north-west and associated with the University College London;
- One contaminated land register entry has been identified within 1km of the Phoenix Place site. The entry is for 8 Duncan Terrace located 963m north-east of the Phoenix Place site. No further details were available at the time of this PERA.

There are no active or inactive Environmental Permits within 500m of the Phoenix Place site that relate to the following:

- Discharge Consents;
- Integrated Pollution Controls; or
- Enforcement and prohibition notices.

3.2 History

A review of recent Ordnance Survey (OS) extracts obtained from Landmark Information Group (see Appendix C) has been undertaken. A summary of relevant information is shown in Table 3 dating from 1851, although parts of the Phoenix Place site and surrounding area has been developed since the 1500s.

Table 3: Phoenix Place Site History

Source	Site	Surroundings
London 1851 (1:5,280)	Limited detail shown, although two buildings are shown on the north-eastern boundary adjacent to Phoenix Place (road).	Limited detail shown on the OS extract of the surrounding area.
London 1874-1875 (1:1,056)	Residential properties along the south-western boundary with Gough Street. Remainder of the Phoenix Place site comprises various **industrial works**, of these only a **cartridge manufacturer** and a **foundry** are denoted.	Surrounding area predominately comprises terraced residential properties, although the following notable uses are identified: • **Percussion cap** and **cartridge factory** located 100m north-west; • **Builders yard** located 250m north-west; • **Coldbath Field Prison** located 10m east on the Calthorpe Street site; • **Timber yard** located 25m south-east. • **Wheel Works** located 250m south. The underground Metropolitan line is present to the east of Farringdon Road.
London 1896 (1:1,056)	Central part of the Phoenix Place site is shown to be redeveloped, however, information denoting the building uses are not shown.	**Fire station** located 100m east. **Timber yard** located 200m north-west. **Timber yard** located 250m south-east. **Postal Telegraph Factory** and Post Office present on the Calthorpe Street site, located north-east of the Phoenix Place site.
London 1916 (1:2,500)	A number of terraced houses along Gough Street demolished. Foundry in the south-east corner of the Phoenix Place site identified as the **Phoenix Foundry**.	**Royal Free Hospital** located 150m north-west.
London 1922 (1:1,056)	Terraced houses in southern corner of the Phoenix Place site facing onto Gough Street demolished.	No significant change.
Aerial Photograph 1946-1949 (1:1,250)	**Industrial buildings** present notably in southern and central part of Phoenix Place site. **Chimney** shown towards the centre of the Phoenix Place site.	Surrounding area remains largely unchanged.
Ordnance Survey Plan 1952-1953 (1:1,1250)	The following industrial uses identified: • **Four garages** located across the Phoenix Place site; • **Phoenix Foundry** in south eastern corner of the Phoenix Place site; • **Food factory** located towards the centre of the Phoenix Place site; • **Printing works** and **joinery works** in the northern part of the Phoenix Place site; and • Ruin in the south eastern corner of the Phoenix Place site likely as a result of bomb damage.	**Printing ink factory** located 250m north-east. **Garage** located 25m south-west. **Engineering works** located 100m south-east. **Printing works** located 115m south-east. A number of ruins in the immediate surrounding area, likely as a result of bomb damage during World War II.

Source	Site	Surroundings
Additional SIMs 1965 (1:2,500)	Two **Garages**, one in the centre and one in the southern corner of Phoenix Place site demolished, likely as a result of bomb damage.	**Various works, depot** and a **large garage** located between 100 and 250m north-west of the Phoenix Place site.
Ordnance Survey Plan 1974 (1:1,1250)	**Various works** and **garages** located in the centre and southern part of the Phoenix Place site shown as demolished and disused.	No significant change.
Additional SIMs 1982-1989 (1:1,250)	No significant change.	**Fire station** located 125m south-east extended in size. A drill tower identifiable.
Additional SIMs 1989 (1,250)	No significant change.	No significant change.
Large Scale National Grid Data 1991 (1:1,250)	Mail Rail House present in centre of the Phoenix Place site, with the remainder of the Phoenix Place site shown as disused.	No significant change.
VectorMap Local 2016 (1:10,000)	Mail Rail House demolished.	No significant change.

*Potentially contaminative uses are shown in Bold

GOAD fire insurance plans dating from 1927 to 1967 indicate the following potentially contaminative land uses in addition to those detailed in Table 3:

- Sunken petrol tank located in the northern part of the Phoenix Place site on the north-eastern boundary (1927);
- Sunken petrol tank located in the centre of the Phoenix Place site (1951);
- Furniture factory located in the south-east corner of the Phoenix Place site (1951);
- Sunken petrol tank located in the southern corner of the Phoenix Place site (1967); and
- Sunken petrol tank located midway along the north-eastern boundary of the Phoenix Place site (1967).

3.3 Previous Environmental Assessments

A Site Investigation was undertaken on the Phoenix Place site (and on the adjacent Calthorpe Street site) in 2005 by Geotechnics. A summary of this Site Investigation is provided in Geotechnics' factual report: 'Ground Investigation at Mount Pleasant Redevelopment' (report reference: PC051744, dated November 2005). A summary of the 2005 Site Investigation is given below, together with the soil and groundwater data from this Site Investigation, which has been compared against the latest screening criteria.

3.4 Geotechnics (2005)

The scope of the Site Investigation on the Calthorpe Street site, Phoenix Place site and within the adjacent Sorting Office is shown on Figure A5 of Appendix A and comprised;

- Eleven boreholes to maximum depths of between 20.0mbgl and 45.0mbgl (BH101-111). Rotary core follow on was employed at BH108, and BH110;
- Thirteen trial pits (TP1-TP13) to depths between 2.50mbgl and 4.50mbgl;
- Five window sample boreholes (WS309, WS312, WS315, WS317 and WS318) to a maximum depth of 4.00mbgl;
- Ground gas and groundwater level monitoring visits on four occasions within boreholes installed with ground gas and groundwater monitoring wells;
- In-situ and ex-situ geotechnical testing, and ex-situ contamination testing.
- Exploratory holes located on the Phoenix Place site are BH101-104, BH111, TP301-308 and TP310.

A summary of the geology recorded during the 2005 Site Investigation has been included in Table 7 of this PERA.

Human Health

Recovered soil samples were tested in a laboratory for a range of determinands, including, metals, Poly-cyclic Aromatic Hydrocarbons (PAH), banded Total Petroleum Hydrocarbons (TPH), asbestos and Volatile Organic Compounds (VOC).

Basements on the Phoenix Place site would be used for residential and commercial uses, RMG staff car parking, cycle storage, plant rooms and waste storage. Soil samples from exploratory holes progressed on the Phoenix Place site have been assessed against the residential land use without plant uptake Generic Assessment Criteria (GAC) presented in Appendix F. This is considered a highly conservative assessment. Contaminants in exceedance of the GAC for a residential land use without plant uptake are detailed in Table 4.

Table 4: Contaminant Exceedances across the Phoenix Place Site

Contaminant	Residential Land Use without Plant Uptake GAC (mg/kg)	Exploratory Location (Concentration mg/kg)	
Lead	310	BH101-0.5mbgl (1,100)	TP302-0.9mbgl (650)
		BH103-0.25mbgl (1,200)	TP304-1.6mbgl (1,100)
		BH103-1.5mbgl (590)	TP305-1.1mbgl (800)
		BH104-0.5mbgl (1,000)	TP306-2.5mbgl (480)
		BH111-0.25mbgl (1,100	TP307-1.6mbgl (500)
		BH111-1.0mbgl (1,100)	TP307-2.2mbgl 850)
		BH102-2.5mbgl (530)	TP308-0.8mbgl (520)
		TP303-0.4mbgl (2,000)	TP308-2.2mbgl (350)
		TP301-0.8mbgl (730)	
Mercury	1.2	BH101-0.5mbgl (5.2)	TP302-0.9mbgl (5.1)
		BH103-0.25mbgl (1.9	TP304-1.6mbgl (7.9)
		BH103-1.5mbgl (3.3)	TP305-1.1mbgl (1.7)
		BH104-0.5mbgl (12.0)	TP306-2.5mbgl (4.0)
		BH111-0.25mbgl (3.7, 2.5)	TP307-1.6mbgl (1.5
		BH102-0.3mbgl (2.4)	TP307-2.2mbgl (1.5)
		TP303-0.4mbgl (22)	TP308-0.8mbgl (2.8
		TP301-0.8mbgl (71)	TP308-2.2mbgl (2.7)
Benzo(a)pyrene	3.2	BH104-0.5mbgl (5.0)	
		BH111-0.25mbgl (7.1)	
Dibenzo(a,h)anthracene	0.31	BH111-0.25mbgl (0.50)	
Benzo(b)fluoranthene	3.9	BH111-0.25mbgl (4.3)	

Following completion of the Phoenix Place Development, Made Ground would be removed during the construction of the basements. In areas of basements and hardstanding, the pollutant pathway linkages to future users would be broken. However, in areas of soft landscaping, active pollutant pathways may be present and therefore a suitable for use capping layer would be required to break the pollutant pathway linkage to human receptors.

Controlled Waters

Groundwater levels within the Hackney Gravel Member and the deposits underlying the London Clay Formation recorded during the 2005 Site Investigation are detailed in Table 5. For a robust assessment of the groundwater flow, the groundwater levels from boreholes installed on the Calthorpe Street site have been included.

Table 5: Groundwater Levels within the Hackney Gravel Member

Borehole	Location	Monitoring Wells Installed within the Hackney Gravel Member	
		Highest Groundwater Level (mAOD)	Lowest Groundwater Level (mAOD)
BH101	Phoenix Place site	14.70	14.60
BH102	Phoenix Place site	12.27	12.06
BH103	Phoenix Place site	13.40	12.98
BH104	Phoenix Place site	12.26	12.10
BH105	Calthorpe Street site	13.02	12.87
BH106	Calthorpe Street site	11.19	10.99
BH107	Calthorpe Street site	15.74	15.58
BH109	Calthorpe Street site	9.96	9.70
BH111	Phoenix Place site	9.60	8.91

Comparison of the recorded groundwater levels and the location of the boreholes across the Calthorpe Street site and Phoenix Place site shows a convergence of groundwater within the Hackney Gravel Member towards the Fleet River Sewer, located beneath Phoenix Place (road).

Groundwater within the Lambeth Group Deposits, Thanet Sand Formation (Secondary A Aquifers) and Upper Chalk Formation (Principal Aquifer) was artesian during the groundwater monitoring of the 2005 Site Investigation.

Groundwater samples were recovered on four occasions from boreholes installed on the Phoenix Place site. Laboratory testing for metals, PAH, TPH and VOC were undertaken on two occasions within BH101, three occasions within BH104, and two occasions within BH102 and BH103. Groundwater samples recovered from the Hackney Gravel Member have been assessed against the Environment Agency derived Environmental Quality Standards (EQS) where possible. Groundwater samples recovered from the Lambeth Group, Thanet Sand Formation, and Upper Chalk Formation have been assessed against the Drinking Water Standards (DWS) where possible.

The groundwater samples recovered on the 15 August and 7 November 2005 do not differentiate between which well installation within the borehole the groundwater sample was recovered from. Laboratory results on these two occasions have therefore been assessed against the most conservative DWS or Environment Agency derived EQS. Contaminants in excess of the relevant EQS (River Terrace Deposits) or DWS (Lambeth Group, Thanet Sand Formation, and Upper Chalk Formation) have not been recorded within the groundwater samples recovered.

PAH and TPH were not speciated, preventing their comparison against relevant EQS or DWS. Total TPH was recorded below the laboratory limit of detection (<10µg/l). Total PAH was generally recorded below 1.0µg/l.

Ground Gas

Ground gas was monitored on six occasions as part of the 2005 Site Investigation, although this did not include vapour monitoring. Peak oxygen, methane, carbon dioxide and flow levels are summarised in Table 6. Ground gas monitoring undertaken on monitoring wells installed within the Calthorpe Street site have been included to provide further confidence to the assessment.

Table 6: Geotechnics Ground Gas Monitoring Results

Borehole	Location	Stratum	Oxygen (%)	Methane (%)	Carbon Dioxide (%)	Flow (l/hr)
BH101	Phoenix Place site	Made Ground	18.4	<0.1	1.3	-0.01
BH101	Phoenix Place site	London Clay Formation	1.90	<0.1	3.6	-0.01
BH102	Phoenix Place site	Made Ground	18.70	<0.1	0.80	-0.01
BH103	Phoenix Place site	Made Ground	19.10	<0.1	0.80	-0.01
BH104	Phoenix Place site	Made Ground	20.4	<0.1	0.10	0.02
BH111	Phoenix Place site	Thanet Sand Formation/Upper Chalk Formation	0.20	<0.1	3.10	-6.04
BH111	Phoenix Place site	Made Ground	19.80	<0.1	0.20	<0.01
BH105	Calthorpe Street site	Made Ground	1.60	<0.10	0.30	-0.01
BH105	Calthorpe Street site	Lambeth Group	17.10	<0.10	2.40	-0.01
BH106	Calthorpe Street site	Thanet Sand Formation	20.00	<0.10	0.20	-0.01
BH106	Calthorpe Street site	Made Ground	19.6	<0.10	0.30	-0.01
BH107	Calthorpe Street site	Made Ground	17.80	<0.10	2.20	-0.01
BH107	Calthorpe Street site	Upper Chalk Formation	<0.10	<0.10	4.30	0.10
BH108	Calthorpe Street site	Lambeth Group	<0.10	<0.10	0.40	<0.01
BH108	Calthorpe Street site	Upper Chalk Formation	16.40	<0.10	1.40	<0.01
BH109	Calthorpe Street site	Made Ground	18.90	<0.10	0.90	<0.01
BH109	Calthorpe Street site	London Clay Formation	18.80	<0.10	0.80	<0.01

Based on the peak methane, carbon dioxide concentrations and flow recorded during the 2005 Site Investigation, the ground gas regime on the Phoenix Place site can be classified as Characteristic Situation 1, whereby no ground gas protection measures would be required.

3.5 Geology

Geology of the Phoenix Place site has been established from historical boreholes progressed during the 2005 Site Investigation, from the BGS maps and historical borehole logs. A summary of the geology has been provided in Table 7.

Table 7: Phoenix Place Site Geology

Stratum	Area Covered	Estimated Thickness	Typical Description
Made ground	Entire Phoenix Place site	1.5m to 5.2m	Clayey sandy gravelly material with fragments of brick, concrete, oyster shells, ceramic, ash,
Alluvium	The former courses of the River Fleet	1m to 2m	Sandy silty clay, with organic matter present
Hackney Gravel Member	Majority of Phoenix Place site	0.9m to 1.2m	Sand gravels with rare clay.
London Clay Formation	Entire Phoenix Place site	5.4m to 9.4m	Silty clay
Lambeth Group	Entire Phoenix Place site	15.5m to 15.8m	Mottled sandy Clay containing shell fragments.
Thanet Sand Formation	Entire Phoenix Place site	7.0m	Fine grained sand with rare clay
Upper Chalk Formation	Entire Phoenix Place site	>13.0m (not proven)	White chalk with flints

The former Fleet River and associated floodplains were historically present on the eastern part of the Phoenix Place site. In this area, there is the potential for Alluvium to be encountered. In localised areas, the Hackney Gravel Member has been replaced by Made Ground.

3.5.1 Ground Stability

The ground stability risks associated with the Phoenix Place site, as reported in the Envirocheck Report, are detailed in Table 8. The Phoenix Place site is not in an area that could be affected by coal mining activity.

Table 8: Ground Stability Risk Classification

Ground Stability Risk	Risk Classification
Collapsible Ground	Very Low
Compressible Ground	Moderate
Ground Dissolution	No Hazard
Landslide	Very low
Running Sand	Very Low
Shrinking or Swelling Clay	No Hazard

3.5.2 Ground Gas and Vapour

According to information from Public Health England, the Phoenix Place site is not located in an area of elevated radon gas levels (a naturally occurring gas). Correspondingly, radon protection measures are not required in the development of new buildings or extensions. However, there are discussions within the industry that radon protection measures should be considered in all new buildings whether located in a radon affected area or not. This approach should be confirmed with the Building Control Officer.

There are no active registered landfills within 500m of the Phoenix Place site. One historical landfill (1975-1978) is located 480m north-east of the Phoenix Place site (Rosoman Street/Skinner Street). The landfill received predominately inert waste.

Sources of ground gas and vapour on the Phoenix Place site include the thick deposits of Made Ground, organic material associated with the Fleet River Sewer and underground petrol tanks historically present on the Phoenix Place site. Ground gas monitoring undertaken by Geotechnics in 2005 recorded low levels of carbon dioxide and methane, as reported above.

3.6 Controlled Waters

3.6.1 Surface Waters

The River Thames is located approximately 1.6km south and Regents Canal is located 1.1km north of the Phoenix Place site. The culverted Fleet River Sewer flows beneath Phoenix Place (road) in a southerly direction towards the River Thames. The Fleet River Sewer outfalls in the River Thames and therefore is considered a viable pollutant migration pathway for contaminants to reach the River Thames.

There are no recorded Environmental Permits for discharges to controlled waters within 500m of the Phoenix Place site.

3.6.2 Groundwater

Based on information on the Environment Agency website and detailed within the Envirocheck Report, the geological deposits beneath the Phoenix Place site are classed as having the hydrogeological properties identified in Table 9.

Table 9: Summary of Hydrogeological Properties of the Main Geological Strata

Stratum	Environment Agency Classification	Hydrogeological Significance
Made Ground	Unproductive Strata	Negligible significance for water supply or river base flow
Alluvium	Secondary A Aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale.
Hackney Gravels	Secondary A Aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale.
London Clay Formation	Unproductive Strata	Low permeability with negligible significance for water supply or river base flow.
Lambeth Group	Secondary A Aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale.
Thanet Sand Formation	Secondary A Aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale.
Upper Chalk Formation	Principal Aquifer	High intergranular and / or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and / or river base flow on a strategic scale.

In areas of the Phoenix Place site in which the Made Ground has replaced the Hackney Gravel Member, the Secondary A Aquifer will be within the Made Ground.

The Phoenix Place site is not located within a groundwater Source Protection Zone (SPZ).

Groundwater flow within the River Terrace Deposits is likely to flow south-east towards the culverted Fleet River Sewer beneath Phoenix Place (road).

One groundwater abstraction borehole located within the Upper Chalk Formation is recorded within 1km of the Phoenix Place site. The groundwater abstraction point, which is located 517m north-east, is operated by Thames Water as a potable water supply and is considered likely to influence groundwater flow within the Upper Chalk Formation.

The nearest pollution incident to controlled waters related to the release of ‘fire water/foam’ 676m to the south west. The incident was categorised by the Environment Agency as a ‘Category 3 – Minor Incident’. Given the incident was south-west of the Phoenix Place site and the anticipated south/south-west groundwater flow, the potential contaminants released are considered unlikely to have migrated on to the Phoenix Place site.

Anecdotal information from RMG management suggests a groundwater abstraction well is located towards the centre of Phoenix Place site, although this was not observed during the walkover. British Geological Survey (BGS) borehole records identify a series of boreholes founded within the London Clay Formation marked as wells on the plan; however, their use as groundwater abstraction wells cannot be confirmed.

3.7 Consultations

The agencies and individuals which have been contacted and/or their records reviewed to inform this PERA are listed in Table 10.

Table 10: List of Parties Consulted during this Study

Organisation	Response
London Borough of Camden	
Planning	On-line planning history reviewed.
Building Control	Response received 13/06/2016
Environmental Health	Response received 13/07/2016
London Borough of Islington	On-line planning history reviewed.
London Fire and Emergency Planning Agency	Response received 10/01/2013

3.7.1 Environmental Health

The London Borough of Camden confirmed the Phoenix Place site has not been determined as contaminated land under Part IIA of the Environmental Protection Act 1990, and has been identified as a medium to very high risk priority for inspection. However, a search of the records identified a number of historical industrial land uses of plausible concern, including a foundry, works, printers, garage, joinery, and unknown industrial use. According to the contaminated land risk categorisation, land uses detailed above, is inherently considered to present a possible risk of contamination. It is conservatively considered likely that such land would exhibit areas of elevated contamination levels. However, the Phoenix Place site is not being investigated under the Contaminated Land regime. The London Borough of Camden has no evidence that confirms there are contamination issues, other than potentially contaminative past uses on the Phoenix Place site. Additional information supplied by the London borough of Camden confirms:

- The Council holds no information on pollution incidents in the area;
- There are no historical landfills within 250m of the Phoenix Place site; and
- The Council has no information about the extent of Made Ground, however, soil profile within the administrative boundary of the London Borough of Camden tends to exhibit high levels of lead (BGS data).

3.7.2 Planning Department

The online planning portals of the London Borough of Islington and London Borough of Camden were reviewed in order to determine if any planning consents with potentially contaminative elements were granted historically for the Phoenix Place site or immediate surrounding area.

Potentially contaminative activities beyond the known uses recorded in Table 3 were not noted from the information contained on the planning portals.

3.7.3 Building Control Department

Information has been requested from Building Control Department. LBC confirmed that they did not hold building control records for the Phoenix Place site.

3.7.4 London Fire and Emergency Planning Agency

Information has been requested from the London Fire and Emergency Planning Agency. In their response, they identified petroleum records relating to Phoenix Place WC1. Further information as to the specific location was not given, however, it is considered likely the Phoenix Place WC1 record relates directly to the Phoenix Place site.

The London Fire and Emergency Planning Authority recorded the presence of three tanks and provided information where present on their status:

- 7 & 8 Phoenix Place – 5,682 litre petrol tank (water filled);
- 12 Phoenix Place – 13,688 litre petrol tank (water filled); and
- 13 & 14 Phoenix Place – 9,092 litre diesel tank (status unknown).

Further historical information on the tanks is not available and the London Fire and Emergency Planning Authority could not confirm the current status, location or dates of water filling of the above mentioned tanks.

4. Hazard Assessment and Preliminary Conceptual Model

4.1 Contaminants of Concern

Contaminants of concern identified above are summarised in Table 11.

Table 11: Contaminants of Concern

Source	Associated Contaminants
On-site (current)	
Made Ground	Metals, PAH, TPH, Asbestos, SVOC, VOC
Car parking	TPH
Fly tipping	Asbestos, PAH, TPH, Metals
On-site (historical)	
Garages and associated fuel tanks	TPH, Phenols, BTEX, asbestos, PAH
Print works	Chlorinated solvents. TPH, PAH, Metals, VOC, SVOC
Foundry	Metals, PAH, TPH, Asbestos
Food factory	Metals, PAH, TPH, Asbestos, SVOC, VOC
Post Office and Telegraph Factory	Metals, PAH, TPH, Asbestos, SVOC, VOC
Cartridge manufacturer	Metals, TPH, Asbestos, PAH
Off-site (historical)	
Garages	TPH, VOC, SVOC, Phenols, BTEX
Foundry	PAH, Metals
Made Ground	Metals, PAH, TPH, Asbestos, SVOC, VOC
Printers and Printing Ink Factory	Chlorinated solvents. TPH, PAH, Metals, VOC, SVOC
Timber Yard	TPH
Off-site (current)	
Made Ground	Metals, PAH, TPH, Asbestos, SVOC, VOC

The preliminary Conceptual Model for the Phoenix Place site, including Phoenix Place Development Plot P1 and Plot P2 is presented in Table 12 and graphically in Figure A4 of Appendix A. The risk rating included in Table 12 has been assessed qualitatively using the criteria given in Appendix D and the potential receptors identified using the criteria given in Appendix E.

Table 12: Preliminary Conceptual Model for the Phoenix Place Site

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
Human Health					
Existing Site Users	Contaminants within the underlying Made Ground and groundwater	Dermal contact, ingestion, and inhalation	Low	The Phoenix Place site is currently used as car parking for RMG staff. Ground conditions comprise a mix of compacted soils and hardstanding in poor condition. Visitors have a short residence time on the Phoenix Place site and are not considered to be at significant risk of harm from contaminants present within the underlying soils and groundwater.	Low
	Ground gas and vapours from Site sources (Made Ground, Alluvium, compromised fuel tanks if present).	Migration to and accumulation within confined spaces	Low	Ground gas monitoring undertaken by Geotechnics in 2005 classified the ground gas regime of the Phoenix Place site as Characteristic Situation 1, whereby no ground gas protection measures would be required. The vapour risk to current users is considered to be low in view of the nature and use of the Phoenix Place site.	Low
Future Site Users	Contaminants within the Made ground and underlying groundwater	Dermal Contact, ingestion, and inhalation	Low	Contaminants were recorded within the Made Ground during the 2005 Site Investigation. The presence of buildings and hardstanding of the Phoenix Place Development would prevent pollutant pathway linkages. Areas of soft landscaping would use validated imported material suitable for its intended use and would be located above basements, therefore breaking the pollutant linkage. A Site Investigation will quantify the contamination status of the underlying deposits and groundwater and, where possible, identify the presence of historical fuel tanks, if present.	Low
	Ground gas and vapours originating from on-site sources (Made Ground, alluvial deposits, compromised fuel tanks if present)	Migration to and accumulation within confined spaces	Low	Ground gas monitoring undertaken by Geotechnics in 2005 classified the ground gas regime of the Phoenix Place site as Characteristic Situation 1. Vapour monitoring was not undertaken. The proposed basement used for car parking, plant rooms, residential and commercial uses are likely to have high ventilation rates reducing the potential for ground gases and vapours to accumulate to unacceptable levels.	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
				Within areas of the Phoenix Place site in which residential uses are present at ground floor and within basements, ventilation rates are likely to be lower. Potential is therefore present for the accumulation of ground gases and vapours to unacceptable levels. Ground gas and vapour monitoring undertaken as part of the Site Investigation will determine the ground gas regime. Appropriate mitigation measures compliant with BS8485 would be implemented, if required.	
Off-site residents	Contaminants within the Made Ground on-site	Lateral migration off-site via wind entrainment, leading to direct contact, and inhalation	Low	Contaminants have been recorded within the Made Ground during the 2005 Site Investigation and further contamination is possibly present given the historical uses of the Phoenix Place site. A Site Investigation would determine the contamination status of the Phoenix Place site. Soft landscaping within the surrounding area is limited, decreasing the potential for off-site receptors to come into contact with contaminants. Any exposure to contaminated dust would be short term and unlikely to significantly affect human health. During construction, good working practices for dust suppression (as set out in the Construction Environmental Management Plan) should be employed to limit dust migration, where practicably possible.	Low
Construction Workers	Organic and in-organic contaminants within the Made Ground and groundwater	Direct contact, ingestion and inhalation	Medium	Contaminants have been recorded within the Made Ground during the 2005 Site Investigation. During construction, workers would come into direct contact with the Made Ground and groundwater. Construction workers should wear the appropriate PPE, adhere to good practice hygiene and safety measures, the Confined Space Regulations 1997, and the Control of Asbestos Regulations 2012.	Low
	Ground gas and vapours originating from on-site sources (Made Ground, alluvial deposits, compromised fuel tanks if present)	Migration to and accumulation within confined spaces	Medium	Potential is present for a vapours to exist on the Phoenix Place site. During construction, workers may be exposed to vapour within confined spaces. Construction workers should avoid entering excavations. If entry cannot be avoided, a risk assessment should be undertaken with PPE and RPE used, where appropriate, and work done in-line with the Confined Space Entry Regulations 1997.	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
Property					
On site structures	Determinands within the underlying soil and groundwater	Chemical attack on buried foundations and services	Medium	Following completion of the Phoenix Place Development, foundations and services would be in contact with the underlying soils and groundwater. If necessary mitigation measures such as the use of sulphate resistant concrete and appropriate potable water pipes should be used. A Site Investigation, which includes the testing of soils and groundwater, is required to determine the specification of buried foundations and services.	Low
Controlled Waters					
River Thames	Made Ground, fuel tanks if present, print works, car parking	Migration via the culverted Fleet River Sewer, which outfalls into the River Thames	Low	The River Thames is located 1.6km from the Phoenix Place site. Contaminants originating from the Phoenix Place site are likely to have naturally attenuated prior to reaching the River Thames when migrating through the Secondary A Aquifer within the Hackney Gravel Formation. The culverted Fleet River Sewer, which outfalls into the River Thames, is considered to be a viable pathway for contaminants originating from the Phoenix Place site. Widespread contamination was not recorded within the Secondary A Aquifer located within the Hackney Gravel Member during the 2005 Site Investigation indicating contaminants are unlikely to have migrated into the Fleet River Sewer and subsequently the River Thames. As part of a Site Investigation, groundwater samples should be recovered from the Hackney Gravel Member to determine the Secondary A Aquifer's contamination status and allow a qualitative assessment to be undertaken of the potential for contamination to reach the River Thames via the Fleet River Sewer pathway.	Low
Secondary A Aquifer within the Hackney Gravel Formation	Made Ground, fuel tanks if present, print works, car parking	Vertical migration into the unconfined aquifer from the Made Ground.	Low	Gross contamination has not been identified within the Secondary A Aquifer from groundwater samples recovered from the 2005 Site Investigation. Following completion of the Phoenix Place Development, the Phoenix Place site would predominately be covered in hardstanding, restricting the leaching of contaminants within the Made Ground.	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
				As part of a Site Investigation, the recovery of samples from the Secondary A Aquifer within the Hackney Gravel Formation will determine the contamination status. Appropriate remediation measures would be undertaken, if necessary.	
Secondary A Aquifer within Lambeth Group and Thanet Sand Formation, Principal Aquifer within Upper Chalk Formation	Made Ground, fuel tanks if present, print works, car parking	Preferential pathways created during piling. Potential groundwater abstraction well founded within the Upper Chalk Formation	Low	The deeper aquifers are overlain by 5.4m to 9.4m of London Clay Formation, which is considered likely to act as an aquiclude, preventing the vertical migration of contaminants within the overlying Secondary A Aquifer to the deeper strata. Groundwater samples recovered from the Upper Chalk Formation during the 2005 Site Investigation did not record contaminant exceedances. Viable pathways may be created during construction through piles penetrating the London Clay Formation and from the uncovering of historical abstraction wells, if present. A FWRA should be undertaken should piles penetrate the London Clay Formation. The FWRA would outline the mitigation measures required to prevent the creation of preferential pathways. The validity of the presence of an historical groundwater abstraction well should be determined. Should an abstraction well(s) be present and founded below the London Clay Formation, measures should be taken to appropriately decommission the groundwater abstraction well, if necessary.	Low

5. Conclusions

Given the end land uses proposed as part of the Phoenix Place Development, the contamination status of the soils and groundwater recorded during the 2005 Site Investigation and the known current and historical contamination sources, the overall risk rating of the Phoenix Place site is classified as **Medium**.

The recommendations of this PERA outline preliminary remedial and mitigation measures that require confirmation through an additional Site Investigation. However, once successfully implemented the risks are anticipated to be **Low**. Therefore, it is unlikely that the Phoenix Place site would be capable of being classified as Contaminated Land under Part IIA of the Environmental Protection Act 1990; thus meeting the requirements of paragraphs 120 to 122 of the National Planning Policy Framework.

6. Recommendations

The recommendations below outline preliminary remedial and mitigation measures that require confirmation through an additional Site Investigation on the Phoenix Place site. Based on the findings reported above, the following is recommended for the Phoenix Place site in relation to Plot P1 and Plot P2:

- A Site Investigation to establish the underlying ground conditions, contamination status of the soils, the Secondary A Aquifer within the Hackney Gravel Member, together with the ground gas and vapour regime;
- Based upon the results of the Site Investigation, a GQRA should be prepared encompassing Phoenix Place Development Plot P1 and Plot P2, in which the pollutant pathway linkages are quantified and assessed;
- A Remediation Strategy encompassing Phoenix Place Development (Plot P1 and Plot P2) should be prepared detailing the remedial strategy required to prevent the active pollutant pathway linkages identified from the GQRA;
- Following completion of the Sections, Validation Reports encompassing Phoenix Place Development Plot P1 and Plot P2 should be prepared, detailing the remedial measures taken and confirming all active pollutant pathways have been mitigated; and
- Since piles are considered likely to penetrate the London Clay Formation, FWRA should be prepared for the Sections, encompassing the Phoenix Place Development Plot P1 and Plot P2 and details the required measures to prevent preferential pathways.

Actions required prior to, and during construction are as follows;

- The validity and status of the groundwater abstraction well on the Phoenix Place site should be determined prior to construction works. If located, the well should be decommissioned in accordance with Environment Agency guidance;
- Following completion of the Site Investigation, boreholes progressed and installed below the London Clay Formation (including any historical wells discovered) should be appropriately decommissioned so as not to act as a preferential pathway in the future;
- A CEMP should be prepared detailing the measures for managing waste/stockpiling during construction and techniques for suppressing dust;
- As part of the Phoenix Place Development, Made Ground would be removed. A PWCA should be undertaken prior to the removal of material to determine the most appropriate disposal options;
- The Phoenix Place site is considered to be at risk from UXO. Measures recommended within the appropriate UXO reports should be followed throughout the investigatory and construction phases;
- During construction, potentially contaminative substances should be stored and handled in accordance with the COSHH Regulations 2002 to prevent fugitive emissions migrating to the Made Ground and underlying groundwater;
- Construction workers should wear the appropriate PPE, adhere to good practice hygiene and safety measures, the Confined Space Regulations 1997 and the Control of Asbestos Regulations 2012; and
- Construction workers should avoid entering excavations. If entry cannot be avoided, a risk assessment should be undertaken with PPE and RPE used where appropriate and in-line with the Confined Space Entry Regulations 1997.

GLOSSARY

For the purpose of this report, the following terms and definitions apply (see BS 10175:2001).

Accuracy	Level of agreement between true value and observed value.
Conceptual Exposure model	Textual and or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. **Note 1:** The conceptual exposure model is initially derived from the information obtained by the preliminary investigation. This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of the field investigation can provide additional data that can be used to further refine the conceptual model.
Contamination	Presence of a substance which is in, on or under land, and which has the potential to cause significant harm or to cause significant pollution of controlled water. **Note 1:** There is no assumption in this definition that harm results from the presence of the contamination. **Note 2:** Naturally enhanced concentrations of harmful substances can fall within this definition of contamination. **Note 3:** Contamination may relate to soils, groundwater or ground gas.
Controlled water	Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three mile limit of territorial waters. **Note 1:** See Section 104 of The Water Resources Act 1991.
Harm	Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case humans, including property.
Hazard	Inherently dangerous quality of a substance, procedure or event.
Pathway	Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.
Precision	Level of agreement within a series of measurements of a parameter.
Receptor	Persons, living organisms, ecological systems, controlled water, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).
Risk	Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.
Risk assessment	Process of establishing, to the extent possible, the existence, nature and significance of risk.
Sampling	Methods and techniques used to obtain a representative sample of the material under investigation.
Soil	Upper layer of the earth's crust composed of mineral parts, organic substance, water, air and living matter. **Note 1:** In accordance with BS 10175:2001 the term soil has the meaning ascribed to it through general use in civil engineering and includes topsoil and subsoil; deposits such as clays, silt, sand, gravel, cobbles, boulders and organic deposits such as peat; and material of natural or human origin (e.g. fills and deposited wastes). The term embraces all components of soil, including mineral matter, organic matter, soil gas and moisture, and living organisms.
Source	Location from which contamination is, or was, derived. **Note 1:** This could be the location of the highest soil or groundwater concentration of the contaminant(s).
Uncertainty	Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.

APPENDICES

Appendix A Site Plans

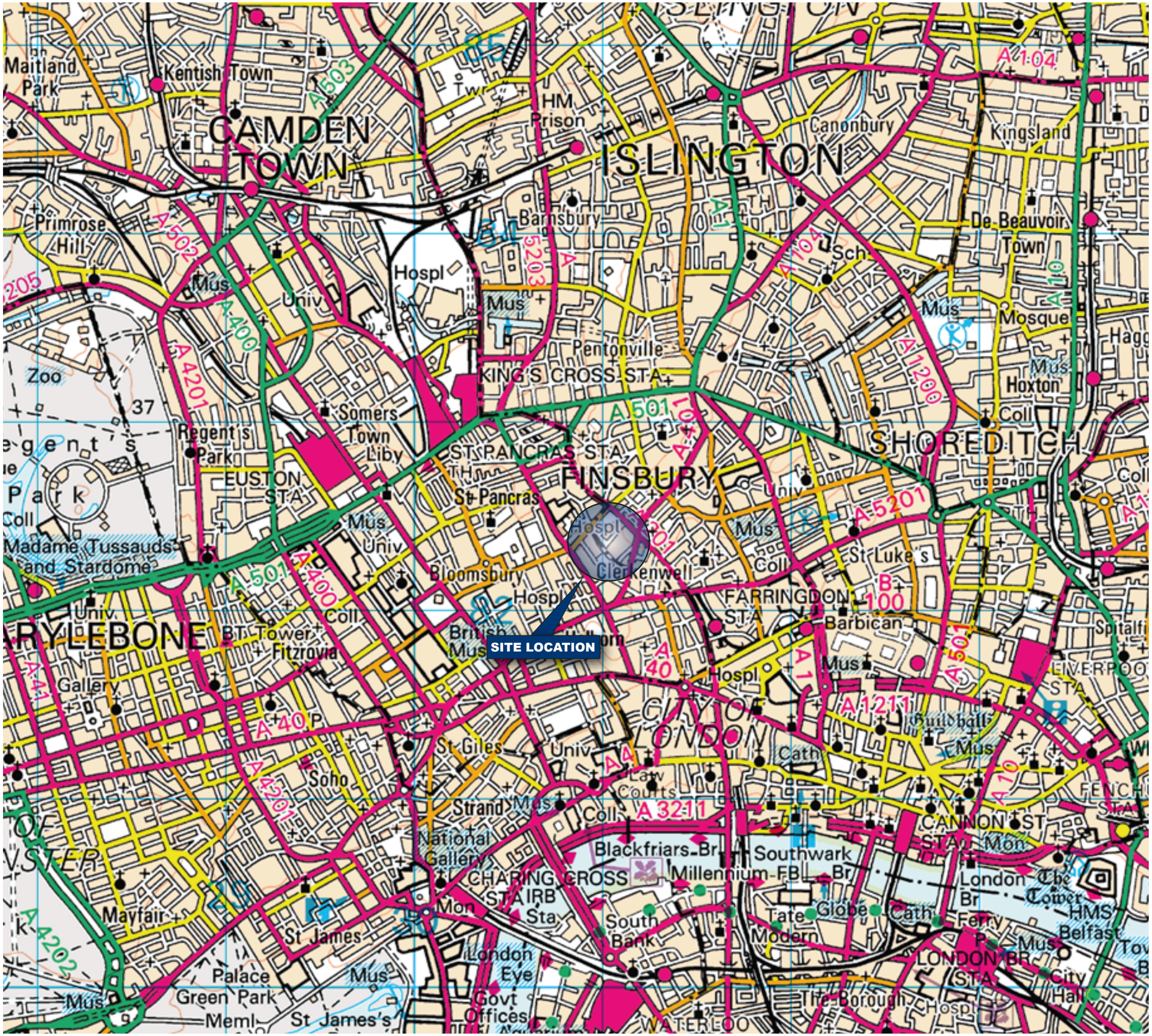

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Figure Ref	WIB13235-102_GR_PERA2_A1A
Date	June 2016
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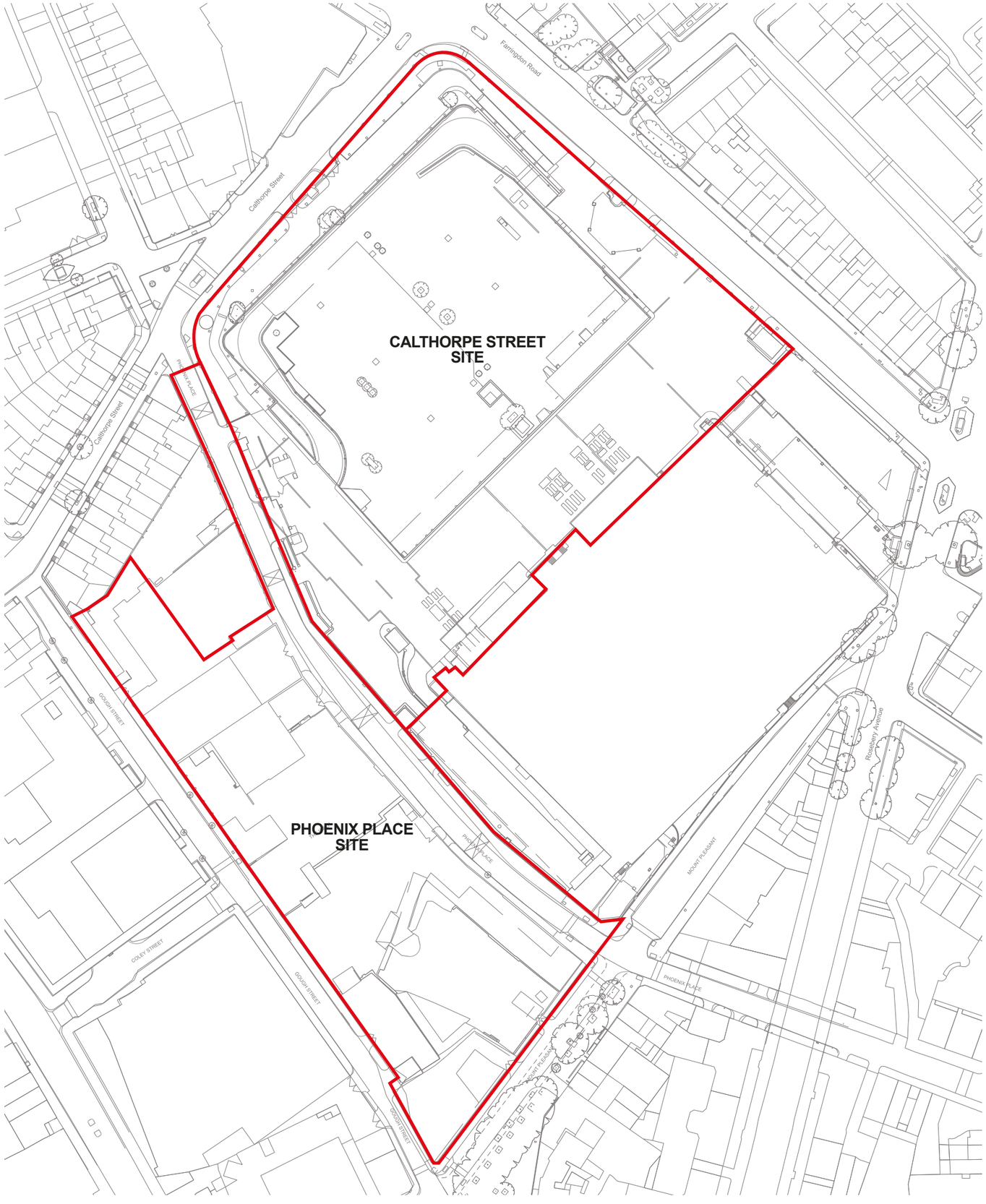

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Planning Application Boundaries

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Date	June 2016
File Location	\\s-lncs\wiel\projects\eed13235\102\graphics\pera2\issued figures

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Planning Application Boundary

D

C

PLOT P2

B

A7

A6

A1

PLOT P1

A5

A2

A4

A3

N

Project Details	WIB13235-102: Royal Mail Mount Pleasant Sorting Office
Figure Title	Figure A3: Pheonix Place Plots
Figure Ref	WIB13235-102_GR_PERA2_A3A
Date	June 2016
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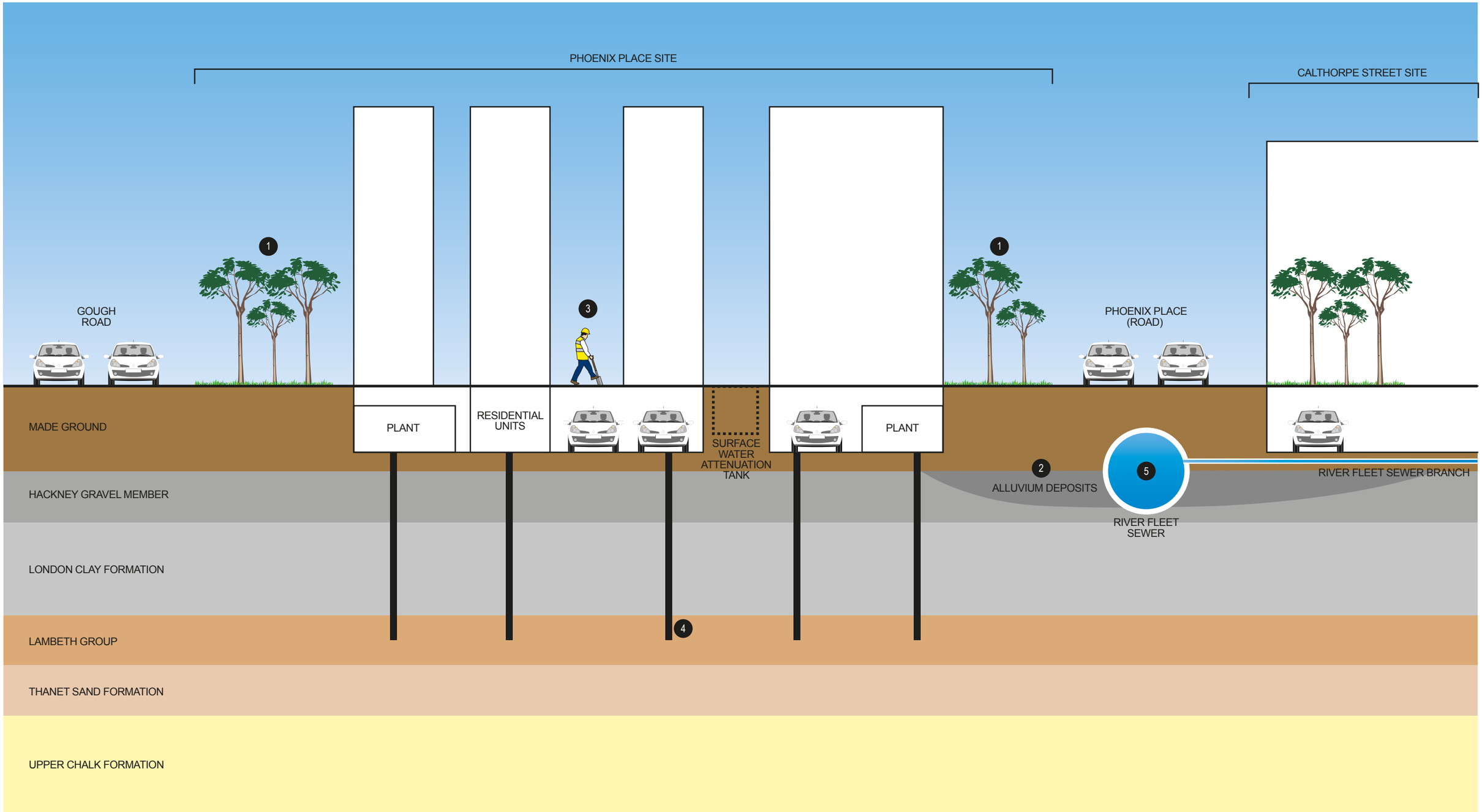
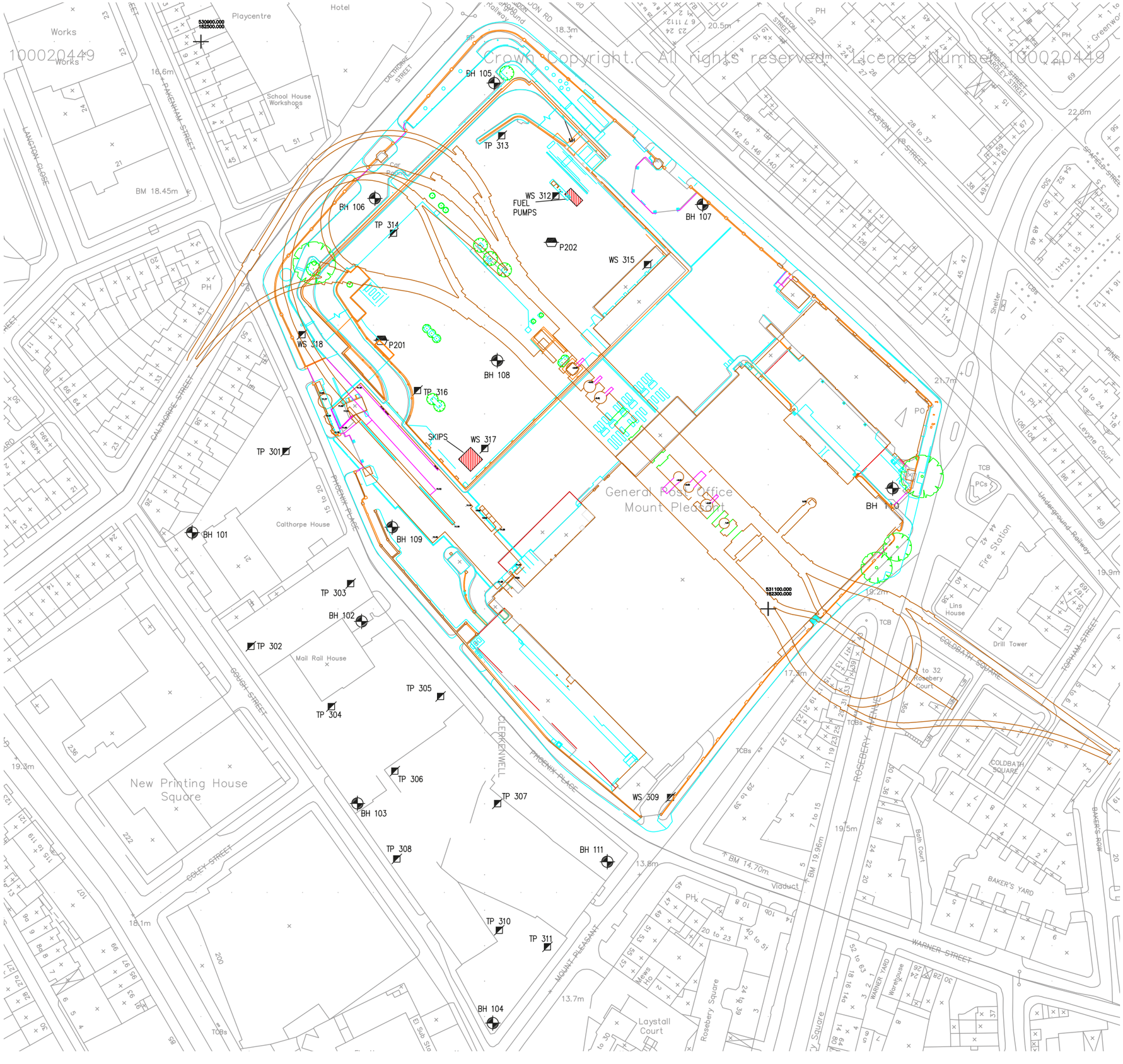


1. In areas of proposed soft landscaping not underlain by basements or surface water attenuation tanks, an active pollutant linkage to future human health receptors will be present.
2. Made, Ground, Alluvial Deposits, potential historic tanks may act as a source of ground gas. Ground gas monitoring by Geotechnics in 2005 classified as Characteristic Situation 1.
3. Construction will come into direct contact with contaminants during development construction.
4. Piles penetrating the London Clay Formation may act as a preferential pathway from contaminants from the shallow deposits to impact the sensitive aquifers underlying the London Clay Formation.
5. The Fleet River Sewer may act as a viable pathway for contaminants to impact the River Thames.

Project Details	WIB13235-102: Royal Mail Mount Pleasant Sorting Office
Figure Title	Figure A4: Conceptual Site Model
Figure Ref	WIB13235-102_GR_PERA2_A4A
Date	June 2016
File Location	\\s-lncs\wiel\projects\eed13235\102\graphics\pera2\issued figures



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Project Details	WIB13235-102: Royal Mail Mount Pleasant Sorting Office
Figure Title	Figure A5: 2005 Geotechnics Exploratory Hole Location Plan
Figure Ref	WIB13235-102_GR_PERA2_A5A
Date	June 2016
File Location	\\s-lncs\wiel\projects\eed13235\102\graphics\pera2\issued figures

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Appendix B Site Photographs

Example of hardstanding on Phoenix Place

Phoenix Place looking north east

Phoenix Place looking south

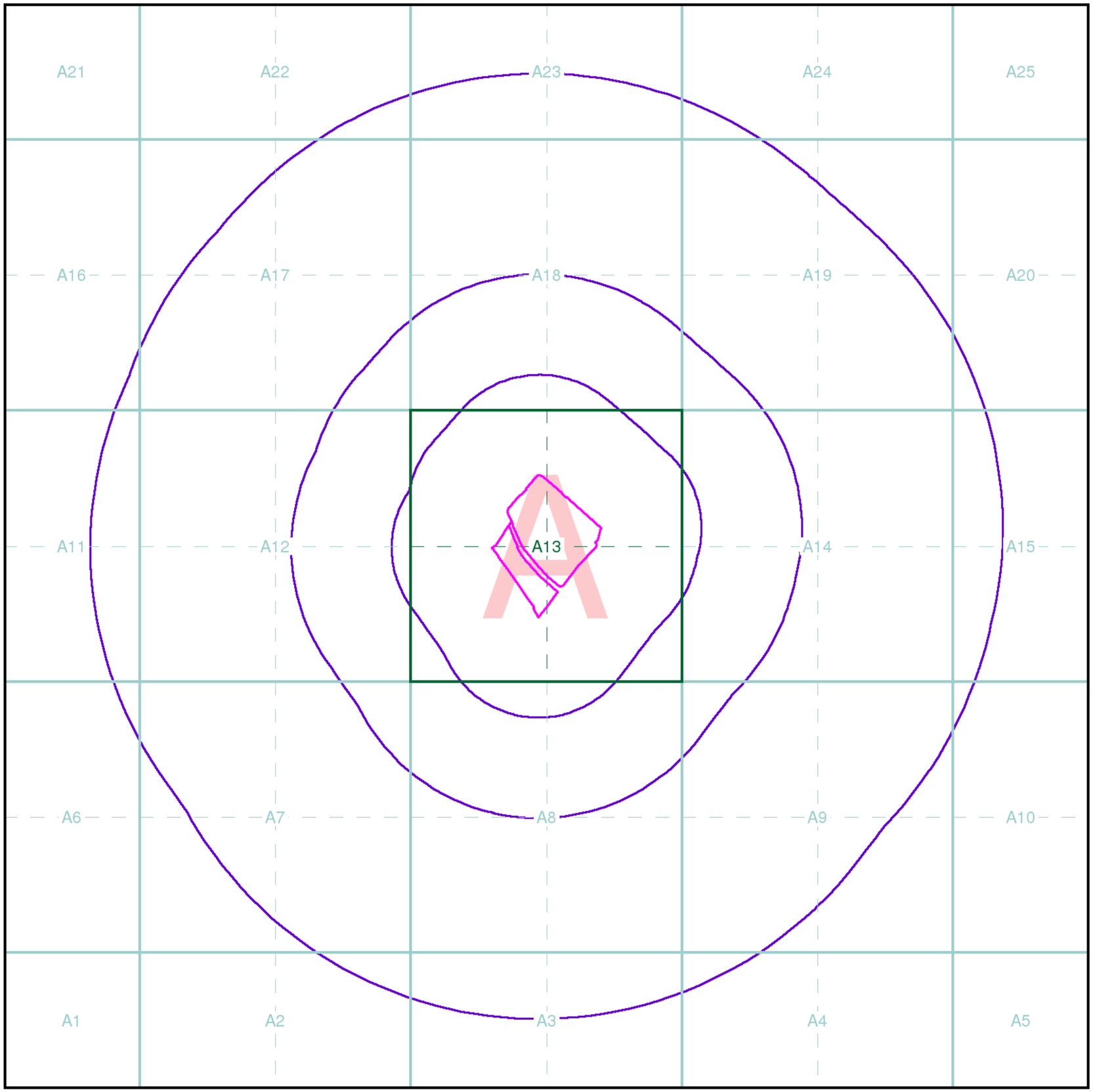
Phoenix Place looking southwards

Vaults underlying Phoenix Place in the southern site corner

Vaults underlying southern corner of Phoenix Place

Project Details	WIB13235-102: Royal Mail Mount Pleasant Sorting Office
Figure Title	Figure B1: Pheonix Place Site Photographs
Figure Ref	WIB13235-102_GR_PERA2_B1A
Date	June 2016
File Location	\\s-lncs\wiel\projects\eed13235\102\graphics\pera2\issued figures

Appendix C Consultation Information



Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:

Map data
British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL
Environment Agency
NATURAL ENGLAND

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Ms C Wilkinson, Waterman Infrastructure & Environment Ltd, Clink Street, Pickfords Wharf, London, SE1 9DG

Order Details

Order Number:	88064573_1_1
Customer Ref:	WIE13235
National Grid Reference:	531020, 182340
Site Area (Ha):	4.82
Search Buffer (m):	1000

Site Details

Mount Pleasent Sorting Office, Calthorpe Street, LONDON, EC1A 1BB

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