

Phase 1 Land Quality Assessment
**VICTORIA TRANSPORT INTERCHANGE
2 (APPLICATIONS 1, 2 AND 3)**

Phase 1 Land Quality Assessment

VICTORIA TRANSPORT INTERCHANGE 2 (APPLICATIONS 1, 2 AND 3)

Client:

LAND SECURITIES

Author:

Name **Alexander Noake BSc (Hons) MSc DIC AIEMA**

Signature _____

Position Consultant

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Checked by:

Name **Ben Steele BSc (Hons) MRes AIEMA**

Signature _____

Position Principal Consultant

Issued by: Waterman Environmental

Kirkaldy House

99 Southwark Street

London SE1 0JF

Approved by:

Name **Carl Slater BSc MSc CEng MIMMM CGeol FGS**

Signature _____

Position Associate Director

Telephone: 020 79287888

Fax: 020 79020981

environmental@waterman-group.co.uk

www.waterman-group.co.uk/we

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EXECUTIVE SUMMARY

SCOPE

Purpose of the Report	Phase I Environmental Desk Study to identify any significant contaminative risks pertaining to the Site which in turn may affect the proposed Development. This report forms a technical appendix to the Environmental Statement (ES) to be submitted in support of the planning application for the Development.
Future Site End-use	The proposals comprise a large, mixed-use development including commercial offices, retail and new residential uses with associated two level basement (car parking, services) The basement excavation will extend into the London Clay (to a maximum depth of approximately 20m Below Ground Level (bgl)) beneath Buildings 5, 6b and 7a (within application site 1 and all four Development Scenarios).

SITE INFORMATION

Grid Reference	528980, 179210.	Site Area (approx.)	5.3785 hectares (53,785 m ²)
Current Site Status	The Site currently comprises a variety of land uses and is almost entirely covered by built form, roads or areas of hard standing. Victoria Street runs along the Site's southern boundary. This is flanked by retail and restaurant outlets at ground floor level together with Grade II listed Victoria Palace Theatre and Duke of York public house. North of Victoria Street, the Site is dominated by office buildings. Serviced accommodation is provided at Lake View Court within the northwest of the Site. Adjacent to the south of Lake View Court is the four-star Thistle Westminster Hotel. At ground level, small scale retail is present together with three public houses: The Kings Arms (Allington Street); The Stage Door (Allington Street) and The Stag (Bressenden Place).		
History	By 1878 the Metropolitan District Railway intersected the Site's southeast corner. By the late 1960s 'The Stag' Public House was situated in the northeast section of the site and an underground line is detailed as following the path of the old Metropolitan District Railway. Bressenden place is shown along the Site's northern and eastern boundaries. By the late 1970s, Lake View Court and the Royal Westminster Hotel were present in the northwest corner of the Site.		
Geology	The British Geological Survey (BGS) 1: 50,000 scale Geological Map (Sheet 270), Scott Wilson Victoria Station Upgrade Geotechnical Interpretive Report (1159-GENL-REP-GEN-00036 July 2006), Norwest Holst Ground Investigation Factual Report (Ref: F14265 August 2006) and BGS Borehole Log TQ27NE1731 indicates that the Site is underlain by Made Ground, over Alluvium, over Taplow Terrace River Gravels, over London Clay Formation, over Thanet Sands, over Upper Chalk.		
Hydrogeology	The Alluvium, Taplow Terrace River Gravels and Thanet Sands are classified as Minor Aquifers, and the Upper Chalk is classified as a Major Aquifer. The London Clay Formation is classified as a Non-Aquifer.		
Hydrology	There are artificial lakes 200m to the northwest in Buckingham Palace gardens and 430m northeast in St. James's Park. The River Thames is located approximately 1.2km to the south and east of the Site. "The Lost Rivers of London" (Barton 1992) indicates that the River Tyburn passes through the eastern section of the site, flowing southwards towards the River Thames. The sewer in which the Tyburn now flows is called the Kings Scholars' Pond Sewer.		

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CONCLUSIONS

Environmental Assessment

Potential historical contamination sources associated with brewery processes and transport have been identified on site. Potentially contaminative historical land uses identified within the surrounding area are associated with transport, communication, military, power generation, industrial and transport operations.

Small scale potentially contaminative activities currently in operation at the site include the dry cleaners on Allington Steet and the Electrical Substations present on Allington Street and immediately to the north of the Victoria Palace Theatre. There is also the potential for ground gas production and ingress onto Site from the Made Ground and Alluvium deposits underlying the Site (and the potentially infilled water body approximately 65m to the northeast).

The low percentage cover of soft landscaping across the Site means that the primary pathways to ground is likely to be from the drainage network. Many surface drains/manhole covers were observed across the Site during the walkover survey, although the design and current level of functionality of the drainage network could not be determined.

Based on the information obtained during the Desk Study and the observations made during the walkover survey, it is concluded that the Site poses a **LOW to MEDIUM** environmental risk with respect to ground contamination and contaminative liabilities, as defined under Part IIA of the Environmental Protection Act 1990. However, following redevelopment it is considered that the residual risk for the site will be **LOW**.

Recommendations

1. Additional Site Investigation (SI) works should be undertaken during the detailed design process. Proposed works should be carried out utilising soil, leachate and groundwater testing to specifically address the potential pollutant linkages, identified as part of this Phase I Assessment.
2. Additional works to identify the location, design and functionality of interceptors and drains should also be completed. All potentially polluting infrastructures (interceptors, underground tanks and associated pipework) should be surveyed, cleaned, and where necessary, decommissioned by specialist contractors prior to demolition and redevelopment of the Site.
3. The Norwest Holst Ground Investigation identified the presence of ground gas from the Alluvium deposits underlying the Site. The potentially infilled pond in the northeast portion of the Site may also be a source of ground gas. In addition, there is the possibility of vapour ingress associated with historical fuel storage. Further gas monitoring should be undertaken as part of the proposed SI works.
4. Waste classification testing and assessment of soils scheduled for off-Site disposal should be included within the proposed SI works. This information should be made available to the cost consultant and included within the cost plan for the Development.
5. An inspection of inaccessible areas should be carried out.
6. A full copy of the Norwest Holst report should be provided and assigned to Land Securities.

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1. INTRODUCTION

1.1 THE BRIEF

Land Securities (the 'Applicant') is seeking to obtain detailed planning permission for a development known as 'Victoria Transport Interchange (VTI) 2', which would involve the redevelopment of an area of land to the north of Victoria Street, London, which totals approximately 2.3 hectares (ha) (the Site). Waterman Environmental Limited (WEL) previously undertook a Phase1 Land Quality Assessment for another application on behalf of the Applicant, known as VTI, and which included the area of land relating to the current application. As such, WEL have therefore been instructed by the Applicant to undertake an updated Phase I Land Quality Assessment and site walkover survey for the new proposals.

The proposed development is split into three separate planning applications (Applications 1, 2 and 3), which comprise a variety of new land uses including commercial office, retail and residential, with associated two level basement (car parking, services) and new public realm. The basement excavation will extend into the London Clay (to a maximum depth of approximately 20m Below Ground Level (bgl)) beneath Buildings 5, 6b and 7a (within application site 1 and all four Development Scenarios).

It is proposed that the three applications could be delivered by way of four possible 'Development Scenarios', as summarised below:

- Development Scenario 1 – Applications 1, 2 and 3 all implemented together;
- Development Scenario 2 – Applications 1 and 2 implemented together;
- Development Scenario 3 – Applications 1 and 3 implemented together; and
- Development Scenario 4 – Application 1 implemented alone.

The purpose of the Phase 1 report is to assess the existing potential for contamination, and as such, this report focuses on the area encompassing the three applications as a whole. Reference to the four proposed Development Scenarios is excluded from this report, with the proposed end use considered within the assessment of contamination risks being 'mixed use'. Due to the close proximity of the three applications to each other, for the purposes of assessing existing contamination risks, this report considers the three applications as a single site.

The assessment of effects caused by, and upon, the proposed Development Scenarios in relation to contamination and ground conditions within the three application sites is reported within Chapter 13: Ground Conditions and Contamination of the Environmental Statement (ES), which accompanies the planning applications. This report forms a technical appendix to this chapter of the ES.

This report has been prepared for the exclusive use of the Applicant for the purpose of assisting in the evaluation of potential risks associated with contamination at the Site.

Table 1: Reports pertaining to the site which were reviewed

Report	Author	Date	Reference
EnviroCheck Report	Landmark	Feb 2007	529000, 179210
Scott Wilson Victoria Station Upgrade Geotechnical Interpretive Report	Scott Wilson	July 2006	1159-GENL-REP-GEN-00036
Explosive Ordnance Threat Assessment Of Victoria Interchange	Bactec	Feb 2006	8948TA
Arup Geotechnics Initial Desk Study	Arup	Sept 2003	113996
Norwest Holst Ground Investigation	Norwest Holst	Aug 2006	F14264

The information presented within this report is based on observations made on the Site, a review of available historical, geological and hydrogeological sources. Further information has been provided by the commissioned and discussions with representatives of the Westminster City Council (WCC).

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1.2 LIMITATIONS AND CONSTRAINTS

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

The scope of this investigation does not include an assessment for the presence of asbestos containing materials within or below buildings or in the ground at the Site. Should there be a requirement under Regulation 4 of the Control of Asbestos Regulations 2006 for any part of the Site to be deemed 'non-domestic premises' (including, inter alia, outbuildings, external pipework, under-floor service ducts, bridges, fixed and mobile plant), the dutyholder(s) should prepare an asbestos risk management plan and this may require technical survey works as described in the relevant HSE Guidance Note MDHS 100.

Due to the current multi-occupancy of the Site, access was not permitted to all areas. Therefore a full survey of all internal spaces could not be completed.

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the Site.

2. SITE DESCRIPTION AND RECONNAISSANCE

The information set out in the following section of this report is based on observations made on the Site, discussions with on-Site facilities management staff, and from information gathered during the desk-based research.

A location plan and Site plan, showing the boundaries of the three planning applications, are included in Appendix A. A selection of relevant Site photographs is included within Appendix B.

2.1 SITE DESCRIPTION

The Site is located directly to the north of Victoria Station and is bounded by commercial premises and offices to the north, east, southeast and west. A residential area is located approximately 120m to the northeast of the Site. The Site occupies an area of approximately 2.3 hectares and is centred at National Grid Reference 528980, 179210.

There are no substantial changes in ground level across the Site. The Arup Initial Geotechnical Desk Study (Ref: 113996 September 2003) indicates that most of the Site is on a locally raised area between +5.0m OD and +6.0mOD. The limited open areas comprise of a mixture of paved surfaces and tarmac hardstanding.

The Site currently comprises a variety of land uses and is almost entirely covered by built form, roads or areas of hard standing. Victoria Street is situated in the southern part of the Site and is flanked by retail and restaurants outlets at ground floor level. Although not forming part of the Site itself, the Grade II listed Victoria Palace Theatre and Duke of York public house are situated immediately to the east of Allington Street.

North of Victoria Street, the Site is dominated by office buildings. Serviced accommodation is provided at Lake View Court within the northwest of the Site. Adjacent to the south of Lake View Court is the four-star Thistle Westminster Hotel. Apartments are also located immediately to the east of the Kings Arms on Allington Street. At ground level small scale retail is present together with three public houses: The Kings Arms (Allington Street); The Stage Door (Allington Street) and The Stag (Bressenden Place).

Land uses surrounding the Site are diverse. Those in the immediate vicinity or of particular significance include:

- Hotel Rubens adjacent to the north of the Site;
- Office buildings along Bressenden Place, Stag Place and Victoria Street to the east and northeast;
- The Grade II* listed Apollo Theatre adjacent to the southeast of the Site;
- Victoria Railway Station providing mainline and LUL Victoria, District and Circle Line underground rail services and connections to Victoria Coach Station beyond;
- The Grade II* listed Grosvenor Thistle Hotel adjacent to the western façade of Victoria Station;
- Residential dwellings at Roebuck House ('The View') to the northeast of the Site and Evelyn Mansions to the southeast of the Site, together with further residential units along Buckingham Palace Road to the west of the Site;

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- The Grade I listed Westminster Cathedral located approximately 200m east of the Site;
- The Grade I listed Royal Mews and Buckingham Palace Gardens located approximately 250m northwest of the Site; and
- The Royal Parks (St. James' Park and Hyde Park) located approximately 400m and 900m northeast and northwest of the Site respectively.

2.2 SITE WALKOVER - CURRENT SITE CONDITIONS

The information below is based on observations made by Alexander Noake of Waterman Environmental on 23 July 2008. A selection of relevant Site photographs is also included within Appendix B.

Due to the multi-occupancy of the operational Site, access was not available to the majority of the on-Site structures so a full survey of these internal spaces could not be carried out.

No significant or obvious signs of contamination were observed during the Site walkover. The presence of road side car-parking facilities along Victoria Street, Allington Street and Warwick Row means that leaks from parked vehicles may be a potential source of fuel/oil contamination. Furthermore, cracked tarmac was noted on Allington Street and Warwick Row. Many surface drains/manhole covers were observed across the Site although the design and current level of functionality of the drainage network could not be determined. Planted tree groves were noted on Warwick Row and Bressenden Place. A raised soft landscaped verge containing trees and shrubs is present along Bressenden Place between Carrier House and The Stag public house.

Potentially contaminating activities within the Site identified from the walkover are mainly associated with oil and fuel leaks from the car parking areas. As detailed on VSU_Figure 12-1, provided in Appendix A, the presence of a Dry Cleaners (Allington Street) and Electrical Substations (Allington Street and to the north of the Victoria Palace Theatre) on site may also give rise to areas of possible contamination. Given the lack of soft landscaping, primary pathways to the subsurface are currently likely to be from the drainage network.

A summary of the surrounding land uses at the Site is shown in Table 2.

Table 2: Summary of Surrounding Land Uses

Location	Description
North.	Offices and commercial buildings with residential properties to the northeast.
East.	Offices and commercial buildings.
South.	Offices and commercial buildings and Victoria Station.
West.	Offices and commercial properties and Grosvenor Gardens.

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3. SITE HISTORY

A review of historical maps obtained from Envirocheck has been undertaken. A summary of relevant information is shown in chronological order in Table 3. Potentially contaminating sources are shown in **bold italicised** font. Pertinent historical plans are provided in Appendix C.

Table 3: History of the Site

Source	Site	Surroundings
OS Map 1878.	<p>Residential and Commercial properties present in the northwest section. The trajectory of the Metropolitan District Railway passes through the southeast corner of the Site.</p> <p>The Stag Brewery encroaches within the site's northeast boundary.</p> <p>Various roads are located on site. Prince's Row, Victoria Bridge Road and Buckingham Palace Road run within the site's northern, southern and western boundaries. Brewer street runs through the middle of the site from Buckingham Palace Road to the Stag Brewery. Buckingham Place connects Brewer Street to Prince's Row and Allington Street connects Brewer Street to Victoria Bridge Road.</p>	<p>The surrounding area is predominantly commercial and residential. However, a large undeveloped area remains approximately 100m to the southeast.</p> <p>The Stag Brewery is located immediately to the northeast.</p> <p>A 'cab stand' and a Station are shown immediately to the south.</p> <p>A tank is located approximately 150m to the northwest.</p> <p>A distillery and Christ Church Grave Yard are located 290m and 500m to the east and northeast respectively.</p> <p>Saw mills and a timber yard are detailed 300m and 380m to the south and southeast and a fire station is positioned 330m to the east/southeast. An industrial home and a coach manufacturing works are located 290m and 370m southeast respectively.</p> <p>Grosvenor Gardens and Victoria Station are situated immediately to the west and 90m south of the Site respectively. A works is located 160m southwest and coach manufactories are located approximately 390m and 470m southwest. Marble and stone saw mills and Pimlico Slate Works are situated 410m and 435m to the southwest respectively.</p>
OS Map 1896-1898	<p>The numerous commercial buildings in the northwest corner of the Site have been replaced by three larger units.</p> <p>Victoria Bridge Road has been renamed Victoria Street.</p>	<p>The aforementioned taxi rank is no longer marked.</p> <p>Victoria Palace is situated immediately to the east of Allington Street.</p> <p>The Little Ben Clock and a lavatory are situated approximately 25m to the south.</p> <p>The tank 150m northwest, works 160m west, marble and stone saw mills, Pimlico Slate Works and the coach manufactories to the southeast and southwest are no longer marked. The distillery and Emmanuel Hospital to the east are also no longer shown.</p> <p>A school and Wellington Barracks are located 230m east and 320m to the northeast respectively.</p> <p>A tramway is located approximately 50m to the south of the Site and a picture theatre has been constructed 100m to the south.</p> <p>Ambrosden Avenue, Thirlby Gardens and other buildings have been constructed in the previously undeveloped area 180m to the southeast.</p>
OS Map 1916	<p>The large units in the northwest corner have been removed and replaced by several small structures.</p> <p>Buckingham Place has been renamed Warwick Row.</p>	<p>Victoria Palace is situated in between Allington Street and the southeast corner of the site.</p> <p>Terminus Place (Bus Station) is marked 40m to the south.</p> <p>Westminster Cathedral is located 140m to the</p>

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Source	Site	Surroundings
		<p>southeast and the Army and Navy Stores have been constructed 350m to the east.</p> <p>Garages are located 290m, 530m and 570m to the south, southeast and southwest respectively. An electricity works is situated 360m to the southwest.</p>
OS Map 1951-1952	<p>The Metropole Theatre is marked in the southwest section.</p> <p>Brewer Street is now labelled as Allington Street.</p>	<p>Ruins are located in the surrounding area the closest of which are located approximately 10m to the east.</p> <p>Tanks, associated with the Stag Brewery, are located approximately 10m to the northeast of the site. Tanks are also shown 100m to the northeast.</p> <p>The Hotel Rubens and the Westminster Theatre are located 20m and 90m to the north respectively.</p> <p>An Electrical Substation and a subway are marked 15m and 50m to the south.</p> <p>TA Centre is located 340m to the northeast.</p> <p>A bus depot is located 350m to the southeast.</p> <p>Artillery houses and a warehouse lie 430m to the east and an engineering works is located 590m to the southeast.</p> <p>To the southwest lies an electricity substation and Victoria Coach Station at 360m and 500m respectively.</p>
OS Map 1967-1968	<p>No structures are present in the northwest corner of the Site.</p> <p>'The Stag' Public House is situated in the northeast of the Site.</p> <p>Bressenden Place runs along the Site's northern and eastern boundaries.</p> <p>The Metropole Cinema occupies the Site of the aforementioned theatre in the southwest portion of the Site, and the path of the old Metropolitan District Railway is followed by an underground line.</p>	<p>Stag Brewery is no longer present. The sand pits in St James's Park are no longer evident</p> <p>The site of the four Development Scenarios is bounded by Glen House to the east and Eland House to the North. Roebuck House and Watney House lie approximately 20m to the northeast. St Vincent's School has been constructed to the southwest.</p> <p>Portland House and Glen House have been constructed approximately 20m and 60m east respectively. A Pond is shown approximately 65m to the northeast.</p> <p>An electrical substation is located 270m northeast. Garages are detailed approximately 350m southwest, 350m south and 350m and 600m to the northwest respectively. In addition a bus depot is located 460m southwest.</p>
OS Map 1977 and 1980-1987	<p>By 1977, Lake View Court and the Royal Westminster Hotel are located in the northwest corner of the Site.</p>	<p>By the 1980s the bus depot 460m to the southwest was labelled generically as a depot and a multi-storey car park has been constructed immediately to the south of Victoria Coach Station.</p>
OS Map 1991	<p>No significant changes to on Site layout and form are evident.</p>	<p>The Pond 65m to the northeast is no longer marked.</p> <p>The electrical substation 270m to the north is no longer marked and a depot is located approximately 430m to the southeast. No other significant changes to the surrounding land use are noted.</p>

Copies of relevant map extracts, together with a full list of maps consulted, are included in Appendix C.

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4. GEOLOGY

4.1 GENERAL GEOLOGY AND GROUND CONDITIONS

The geology beneath the Site is summarised in Table 4 and has been established from the British Geological Survey (BGS) 1: 50,000 scale Geological Map, Sheet 270 (South London), together with information from the Scott Wilson Victoria Station Upgrade Geotechnical Interpretive Report (1159-GENL-REP-GEN-00036 July 2006), the Norwest Holst Ground Investigation Factual Report (Ref: F14265 August 2006) and BGS Borehole Log TQ27NE1731 (roughly located in the centre of the site).

Table 4: Site Geology

Stratum	Area Covered	Estimated Thickness	Stratigraphy	Typical Description
Made Ground.	Whole Site.	2-4.3m.	Recent.	Concrete/tarmac hardstanding underlain by soil fill materials (brick, stone and concrete rubble in a sand and clay matrix). Decomposing wood, ash and mortar have also been noted, with the lower layers of the made ground recorded as black organic silt with coal and brick fragments although this may constitute the interface of the made ground and alluvium.
Alluvium.	Whole Site.	0-2.5m (average 1.5m)	Quaternary.	Soft silty clay which is described as peaty or organic.
Taplow Terrace River Gravels.	Whole Site.	4-6m.	Quaternary.	Sand and gravel.
London Clay Formation.	Whole Site.	40m +.	Tertiary.	Fissured blue grey clay with occasional pyrite nodules.
Thanet Sands.	Whole Site.	0 - 18m.	Palaeocene.	Fine grained sand.
Upper Chalk.	Whole Site.	95m.	Cretaceous.	Soft white limestone with flints.

The Site is situated in an area where less than 1% of homes are above the Radon Action Level. Consequently, no radon protective measures are necessary in the construction of new dwellings or extensions.

4.2 ECONOMIC GEOLOGY AND LANDFILLS

The Landmark Information Group indicates that neither the Site nor the local vicinity is in a coal mining affected area. There are no landfills within 1km of the Site.

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5. CONTROLLED WATERS

5.1 SURFACE WATERS

Artificial Lakes are situated 200m northwest in Buckingham Palace Gardens and 430m northeast in St. James's Park. The River Thames is located approximately 1.2km to the south and east of the Site.

The Environment Agency's indicative floodplain map shows that the Site is located within an area of potential risk from river flooding. Further details are provided in a Flood Risk Assessment (FRA) report which has been produced as a separate stand alone document in support of the planning application.

"The Lost Rivers of London" (Barton 1992) indicates that the River Tyburn passes through the eastern section of the site, flowing southwards towards the River Thames. The sewer in which the Tyburn now flows is called the Kings Scholars' Pond Sewer.

5.2 GROUNDWATER

According to the Environment Agency groundwater vulnerability map, Sheet 39 (West London), the Alluvium and Taplow Terrace River Gravels underlying the Site are classified as Minor Aquifers. The London Clay Formation is classed as a Non-Aquifer; the Thanet Sand is classified as a Minor Aquifer and the Upper Chalk, at depth, is classified as a Major Aquifer. An assessment of the hydrogeological properties of main geological units underlying the Site is shown in Table 5.

The London Clay formation is considered to act as an aquiclude preventing any contamination present in the superficial Made Ground, Alluvium and River Terrace Gravels from migrating vertically into the underlying Thanet Sands (Minor Aquifer) and Upper Chalk (Major Aquifer).

Table 5: Summary of Hydrogeological Properties of the Main Geological Strata

Strata	Hydrogeological Significance	Classification (Environment Agency)
Made Ground.	May contain small quantities of perched water.	Non-Aquifer.
Alluvium.	Important for local supplies and maintaining river base-flow.	Minor Aquifer.
Taplow Terrace River Gravels.	Important for local supplies and maintaining river base-flow.	Minor Aquifer.
London Clay Formation.	Contains insignificant quantities of water for abstraction.	Non-Aquifer.
Thanet Sands.	Important for local supplies and maintaining river base-flow.	Minor Aquifer.
Upper Chalk.	Highly permeable strata, contains large quantities of groundwater for abstraction.	Major Aquifer.

The Site does not lie within a Groundwater Source Protection Zone.

5.3 WATER ABSTRACTIONS

The Landmark Information Group indicates that there are sixteen groundwater abstraction within 1km of the Site. The closest is operated by London Underground Ltd (LUL) for non-evaporative cooling purposes 53m to the south. The nearest sensitive abstraction is operated 247m to the north by The Keeper of the Privy Purse for irrigational purposes. The strata from which the groundwater is abstracted in these wells is not specified, although it would be usual for this to be abstracted from the Chalk Aquifer at depth.

5.4 DISCHARGE CONSENTS

Landmark Information Group Report records three active discharge consents within 1km of the Site. The closest is operated by Terrace Hill (Wilton Road) Nominee No. 1 Ltd. & No. 2, who is permitted to discharge

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process water to ground waters via a borehole 269m to the south of the Site. Details of the receiving strata are not provided.

5.5 POLLUTION INCIDENTS

The Landmark Information Group Report records two Category 3 (minor) pollution incidents to controlled waters have occurred within 1km of the Site. This involved unknown oils contaminating on unspecified receiving waters 61m to the southwest of the Site on the 20 September 1995.

6. CONSULTATION

The agencies and individuals which have been contacted and/or their records reviewed during the course of this study are listed in Table 5.

Table 6: List of Agencies and Individuals Consulted During this Study

Institution	Consultee	Response
Westminster City Council		
Environmental Health.	Amelia Haskell	Written Response.
Thames Water		
Property Insight.	Mandy Davey-Patton	Written Response.
Landmark		
Envirocheck Report.	-	Written.

Written responses from statutory consultees are detailed in Appendix D.

6.1 ENVIRONMENTAL HEALTH

A written response from WCC Consumer Protection Department during the Phase I assessment for the original VTI scheme confirmed the following.

- In Westminster there are no sites registered under Section 143, EPA 1990 and none where notices have been served under Section 78; and
- There are no recent domestic reuse landfill sites, sludge disposal or diseased animal burial sites that WCC is aware of.

As the new VT12 scheme lies within the original VTI boundary, the above responses are considered to remain valid. However, a request for updated information has been made to the WCC consumer protection and a response is pending.

6.2 THAMES WATER

A request for information was made to Thames Water during Phase I assessment for the original VTI scheme and a written response received from Thames Water Property Insight confirmed the presence of public sewers on the Site and incidences of flooding as a result of sewer surcharging. Although Thames Water may have records of sewer flooding within the vicinity of the area, the details of the effect of this flooding on individual properties should be obtained from the current owners. Furthermore consideration should be given to the fact that sewers react to rainfall intensity and duration and these could be exceeded during future rainfall events, resulting in greater levels of sewer surcharging occurring. As the new VT12 scheme lies within the original VTI boundary, the above responses are considered to remain valid.

6.3 ENVIROCHECK REPORT

The commissioned Landmark Envirocheck Report provided the following information:

- On 24 November 1998 a prosecution occurred, relating to polluting matter entering controlled waters on the River Thames, occurred approximately 216m to the south of the Site;

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- There are three Registered Radioactive Substances operations situated within 1km of the Site. The closest is located 452 to the east and pertains to Rolls Royce Plc. who are authorised under Section 13 of the Radioactive Substances Act to dispose of radioactive waste;
- A single Environmental Permit (formerly Local Authority Pollution Prevention and Control) is operated on Allington Street), by Victoria Dry Cleaners, for laundry operations;
- A further three Environmental Permits (formerly Local Authority Pollution Prevention and Controls) are operation within 500m of the Site. The nearest also pertains to a dry cleaners located approximately 290m to the northeast of the Site; and
- A single Control of Major Accident Hazards Site (upper tier) was present within 1km of the Site and pertained to Aquila Energy Storage Ltd. 345m to the east. However the records have ceased to be supplied under the COMAH regulations.

7. PREVIOUS INVESTIGATIONS

7.1 ARUP GEOTECHNICS INITIAL DESK STUDY

In September 2003 Arup Geotechnics completed an environmental and geotechnical desk study (Ref: 113996) for previous redevelopment proposals for part of the site. These proposals were never taken forward to the planning application stage. The primary focus of the study appeared to be geotechnical and primarily related to the identification of specific Site constraints. However, the report did identify the presence of a brewery and the King Scholars Pond Sewer as potential contamination sources. The report recommended the requirements for environmental chemical testing should be more closely reviewed at a later stage of any design process.

7.2 NORWEST HOLST GROUND INVESTIGATION

Between 23rd January and 8th March 2006, Norwest Holst Ltd undertook a ground investigation of the Site (for both contamination and geotechnical purposes), as detailed within a factual report issued in August 2006 (Ref: F14264). This investigation comprised seven boreholes (BH05/1 to BH05/7) drilled by a cable percussion drill rig to depths between 11 and 30mbgl, four of which, (BH05/2, BH05/4, BH05/4 and BH05/7) were extended to 40mbgl using rotary drilling follow-on. The investigation also included six inspection pits excavated at the borehole positions to between 0.57 and 3.5mbgl in order to break through the concrete hardstanding, prior to the drilling commencing.

Chemical testing of soils revealed elevated levels of Lead in the south (BH05/5) and northeast (BH05/1) of the Site within the made ground. Furthermore, elevated copper values were recorded in made ground samples obtained from BH05/1, BH05/3, BH05/4 and BH05/5.

Soils were sampled and tested for sulphates and pH within the made ground, alluvium, Taplow Terrace River Gravels and London Clay formation. According to the BRE Special Digest 1 3rd edition (Ref: SD1 2005), the soils tested would fall into aggressive chemical environment for concrete (ACEC) classification AC-1 to AC-3. This corresponds to a design sulphate classification of up to DS-3. However, all soil samples that were classified as DS-3 were located within the London Clay.

Chloride, nitrate and sulphate contaminants were derived from made ground leachate tests. Sulphate leachate tests were also conducted on natural strata. No elevated chloride or nitrate concentrations were recorded in the groundwater.

Given the potential for ground gas production through the decomposition of peat deposits, eleven gas monitoring visits were undertaken between 22/02/06 to 22/03/06 for borehole BH05/04, and six gas monitoring visits were undertaken between 03/03/06 and 22/03/06 for BH05/06.

Carbon Dioxide concentrations of 7.6% and 5.6% were recorded in boreholes BH05/04 and BH05/06 respectively. Methane and hydrogen sulphide were below the level of detection. 2% carbon monoxide was recorded in BH05/06, although it was reported that this may have been caused by heavy traffic around the borehole. Norwest Holst concluded that gas protection measures would need to be incorporated into any future building design at the site.

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7.3 EXPLOSIVE ORDNANCE THREAT ASSESSMENT

An explosive ordnance threat assessment for the original Victoria Transport Interchange Site was undertaken by BACTEC International in February 2006 (Ref. 8948TA).

The BACTEC assessment indicates that there is considered to be a risk of encountering explosive ordnance during any redevelopment of the Site. Consequently they have advised risk mitigation measures to assess these areas at risk.

The explosive ordnance threat assessment indicates that there is a high risk of encountering explosive ordnance in the southwest part of the Site (at the building fronting both sides of Victoria Street west of Allington Street). A medium risk exists at the junction Allington Street / Bressenden Place). The remainder of the Site is at low risk of encountering explosive ordnance.

To mitigate safety and awareness briefings were recommended by BACTEC for all sites. In addition, BACTEC recommended that areas of medium and high risk require an Explosive Ordnance Disposal (EOD) Engineer to be present on site. If any sheet piling is undertaken in areas of medium to high risk BACTEC recommended that further mitigation measures would be needed which include Intrusive Magnetometer Surveys and Targeted Investigations.

8. PRELIMINARY CONCEPTUAL GROUND MODEL

A conceptual exposure model of the Site has been developed, based on the information presented in the previous sections. This is described in Section 8. A simplified schematic conceptual model for the Site illustrating the identified sources, pathways and identified receptors is presented in Appendix A.

8.1 PRELIMINARY CONTAMINATION ASSESSMENT

In order to assess the risks associated with the presence of ground contamination, the linkages between the sources and potential receptors need to be established and evaluated.

Contaminated Land, as defined in Part IIA of the Environmental Protection Act 1990 and the Contaminated Land Regulations 2000, 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 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) Pollution of controlled waters is being, or is likely to be, caused.

It should be noted that DEFRA has advised (Ref. Part 4, Chapter A, Annex 3, DETR Circular 2/2000) Local Planning Authorities (LPAs) that land should not be designated as contaminated where:

- (a) A substance is already present in controlled waters;
- (b) Entry into controlled waters of that substance from land has ceased; and
- (c) It is not likely that that further entry will take place.

Furthermore, the LPA should regard an event of or occurrence as being 'likely' when they judge it 'more likely than not to occur'.

These exclusions do not necessarily preclude regulatory action under the Water Resources Act 1991, which makes it a criminal offence to cause, or knowingly permit, any poisonous, noxious or polluting matter to enter controlled waters. In England and Wales, under the Anti-Pollution Works Regulations 1999, an anti-pollution notice may be served by the regulator requiring appropriate investigation and clean-up.

Environmental Risk Assessment is a systematic, staged process, which generally comprises the following stages:

1. Hazard identification;
2. Hazard assessment;
3. Risk estimation; and
4. Risk evaluation.

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At the desk study stage, the risk assessment is limited to hazard assessment and initial risk estimation.

8.2 POTENTIAL CONTAMINATION SOURCES

The potentially contaminative activities which have taken place at or adjacent to the Site as revealed from the information review previously presented is summarised in Table 6 and Table 7. Those potential contamination sources and their form (soil, water, gas), in which they are likely to be present as a result of these activities, are also detailed.

Table 7: Potential Contamination Sources on the Site

Source	Location	Activity	Potential Contaminants	Solid	Liquid	Vapour/ Gas
<i>Potential Sources from Historical Records and Site Walkover</i>						
1.	Road side car parking areas. Victoria Street, Allington Street, Warwick Row.	Leaks from parked vehicles.	Fuels, oils.	✓	✓	✓
2.	Drainage and Sewage Network. Road side car-park areas.	Drainage collection.	Fuels, oils.	✓	✓	✓
3.	Alluvium and Made Ground Whole Site.	Decomposition.	Ground Gas, Metals (lead, copper), asbestos.	✓	✓	✓
4.	Dry cleaners. Allington Street.	Cleaning processes.	Storage of cleaning chemicals and waste effluent.	✓	✓	
5.	Electrical Substations Allington Street and on the Site boundary with the Victoria Palace Theatre	Power Generation	PCBs, asbestos, metals, oils	✓	✓	
6.	Stag Brewery (Historical Land Use) Northeast section of site	Pipe cleaning processes.	Effluent.	✓	✓	
7.	UXB Whole Site.	WWII bombing	Unexploded Ordnance.	✓		

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Table 8: Potential Contamination Sources Identified off-Site

Source	Location	Activity	Potential Contaminants	Solid	Liquid	Vapour / Gas	
<i>Potential Sources from Historical Records and Site Walkover</i>							
1.	Brewery/ Distillery	Immediately northeast/ 300m east	Pipe cleaning processes.	Effluent.	✓	✓	
2.	Grave yard.	390m east.	Historic embalming.	Arsenic (other metals).	✓	✓	
3.	Saw mills, timber yard.	250m and 340m south.	Timber treatment/ manufacturing.	Metals, solvents, pesticides, pigments/dyes, preservatives.	✓	✓	
4.	Stone saw mills/Slate works.	325m and 350m to the southwest.	Stone cutting.	Machinery waste oil containing metals.	✓	✓	✓
5.	Victoria Station.	90m south/ southwest	Transport of people and goods.	Metal fines, weed killers.	✓	✓	
6.	Tanks.	100m northeast and 150m northwest	Storage of chemicals.	Dependant on tank contents.	✓	✓	✓
7.	Pond	65m northeast	Potential infilling.	Ground gas, subsurface contamination depends of infill materials used.	✓	✓	✓
8.	Electricity substations.	15m south.	Power generation.	PCBs, asbestos.	✓	✓	
9.	Victoria Coach Station.	450m southwest.	Maintenance, leaks from parked vehicles and tanks.	Fuel, oil, metals/metalloids, cleaning chemicals.	✓	✓	✓
10.	Coach manufacturers	270m and 340m southeast; 300m and 370m southwest.	Vehicle manufacture.	Metals/metalloids, paints, solvents.	✓	✓	
11.	Garages.	250m southwest; 250m, 300m, 395m and 470m south; 350m northwest.	Vehicle fuelling, repair and maintenance.	Fuel, oils, metals/metalloids.	✓	✓	✓
12.	Bus depots.	40m and 300m south.	Vehicle fuelling, repair and maintenance.	Fuel, oils, metals/metalloids.	✓	✓	✓
13.	Engineering works.	480m southeast.	Electrical/ mechanical goods manufacture and servicing.	Metals/metalloids, PCBs.	✓	✓	
14.	Barracks.	220m northeast.	Proofing ranges, vehicle maintenance and repair.	Metals, fuels, oil.	✓	✓	
15.	Artillery houses.	390m east.	Weaponry manufacture.	Metals, explosive residues.	✓	✓	
16.	Electricity works.	300m southwest.	Power generation.	Metals/metalloids, PCBs.	✓	✓	

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Source	Location	Activity	Potential Contaminants	Solid	Liquid	Vapour / Gas
17. Other works/factories.	140m west.	Unknown manufacture and/or industrial processes.	Dependent on processes at Site.	✓	✓	

8.3 POTENTIAL RECEPTORS

Receptors that are required to be considered under Part IIA of the Environmental Protection Act 1990 are summarised in Appendix F.

The potential environmental receptors identified during this study are summarised in Table 9.

Table 9: Environmental Receptors Potentially at Risk from the Identified Potential Hazards

Category	Receptor	Location	Comments
Human beings	Existing Site users.	On the Site.	Site uses currently comprise a mixture of commercial, office and residential buildings and roadside car parking facilities.
	Future Site users.	On the Site.	The Site is to be redeveloped as a new mixed-use Development comprising office, retail and residential uses and public space.
	Construction and maintenance workers.	On the Site.	Construction and maintenance workers may be exposed to soils and groundwater from contamination sources during construction works or ongoing maintenance.
	Surrounding residents and other occupants, users and visitors.	On the Site.	The Site is bounded by commercial and office buildings with residential properties present to the northeast, west (Buckingham Palace Road) and southeast (Evelyn Mansions).
Property (buildings)	On Site structures	Whole Site.	Primarily foundations and services.
Adjacent land	Commercial, office, residential.	Surrounding the Site	Adjacent sites are of similar nature to the Site.
Ecological systems	None identified.	-	-
Controlled waters	River Thames.	1.2km to the south and east.	The River Thames is unlikely to be within significant influencing distance of the site.
	Water features (pond/lake)	200m northwest of in Buckingham Palace Gardens and 430m northeast in St. James's Park.	Although the potential lateral migration within the underlying strata or Made Ground is unknown the water features are unlikely to be within significant influencing distance.
	Aquifers.	Underlying Alluvium, Taplow Terrace River Gravels, Thanet Sands and Upper Chalk.	The Alluvium and Taplow Terrace River Gravels are Minor Aquifers and are likely to be in hydraulic continuity with the Site. The Thanet Sands (Minor Aquifer) and the Upper Chalk (Major Aquifer) are likely to be afforded adequate protection by the London Clay Formation aquiclude. The Site is not located in a Groundwater Source Protection Zone.

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8.4 PRELIMINARY CONTAMINATION ASSESSMENT

Using the criteria shown in Appendix E, the risk of significant harm or pollution of controlled waters given the current Site use has been assessed qualitatively as **low to medium**.

A risk estimation matrix for all pollutant linkages identified is shown in Table 9 below.

Table 10: Contamination Assessment Summary

Receptor	Potential Sources	Pathways	Risk	Justification/ Mitigation	Residual Risk
Human Health					
Existing Site users.	On-Site/off-Site contamination in soil, groundwater.	Lateral migration through granular soils resulting in direct contact, ingestion, inhalation.	Low.	Hard cover across Site prevents direct contact with soil contamination.	Low.
	Ground gas.	Vapour inhalation.	Medium.	Carbon dioxide levels of up to 7.6% were recorded during the Norwest Holst ground investigation. It is not known whether the existing buildings have gas protection measures.	Low.
Future Site users.	On-Site/off-Site contamination in soil, groundwater and ground gas.	Lateral migration through granular soils resulting in direct contact, ingestion, inhalation.	Low.	A significant proportion of the contamination source will be removed from areas subject to basement dig. Hard cover across the majority of the Site will prevent direct contact with general soil contamination.	Low.
	Ground gas.	Vapour inhalation.	Low.	Carbon dioxide levels of up to 7.6% were recorded during the Norwest Holst ground investigation. A substantial proportion of the ground gas source (i.e. Made Ground and Alluvium) will be removed from the areas subject to the basement dig. Ground gas monitoring should be undertaken and appropriate mitigation measures should be implemented as necessary.	Low.
Off-Site residents / users.	On-Site/off-Site contamination in soil, groundwater and ground gas.	Lateral migration through granular soils resulting in direct contact, ingestion, inhalation.	Low to Medium.	The Site has a history of potentially contaminative uses, although current activities are of limited contaminative risk.	Low.

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Receptor	Potential Sources	Pathways	Risk	Justification/ Mitigation	Residual Risk
Construction workers and maintenance.	On-Site/off-Site contamination in soil, groundwater and ground gas.	Lateral migration through granular soils resulting in direct dermal contact, ingestion, inhalation, explosion	Low.	This study has identified a number of land uses and processes on Site and in the vicinity that may have led to contaminants in the soil and groundwater. Any works involving ground excavation and/or entrance into confined spaces may expose workers to direct contact with contamination and appropriate personal protective equipment would be required. All construction works would be subject to legislative and best practice controls to minimise contaminative risk. Adoption of BACTEC mitigation proposals for UXB.	Low.
Property					
Future Site structures.	On-Site/off-Site contamination in soil and groundwater.	Direct contact.	Low to Medium.	Additional Site Investigations are recommended and any future development should consider the potential presence of elevated contaminants identified.	Low.
Current infrastructure.	On-Site/off-Site contamination in soil and groundwater.	Direct contact.	Low to Medium.	Risk of current infrastructure such as buried water pipes in direct contact with potential contamination.	Low.
Plants /Landscaping.	On-Site/off-Site contamination in soil and groundwater.	Direct contact.	Low.	Any soft landscaping should be provided with an appropriate thickness of clean, inert soil.	Low.
Adjacent Property					
Adjacent office properties/ Off Site structures.	On-Site/off-Site contamination in soil and groundwater.	Soil leaching and lateral migration, direct contact.	Low.	This study has identified a number of land uses and processes on Site and in the vicinity that may have led to contaminants in the soil and groundwater. Hardstanding in the vicinity would limit direct contact with contaminants.	Low.
Controlled Waters					
Alluvium and Taplow Terrace Gravels (Minor Aquifers)	Contaminated soil and groundwater.	Soil leaching and vertical migration.	Low to Medium	The Site and the surrounding area have a history of contaminative use although current activities are of limited contaminative risk. A significant proportion of the contamination source will be removed from areas subject to basement dig. Hardstanding across the Site will limit rainwater infiltration. Potentially contaminated drainage would be redeveloped as part of the proposed works.	Low.

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CONCLUSIONS

By 1878 the Metropolitan District Railway intersected the Site's southeast corner and part of the Stag Brewery lay within the sites northeast boundary. By the late 1960s 'The Stag' Public House was situated in the northeast section of the site, an underground line followed the path of the old Metropolitan District Railway and Bressenden Place was located along the Site's northern and eastern boundaries. By the late 1970s, Lake View Court and the Royal Westminster Hotel were present in the northwest corner of the Site. Potential historical contamination sources identified within the surrounding area are associated with transport, communication, military, power generation, industrial and transport operations.

Small scale potentially contaminative activities currently in operation at the site include the dry cleaners on Allington Steet and the Electrical Substations present on Allington Street and immediately to the north of the Victoria Palace Theatre. There is also the potential for ground gas production and ingress onto Site from the Made Ground and Alluvium deposits underlying the Site (and the potentially infilled water body approximately 65m to the northeast).

The low percentage cover of soft landscaping across the Site means that the primary pathways to ground is likely to be from the drainage network. Many surface drains/manhole covers were observed across the Site although the design and current level of functionality of the drainage network could not be determined.

Based on the information obtained during the Phase I Land Quality Assessment and the observations made during a walkover survey, it is concluded that the Site poses a **LOW** to **MEDIUM** environmental risk with respect to ground contamination and contaminative liabilities, as defined under Part IIA of the Environmental Protection Act 1990. However, following redevelopment it is considered that the residual risk for the site will be **LOW**.

9. RECOMMENDATIONS

9.1 SITE INVESTIGATION

Additional intrusive Site Investigation works should be completed prior to redevelopment works commencing for both geotechnical and environmental purposes. The Site investigation should include a number of exploratory positions which penetrate the full depth of the Alluvium and Taplow Terrace River Gravels, to permit a detailed assessment of groundwater flow, hydraulic continuity and water quality.

Intrusive works should ideally be completed when unrestricted access is available. The intrusive works would comprise trial pits and cable percussion boreholes for geotechnical purposes and to provide groundwater and ground gas monitoring installations.

The results of the intrusive works should be reported in a Phase II Site Investigation and Environmental Assessment Report, which should specifically address the potential pollutant linkages, identified as part of this Phase I assessment.

9.2 DRAINAGE SURVEY

It is recommended that a full drainage survey should be completed to identify the location, design and functionality of interceptors and drains. All potentially polluting infrastructures (interceptors, underground tanks, and soakaways) should be surveyed, cleaned, and where necessary, decommissioned by specialist contractors prior to demolition and redevelopment of the Site.

9.3 UNDERGROUND SERVICE CONSTRAINTS

The Western Deep Sewer and King Scholars Pond Sewer are located beneath the site and appropriate mitigation will be necessary to ensure these are not affected by the Development. The LUL Victoria, District and Circle line tunnels are also located at depth and consultation would be required with LUL to again avoid adverse effects resulting by the Development.

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9.4 GROUND GAS

The Norwest Holst Ground Investigation identified the production and ingress of ground gas from the Alluvial deposits underlying the Site. The potentially infilled pond in the northeast portion of the Site may also be a source of ground gas. Further gas monitoring should be undertaken as part of Site Investigation works.

9.5 WASTE DISPOSAL

The construction of a two level basement to a maximum depth of approximately 20m Below Ground Level (bgl) beneath Buildings 5, 6b and 7a and other significant ground works will involve the excavation of significant quantities of soil.

Waste classification testing and assessment for any soils to be excavated and disposed of off Site should be included within the proposed Site Investigation works. This information should be made available to the cost consultant for the Site and included within the cost plan for the Development.

9.6 INSPECTION

An inspection of those areas not accessible during the current walk over should be undertaken.

9.7 FURTHER INFORMATION

A full copy of the Norwest Holst Site Investigation report, including appendices, should be requested and assigned to Land Securities.

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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 model	<p>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 base 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.</p> <p>Note 1: The conceptual 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.</p>
Contamination	<p>Presence of a substance which is in, on or under land, and which has <u>the potential</u> to cause significant harm or to cause significant pollution of controlled water.</p> <p>Note 1: There is no assumption in this definition that harm results from the presence of the contamination.</p> <p>Note 2: Naturally enhanced concentrations of harmful substances can fall within this definition of contamination.</p> <p>Note 3: Contamination may relate to soils, groundwater or ground gas.</p>
Controlled water	<p>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.</p> <p>Note 1: See Section 104 of The Water Resources Act 1991.</p>
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	<p>Upper layer of the earth's crust composed of mineral parts, organic substance, water, air and living matter.</p> <p>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.</p>
Source	<p>Location from which contamination is, or was, derived.</p> <p>Note 1: This could be the location of the highest soil or groundwater concentration of the contaminant(s).</p>
Uncertainty	Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.

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Glossary

Appendix A SITE PLANS

- **SITE LOCATION PLAN (FIG. A1)**
- **SITE PLAN (FIG. A2)**
- **SIMPLIFIED CONCEPTUAL MODEL (FIG. A3)**
- **VSU_FIGURE 12-1.DGN (1 PAGE)**

Appendix B SITE PHOTOGRAPHS

- o **PLATES 1-6 (3 PAGES)**

Appendix C HISTORICAL MAPS

- **FOR THE YEARS 1878, 1896, 1916,
1952, 1968, 1972, 1991 AND 2005 (8 PAGES)**

Appendix D CONSULTATION INFORMATION

- **LANDMARK TECHNICAL REPORT (70 PAGES)**
- **RESPONSE FROM THAMES WATER (1 PAGE)**
- **RESPONSE FROM LFEPA (5 PAGES)**
- **RESPONSE FROM WCC CONSUMER PROTECTION DEPARTMENT (2 PAGES)**
- **BGS BOREHOLE LOG TQ27NE1731 (8 PAGES)**
- **BACTEC REPORT (79 PAGES)**

Appendix E RISK RATING MATRIX

Table E.1: Risk rating for contaminated land qualitative risk assessment

Level of Severity	Likelihood		
	Most Likely	Reasonably Foreseeable	Unlikely
Acute harm or severe chronic harm. Direct pollution of sensitive water receptors or serious pollution of other water bodies.	High	High	Low
Harm from long-term exposure. Slight pollution of sensitive receptors or pollution of other water bodies.	Medium	Medium	Low
No significant harm in either short or long term. No pollution of water that is likely to affect sensitive receptors. No more than slight pollution of other water bodies.	Low	Low	Low

Appendix F ENVIRONMENTAL RECEPTORS

Table F.1: Pollution to controlled waters

'Section 78A (9) of the EPA 1990 defines the pollution of controlled waters as: "the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter".' (A35)

'Before determining that pollution of controlled water is being, or is likely to be, caused, the local authority should be satisfied that a substance is continuing to enter controlled waters or is likely to enter controlled waters. The local authority should regard something as being "likely" to be caused when the local authority judge it more likely than not to occur.' (A36)

'Land should **not** be designated as contaminated land where:

- (a) a substance is already present in controlled waters;
- (b) entry into controlled waters of that substance from land has ceased; and
- (c) it is not likely that further entry will take place.' (A37)

'Substances should be regarded as having entered controlled waters where:

- (a) they are dissolved or suspended in those waters; or
- (b) if they are immiscible with water, they have direct contact with those waters on or beneath the surface of the water.' (A38)

The term 'continuing to enter' should be taken to mean any entry additional to any which has already occurred. (A39)

Reproduced from DETR (2000) Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990 Circular 2/2000 and Scottish Executive Rural Affairs Department (2000) Circular 1/2000. Environmental Protection Act 1990: Part IIA – Contaminated Land.

Table F.2: Significant harm to various receptors

Type of receptor	Description of harm to that type of receptor that is to be regarded as significant harm
Human beings	<p>Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.</p> <p>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned.</p> <p>In the Guidance, this description of significant harm is referred to as a 'human health effect'.</p>
<p>Any ecological system, or living organism forming part of such a system, within a location which is:</p> <ul style="list-style-type: none"> • an area notified as an area of Special Scientific Interest under Section 28 of the Wildlife and Countryside Act 1981. • any land declared a National Nature Reserve under Section 35 of that Act • any area designated as a Marine Nature Reserve under Section 36 of that Act • an area of Special Protection of Birds, established under Section 3 of that Act • any European Site within the meaning of regulation 10 of the Conservation (Natural Habitats etc.) Regulations 1994 (i.e. Special Areas of Conservation and Special protection Areas) • any candidate Special Areas of Conservation or potential Special Protection Areas given equivalent protection 	<p>For any protected location:</p> <p>Harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location;</p> <p>or</p> <p>Harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location.</p> <p>In addition, in the case of a protected location, which is a European Site (or a candidate Special Area of Conservation or a potential Special Protection Area), harm which is incompatible with the favourable conservation status of natural habitats at that location or species typically found there.</p> <p>In determining what constitutes such harm, the local authority should have regard to the advice of English nature and to the requirements of the Conservation (Natural Habitats etc Regulations 1994.</p>

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Appendices

Type of receptor	Description of harm to that type of receptor that is to be regarded as significant harm
<ul style="list-style-type: none"> • any habitat or Site afforded policy protection under paragraph 13 of Planning Policy Guidance Note 9 (PPG9) on nature conservation (i.e. candidate Special Areas of Conservation, potential Special protection Areas and listed Ramsar Sites); or • any nature reserve established under Section 21 of the National Parks and Access to the Countryside Act 1949. 	<p>In the Guidance this description of significant harm is referred to as an 'ecological system effect'.</p>
<p>Property in the form of:</p> <ul style="list-style-type: none"> • crops, including timber • produce grown domestically, or on allotments, for consumption • livestock • other owned or domesticated animals; wild animals which are the subject of shooting or fishing rights. 	<p>For crops, a substantial diminution in yield or other substantial loss in their value, resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage.</p> <p>The local authority should regard a substantial loss in value as occurring only when a substantial proportion of the animals or crops are dead or otherwise no longer fit for their intended purpose. Food should be regarded as being no longer fit for purpose when it fails to comply with the provisions of the Food Safety Act 1990. Where a diminution in yield or loss in value is caused by a pollutant linkage, a 20% diminution or loss should be regarded as a benchmark for what constitutes a substantial diminution or loss.</p> <p>In the Guidance this description of significant harm is referred to as an 'animal or crop effect'.</p>
<p>Property in the form of buildings. For this purpose 'building' means any structure or erection and any part of a building, including any part below ground level, but does not include plant or machinery comprised in a building.</p>	<p>Structural failure, substantial damage or substantial interference with any right of occupation.</p> <p>For this purpose, the local authority should regard substantial damage or substantial interference as occurring when any part of the building ceases to be capable of being used for the purpose for which it is or was intended.</p> <p>Additionally, in the case of a scheduled Ancient Monument, substantial damage should be regarded as occurring when the damage significantly impairs the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument was scheduled in the Guidance this description of significant harm is referred to as a 'building effect'.</p>

Reproduced from DETR (2000) Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990. Circular 2/2000 and Scottish Executive Rural Affairs Department (2000) Circular 1/2000. Environmental Protection Act 1990: Part IIA – Contaminated Land.