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2.1 INTRODUCTION

2.1.1 This report has been prepared by Campbell Reith Hill LLP (CampbellReith) on behalf of the Haymarket Media Group ('the Client') relating to a site known as Teddington Riverside.

Scope of Assessment

2.1.2 This chapter considers the prevailing conditions at the site and the potential for contamination to generate potential environmental impacts relating to human health, controlled waters, and other environmental receptors associated with the redevelopment of the site.

2.1.3 The aim of the chapter is to assess the effects of the ground contamination upon the development in terms of the site subsequently being demonstrated as 'suitable for use' and also the effects during the 'construction' and 'operational' phases. Mitigation measures are identified where necessary and the resulting impact assessment is based upon a 'pre-mitigated' and 'mitigated scheme'. Impacts are therefore residual and these are summarised at the end of the chapter.

Data Collection

2.1.4 This section describes the methods used in undertaking the technical assessment and presents the criteria used for assessing impacts relating to ground conditions.

2.1.5 The assessment of baseline ground conditions at the site has been made through collection and review of available information on site history, geology and ground conditions and potentially contaminative uses on and adjacent to the site. This information has been sourced by CampbellReith and includes information from a site walkover and a Desk Study (or Preliminary Risk Assessment).

2.1.6 It should be noted that the technical reports used to inform the assessment of significant effects in this Environmental Statement chapter are risk assessments

derived from a function of consequence and probability, whilst effect is a function of the magnitude of change and the sensitivity of the receptor.

2.1.7 The Desk Study research is presented in full within CampbellReith Report: Teddington Riverside, Teddington, TW11 9BE, Geoenvironmental Desktop Study, Dated October 2013. This is contained within Appendix 2.1. In summary, the following primary references have been consulted:

TABLE 2.1: REFERENCES

Reference	Reference Title	Type
1	Geological Sheet 270 South London, Geological Survey of England and Wales (1:50,000)	Geological Map
2	Report Reference: 48975075_1_1	Envirocheck Report
3	Environment Agency Website [www.environment-agency.gov.uk]	EA Website
4	CIRIA Special Publication SP69: The Engineering Implications of Rising Groundwater Levels in the Deep Aquifer Beneath London.	CIRIA Report
5	HPA NRPB R920. Radon Atlas of England, 1996.	NRPB Radon Atlas
6	Bomb Sight Website [www.bombsight.org]	Bomb sight Website
7	CIRIA C681: UXO. A Guide for the Construction Industry. 2009.	CIRIA Publication
8	The Lost Rivers of London, N.J. Barton, 1982	Publication
9	Radon: Guidance on Protective Measures for New Buildings 2007. BRE Publication BR 211 BRE Publication BR 211.	BRE Publication
10	Consultation with the Building Control Officer of the London Borough of Richmond upon Thames.	Telephone conversation
11	Contaminated Land enquiry from the Scientific Officer of the London Borough of Richmond upon Thames.	Email
12	Petroleum search request from the London Fire and Emergency Planning Authority	Email

Technical Assessment Methodology

ASSESSMENT OF IMPACT

2.1.8 In the absence of intrusive site investigations at this stage of the project, the likely impacts of the development have been based on a 'worst-case' scenario of the potential for contamination, considering the potential sources of contamination identified at the site via the Desk Study research. It has been assumed that some contamination will exist. The forms of mitigation proposed are those typical for a project of this nature.

ASSESSMENT OF SENSITIVITY, MAGNITUDE AND SIGNIFICANCE

2.1.9 The assessment of sensitivity has considered the likely sensitivity of human, groundwater and surface water receptors, on and in the vicinity of the site, in conjunction with the sensitivity scale set out below.

TABLE 2.2: SCALE OF SENSITIVITY

Sensitivity	Description		
	Humans	**Groundwater**	**Surface water**
Very high	Residences with gardens or allotments	Principal Aquifer (formerly Major Aquifer) with a Source Protection Zone Groundwaters where River Basin Management Plans indicate a High current or predicted ecological and chemical quality	Surface watercourses with a GQA for chemical and/or biological water quality of 'A' Surface waters where River Basin Management Plans indicate a High current or predicted ecological and good chemical quality Watercourses within a SPA/SAC/Ramsar
High	Residences without gardens, agricultural land and schools	Principal Aquifer (formerly Major Aquifer) with no Source Protection Zone. Groundwaters where River Basin Management Plans indicate a Good current or predicted ecological and chemical quality	Surface watercourses with a GQA for chemical and/or biological water quality of 'B' Surface waters where River Basin Management Plans indicate a Good current or predicted ecological and good chemical quality Watercourses within a SSSI or those of high amenity value
Medium	Areas where there is human contact with	Secondary A Aquifer (formerly Minor	Surface watercourses with a GQA for chemical

Sensitivity	Description		
	Humans	**Groundwater**	**Surface water**
	the ground e.g. construction and maintenance	Aquifer) with no Source Protection Zone but which is in continuity with a watercourse Groundwaters where River Basin Management Plans indicate a Moderate current or predicted ecological and chemical quality	and/or biological water quality of 'C' Surface waters where River Basin Management Plans indicate a Moderate current or predicted ecological and good chemical quality
Low	Commercial or industrial development where there is little ground contact	Secondary B Aquifer (formerly water bearing components of Non-Aquifers) with no Source Protection Zone and which is not in continuity with a watercourse Groundwaters where River Basin Management Plans indicate a Low current or predicted ecological and chemical quality	Surface watercourses with a GQA for chemical and/or biological water quality of 'D' or 'E' Surface waters where River Basin Management Plans indicate a Low current or predicted ecological and fails chemical quality
Negligible	Areas with no human contact	Unproductive Strata (formerly Non-Aquifer) Groundwaters where River Basin Management Plans indicate a Bad current or predicted ecological and chemical quality	Surface watercourses with a GQA for chemical and/or biological water quality of 'F' Surface waters where River Basin Management Plans indicate a Bad current or predicted ecological and fails chemical quality

Notes: GQA - General Quality Assessment

2.1.10 The magnitude of potential effects has been considered based upon the scale set out below:

TABLE 2.3: SCALE OF MAGNITUDE

Magnitude	Description
Very Large	Extensive spatial distribution of contaminants where a full pollutant linkage has been identified.
Large	Concentrations of contaminants in excess of applicable thresholds **and** where a full pollutant linkage has been

Magnitude	Description
	identified
Medium	Concentrations of contaminants are below applicable thresholds **but** a full pollutant linkage has been identified.
Small	Concentrations of contaminants in excess of applicable thresholds **but** where no pollutant linkage has been identified.
Negligible	Concentrations of contaminants are below applicable thresholds **and** no pollutant linkage has been identified.

2.2.1 The significance of the identified impacts is determined on the basis of the matrix presented below.

TABLE 2.4: SIGNIFICANCE MATRIX

Magnitude of effect	Sensitivity of receptor				
	Very high	High	Medium	Low	Negligible
Very large	Substantial Significance	Substantial Significance	Moderate Significance	Moderate Significance	[1]
Large	Substantial Significance	Moderate Significance	Moderate Significance	Minor Significance	[2]
Medium	Moderate Significance	Moderate Significant	Minor Significance	[2]	Neutral Significance
Small	Moderate Significance	Minor Significance	[2]	Neutral Significance	Neutral Significance
Negligible	[1]	[2]	Neutral Significance	Neutral Significance	Neutral Significance
[1] The choice between '*Moderate Significance'*, '*Minor Significance'* and *'Neutral Significance' will* depend on the specifics of the impact and will be down to professional judgement and reasoning.					
[2] The choice between '*Minor Significance'* and '*Neutral Significance'* will depend on the specifics of the impact and will be down to professional judgement and reasoning.					

2.2 POLICY CONTEXT

National Planning Policy

2.2.1 This section provides an overview of the relevant legislation, planning policy and guidance at national and local levels that is considered relevant to the development with respect to the assessment of land contamination.

2.2.2 This particularly comprises:

- Part IIA of the Environmental Protection Act (EPA) 1990, published by HMSO (1990);
- Environment Act 1995, published by HMSO (1995);
- Contaminated Land (England) Regulations 2012 (Amendment) No 263;
- Environmental Protection Act (EPA) 1990: Part 2A Contaminated Land Statutory Guidance, published by DEFRA (April 2012) and HM Government Water Act 2003, published by HMSO (2003);
- DEFRA / Environment Agency Contaminated Land Report CLR 11 (2004);
- CIEH / CL:AIRE Guidance on comparing Soil Contamination Data with a Critical Concentration (2008);
- National Planning Policy Framework Published by the Department for Communities and Local Government (2012);
- Building Regulations (in particular Approved Document C); and,
- European Union Water Framework Directive and Groundwater Daughter Directive.

Definition of Contaminated Land

2.2.3 "Contaminated land" is defined under Part IIA (Section 78A(2)) of the Environmental Protection Act, 1990 (inserted by Section 57 of the Environment Act, 1995)[1], as:

"Any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

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

Key National Technical Guidance

2.2.4 The principal guidance document for the assessment of land contamination is presented in Department for Rural Affairs (DEFRA) / Environment Agency (EA)

[1] Statutory Instrument No 3026. (2005). The Environmental Protection Act 1990 (Amendment of Section 57) (England and Wales) Regulations 2005.

document *Model Procedures for the Management of Land Contamination* (CLR11).

2.2.5 This outlines the main assessment framework comprising the requirement of a Conceptual Site Model (CSM) which summarises the feasible pollutant linkages at a site. A pollutant linkage consists of a contaminant source, pathway and receptor. Each of these elements can exist independently, but they create a risk only where they are linked together.

2.2.6 Once a pollutant linkage is established an appraisal of **risk** is made considering the **sensitivity** of the receptor, the **severity** of the potential impact and the **likelihood** of that impact occurring.

2.2.7 The feasibility of a pollutant linkage and risk of harm is summarised in the CSM in order to demonstrate whether the site is 'suitable for use'. This is undertaken through a combination of both qualitative (Tier 1) and quantitative (Tier 2) risk assessment. The evaluation process[2] fundamentally incorporates: Phase 1: Hazard Identification; Phase 2: Risk Assessment; and Phase 3: Remediation Design and Verification.

2.2.8 The Environment Agency (EA) has produced specific guidance in relation to their policies and practice in relation to both groundwater and land contamination. These comprise: Groundwater Protection: Policy and Practice or GP3 and Guiding Principles for Land Contamination (GPLC).

<u>NPPF</u>

2.2.9 The National Planning Policy Framework states that planning policies and decisions must 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; and,*

[2] Full details are presented in the Model Procedure for Contaminated Land (Contaminated Land Report 11)

- *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".* [3,4]

2.2.10 The *minimum* level of information to appraise these matters is a Desk Study and site visit but it is incumbent upon the developer to collect 'adequate' information.

2.2.11 The NPPF provides a link to technical procedures via BS 10175 "Investigation of Contaminated Sites – Code of Practice", which in turn lists the plethora of associated technical guidance documents and British (and European) standards.

Regional Planning Policy

2.2.12 The London Plan does not offer any specific guidance to outline an approach for developers. However, it encourages the inclusion of remediation of contaminated sites in Local Development Frameworks (LDFs), urging development of brownfield sites, whilst ensuring contamination is not spread or activated.

Local Planning Policy

2.2.13 The London Borough of Richmond upon Thames has a Contaminated Land Strategy. This was adopted following Public Consultation, approved for Publication by Richmond Council, 14th August 2001. This outlines the cycle of inspection for Contaminated Land. It can be obtained at:

http://www.richmond.gov.uk/home/environment/pollution/land_contamination/contaminated_land_strategy.htm

2.2.14 In addition their website illustrates the publication of: London Borough of Richmond upon Thames, Supplementary Planning Guidance on redevelopment of potentially contaminated sites, 2003.

http://www.richmond.gov.uk/supplementary_planning_guidance-3.pdf

[3] The full definition is presented in Paragraphs 109, 111 and 121 of the NPPF
[4] Environmental Protection Act 1990 (including Part IIA). It should be recognised that 'Contaminated Land' under part IIA has a narrower definition than land 'affected' by contamination. Refer to DEFRA Contaminated Land Statutory Guidance April 2012 for full definitions.

2.2.15 The introduction to this guidance states:

" This guidance is to outline the approach the Council expects developers to take in relation to contaminated land issues for ensuring compliance with the requirements of the Town and Country Planning Act 1990 and Planning Policy Guidance Note (PPG) 23: Planning and Pollution Control, 1994 to bring the land into a 'suitable-for-use' state as well as to address possible future liabilities under Part ll A of the Environmental Protection Act 1990. In addition to these the Building Regulations 1991 under the Building Act 1984 must be observed to protect the fabric of new buildings and their occupants."

2.2.12 It is noted that PPS23 has been superseded by the NPPF and this policy does not appear to have been specifically updated to address this. As such the national policy associated with the NPPF would preside over planning matters. It is noted however the process of technical assessment has not been substantially altered and the ultimate standard of performance remains, e.g. demonstrating the site is "suitable for use" and does not constitute "Contaminated Land".

Core Strategy

2.2.13 Richmond's Core Strategy and Development Management Plan outline the Council's commitment to sustainable construction and the overall environmental impact of new developments, including demolition and redevelopment. Section 8 [The Spatial Policies] specifically considers the adverse impacts of development including that of ground contamination. It is noted that this again refers to PPS 23 (noted above).

2.2.14 The Core Strategy seeks to:

"maximise the effective use of resources including land, water and energy, and assist in reducing any long term adverse environmental impacts of development. Development will be required to conform to the Sustainable Construction checklist" and notes "Almost all new development will be on brownfield sites."

2.2.15 One of the principles which is to be promoted is [1D] one of Reducing Environmental Impact and it states:

"Development should seek to minimise the use of open land for development and seek to maintain the natural vegetation, especially trees, where possible. Local environmental impacts of development with respect to factors such as noise, air quality and contamination should be minimised.".

2.2.16 The plan aims to take account of existing national guidance and exceed national standards, if possible, as set out in Core Policy CP1. It further states that "The implementation of this policy will be through the development process and operation of the Sustainability Checklist SPD.".

2.2.17 It is noted that preparation of the assessment of Ground Contamination forms the Preliminary stage of the process that will allow the principles set out in the Core Policy to be satisfied with respect to land contamination. The potential issues have been identified and can be thereafter controlled.

2.2.18 As part of this strategy, a target of five remediated contaminated land sites must be completed per year, which will act as a performance indicator for the Council's progress in achieving the highest level of sustainable construction and the implementation of CP1 Sustainable Development. The target achieved is published each year in the Annual Monitoring Report (AMR) as required by the Planning and Compulsory Purchase Act 2004.

2.3 BASELINE CONDITIONS

Site Condition

2.3.1 The site location is presented in Figure 2.1. An annotated site layout plan is presented in Figure 2.2.

2.3.2 The site is currently occupied by Teddington Studios which has a main central building split into Haymarket and Pinewood areas. The Haymarket area

comprises 'listening rooms' for testing of audio equipment and a photographic studio, main reception area and coffee shop at ground floor level, with offices above. The Pinewood area of the main building comprises television studios. A building in the north east of the site comprises offices, which are currently being refurbished. This is a former restaurant which has not been used for years. The building along the eastern site boundary comprises multi-storey car parking and further office space to the south. Surface car parking areas are situated in the north and west of the site.

2.3.3 A number of trees are present on site along the western site boundary and in the north of the site. A number of trees are located within the car park on the studio grounds. The tallest is about 20m high located approximately 10m west of the Studios building.

2.3.4 The northern site boundary is retained by an existing riverside wall, which appears to be of sheet pile construction. There is also a retaining wall approximately 0.5m in height retaining the car park to the west.

Geology

2.3.5 Given the history of development at the site, it is likely that the natural geological materials are overlain by a thickness of Made Ground. The geological sheet for the area indicates that the site geology comprises River Terrace Deposits over London Clay. However, the sheet indicates the presence of Alluvium close to or just within the northern corner of the site and that the boundary for this geological unit is imprecise. Therefore, for the part of the site closest to the River Thames, the possibility of alluvial soils (between the Made Ground and the River Terrace Deposits) should be recognised. A summary of anticipated geology is shown below.

TABLE 2.5: SUMMARY OF ANTICIPATED GEOLOGY

Strata	Depth to Base (m bgl)	Depth to base (m AOD)	Thickness (m)	Typical Description
Made Ground	1 to 2[b]	4 to 5	1 to 2[b]	A mixture of cohesive and granular man-made soils associated with historic development of the site.
Alluvium[a]	2 to 3[b]	4 to 3	1 to 2[b]	Soft clay and silt, with bands of loose sand, gravel. Often contains bands of soft organic rich clay and peat.
River Terrace Deposits	5 to 6	1	3	Kempton Park Gravel (Medium dense gravel and sand. Can be clayey in part)
London Clay	65	-60	60	Stiff fissured grey clay, becoming very stiff at depth. Weathers near surface to an orange-brown colour and firm consistency.

a - where present
b - based on historic SI, held in CampbellReith GIS system, and located 300m to the north of the site. Actual values may vary.

Hydrogeology

2.3.6 The north of the site is underlain by a Superficial Secondary (undifferentiated) aquifer. This is likely to relate to the Alluvium. The rest of the site is underlain by a Superficial Principal Aquifer. This is likely to relate to the River Terrace Deposits. The bedrock (London Clay) has been designated as 'unproductive strata'.

2.3.7 The groundwater in the Alluvium and River Terrace Deposits are likely to be in hydraulic continuity with the River Thames. A summary of hydrogeology is presented below.

TABLE 2.6: SUMMARY OF HYDROGEOLOGY

Type	Distance	Description	Reference
Superficial Principal Aquifer	On site	Soils with high inter-granular permeability which can provide a high level of water storage and may support water supply and/or river base flow on a strategic scale.	2 & 3
Soil Leaching Potential	On site	Due to the urban setting of the site, the Environment Agency suggests that an assumed high soil leaching potential.	2
Source Protection Zone	>2km	N/A	2 & 3
Groundwater Abstractions	75-95m SW 160-180m E	In the Envirocheck Report there a multiple references to Boreholes A and B associated with the 'Lensbury Club' discussed below. None of these relate to potable supply – they relate to use in spray irrigation at sporting facilities.	2
Rising groundwater	N/A	With respect to foundations and basements, the site is remote from any 'critical areas' associated with the potential for rising groundwater.	4

2.3.8 There are seven abstraction licences relating to 'Borehole A' and 'Borehole B' associated with the Lensbury Club, adjacent to the site. The Envirocheck report suggests that Borehole A is located around 75 to 95m to the southwest of the site and Borehole B is recorded as being present around 160 to 180m to the east of the site. The aquifer relating to these abstractions is not stated. All of the abstractions relate to 'direct' spray irrigation of sports grounds and golf clubs. Only two of the entries provide information on the rate of abstraction: 91m^3 daily and 6000m^3 annually.

Hydrology

2.3.9 Data contained in the Envirocheck report indicates that water quality of the Hogsmill-Teddington stretch of the River Thames has progressively improved with time, with a Chemistry GQA grade of 'C' 'fair' recorded from 1990 to 1998 and 'A' 'very good' between 2003 to 2007.

TABLE 2.7: SUMMARY OF HYDROLOGY

Type	Distance	Description	Reference
Surface Waters	0	The River Thames is adjacent to the north of the site. The Hogsmill-Teddington Stretch of the River Thames indicated to have GQA grade of B 'good'.	2
Surface Water Abstractions	>1km	N/A	2

Radon

2.3.10 Reference to the National Radiological Protection Board (NRPB) Atlas [7] and BRE 211 document [9] indicates that the site does not fall within an area where basic or full radon protection measures are considered necessary for domestic dwellings, nor is it in an area requiring a geological assessment for such measures.

Sensitive Land-Uses

2.3.11 The Envirocheck Report indicates that there is a Local Nature Reserve and Nitrate Vulnerable zones at 135m and 120m from the site respectively.

Site History

2.3.12 Information relating to the site history has been obtained by reference to the historical maps contained within the Envirocheck Report and is summarised below.

TABLE 2.8: SUMMARY OF SITE HISTORY

Date	Development
1850	The site generally comprises open land.
1865	Buildings denoted 'The Weir' (later 'Weir House') are indicated. The remainder of the site is landscaped. A well and two pumps are indicated to be present in the western quadrant of the site.
1894	The buildings have been extended. The well and pump are no longer shown.
1896	Another pump is shown in the south western quadrant of the site. A boat house

	exists on the north western corner of the site.
1934	New buildings in addition to 'Weir House' are shown. These new buildings are indicated to house film studios.
1948	At some time between 1940 and 1948 the buildings at the site were demolished and replaced by new structures.
1959	The 1959 plan indicates the construction of additional new buildings. 'Tanks' are recorded in the north east and south east of the site. The site is now indicated to be the 'Teddington Film Studios'. The boat house is no longer evident.
1978	At some time between 1975 and 1978 most of the buildings at the site were demolished and replaced with new structures. The tanks are no longer shown. An electricity substation is present in the north of the site and the site is now indicated to be a 'Television Studio'.
2013	The plans consulted do not indicate significant changes from 1978 to 2013.

TABLE 2.9: SUMMARY OF ADJACENT LAND HISTORY

Date	Development
1850	Surrounding land use generally comprises open land.
1865	A graveyard is present approximately 120m west of the site. The River Thames is present adjacent to the north.
1896	Pumps are indicated 10m south west of the site, 20m south of the site and 170m away from the southern quadrant of the site.
1915	Tramway now present around 85m to the south west.
1920	Tramway not shown.
1933	On the other side of the Thames, at a location about 200m north of the site, a possible excavation associated with' sand and ballast works 'is indicated.
1948	The building layout to Lansbury House, 30m South East had notably changed.
1959	A small 'works' building is noted 60m to the north west.
1966	Excavation for ballast to the north no longer shown.
1978	'Works' building to the north west shown. A substation is also indicated about 100m to the south east of the site boundary.
1991	A swimming pool is indicated about 20m from the east of the site.
1993-1994	The substation about 100m to the south east of the site boundary is still shown.
1994-2013	The plans consulted show the addition of sports and leisure centres in the area through the years plus more residential developments and schools.

Unexploded Ordnance (UXO)

2.3.13 A preliminary review has been made of the UXO risk presented by the site based upon CIRIA C681 ('Unexploded Ordnance (UXO) – A guide for the construction industry'). The risk of encountering UXOs is considered **Low** in relation to ground investigations, piling operations and excavation for facilities and

services. However, a **Low- Medium** potential is suggested for basement excavations.

Current Industrial Setting

2.3.14 Reference to the Envirocheck Report has identified three active entries within the Contemporary Trade Directory within 250m of the site. These comprise ultrasonic equipment manufacturers on Broom Road in the southwestern part of the site, marine equipment & supplies (70m north west) and a soft furnishings manufacturer (250m north west). Other Inactive entries within 250m of the site comprise car dealers, indicated to be present in the south western part of the site, and boat builders and repairers on Ferry road (70m north west) at the location of the current marine equipment and supplies.

2.3.15 The table below summarises identified industrial features within 250m of the site, which may present a potential source of contamination to the site based upon the Envirocheck Report.

2.10: INDUSTRIAL SETTING

Type	Distance	Description
Discharge Consents	210m NW	Relates to discharge to land/soakaway for final/treated effluent for a single domestic property approved by the Environment Agency.
Pollution Incidents to Controlled Waters	0m N	[Category 3:minor incident] Pollutant: unknown sewage Date: 11th June 1997 Ref: HSE1997032324.
	0m N	[Category 3:minor incident] Pollutant: Oils unknown Date: 2nd February 1996.Ref: SE960075.
	0m N	[Category 3:minor incident] Pollutant: Oils unknown Date: 26th July 1991 Ref: SE910214.
	0m N	[Category 3:minor incident] Pollutants: Oils-unknown Date: 6th October 1990 .Ref: SE900292.
	45m N	[Category 3:minor incident-no pollution was found] Pollutants: Miscellaneous-Natural.Date:17th November 1998.Ref: THSE1998041140.
	85m N	[Category 3:minor incident] Pollutants: Oils-unknown Date: 27th March 1996.Ref: SE960135.
	100m NW	[Category 3: minor incident].Pollutants: Chemicals-unknown.Date:10th May 1990.Ref: SE900141.
	110 E	[Category 3:minor incident] Pollutants: Oils-unknown Date:

Type	Distance	Description
		17th July 1992.Ref: SE920227.
	130m E	[Category 3:minor incident] Pollutant: unknown sewage. Date: 19th September 1989 Ref: S1890460.
	155m NE	[Category 3:minor incident] Pollutant: Miscellaneous-natural.Date:30th April 1999 .Ref: THSE1999042983.
	160m NE	[Category 3:minor incident] Teddington. Pollutant: Oils-unknown.Date:15th October 1990.Ref: SE900296.
	175m NW	[Category 3:minor incident] Teddington. Pollutant: Oils-unknown.Date:22nd September 1990.Ref: SE900286.
	185m N	[Category 3:minor incident] Pollutant: Oils-unknown. Date: not supplied. Ref: SE950308.
	205m E	[Category 3:minor incident] Pollutant: Oils-unknown.Date:7th August 1989.Ref: N1890418.
	210m N	[Category 3:minor incident] Pollutants: Oils-unknown.Date:25th May 1993.Ref: SE930143.
Substantiated pollution incident register	150m N	[Water impact: Category 2-significant.Land and air impact: Category 4-no impact] Pollutants: Oils-diesel (including agricultural).Date:11th March 2002.Ref:63255.

Consultation with Building Control

2.3.16 The Building Control Department of The London Borough Of Richmond upon Thames were contacted during the preparation of the Desk Study. They indicated that, with respect to geology, alluvial clay is typically encountered close to the River Thames, whereas closer to Broom Road, River Terrace Deposits are typically encountered. They did not have specific records of any substantial thicknesses of Made Ground at the site, however, they did note the presence of a gravel pit on the opposite side of the River Thames (which has since presumably been backfilled).

Consultation with Contaminated land/ Environmental Services

2.3.17 The Contaminated Land Department at The London Borough of Richmond upon Thames were contacted during the preparation of the Desk Study. The Scientific Officer indicated that they do not hold records of any current or former landfill sites within 500m of the site and confirmed that a degree of Made Ground is likely to be present in view of the history of the site.

2.3.18 They are not aware of any specific issues or hold any records relating to gas emissions, pollution incidents or contamination either on or adjacent to the site.

2.3.19 The Officer does hold records of above ground storage tanks located on site as well as an electricity substation.

2.3.20 The Officer is not aware of any problems with asbestos/radon/radioactivity on the site but notes that in view of the age of the buildings on site it is likely that asbestos is present on site.

Potential Sources of Contamination

2.3.21 In generality, the site has a relatively benign history with respect to potential sources of contamination with a consistent non industrial use. However there are a number of potential contamination sources that have been identified on or near the site. These are summarised below. The potential contaminant types associated with these is then given based upon a review of CLR 11, industry profiles and anecdotal information.

TABLE 2.11 POTENTIAL SOURCES OF CONTAMINATION

Feature on or near site	Potential Contaminant
Areas of backfilling and Made Ground resulting from historical demolition of the site and surrounding area	Metals and hydrocarbons, particularly PAHs. In addition, Asbestos Containing Materials (ACM) may be present associated with backfilled demolition arisings from historical development. Deleterious constituents of the Made Ground or organic deposits within the Alluvium may also give rise to elevated levels of hazardous ground gases (carbon dioxide and methane).
Former car dealers	If painting was done on site possible contaminants could be solvents and fuel oils together with inorganic compounds Asbestos Containing Materials may be present from waste disposal/storage from the vehicle parts.
Sub-station on site	Poly-chlorinated biphenyls (PCBs), hydrocarbons and volatile organic compounds (VOCs).
Existing and historic tanks in former film studio grounds	Hydrocarbons and VOCs.
Below ground sewage tank	Metals, Inorganic chemicals and organic chemicals.

(east of the site which is used to store sewage pumped from the building prior to being pumped off-site)	
Above ground fuel storage tank (north-east of the site)[a]	Hydrocarbons and VOCs.
Gas/oil tank and unknown tanks in the car parking area in the south west of the site[b]	Hydrocarbons and VOCs.
Generators in the south west of the site.	Hydrocarbons, VOCs and PCBs.
Recycling areas including mercury recycling	Miscellaneous, including mercury.
Chemical storage area	Hydrocarbons, VOCs and SVOCs.

a) On-site personnel have confirmed that the tank is double skinned and contains red-diesel to power a generator.

B) No obvious signs of leakages were noted during the site walkover.

Pathways

2.3.22 In the context of the proposed site uses, the following potential pathways are considered applicable and have been appraised.

TABLE 2.12: EXPOSURE PATHWAYS

Pathway		Phase
Ingestion of soil / dust	Outdoor	C, O
	Indoor	O
Inhalation of soil / dust	Outdoor	C, O
	Indoor	O
Inhalation of vapour from soil / dust / water	Outdoor	C, O
	Indoor	O
Dermal contact with soil / dust / water	Outdoor	C, O
	Indoor	O
Migration of soil gases to confined spaces / structures	Indoor	C, O, B
	Outdoor	O
Migration of water borne contaminants	On site	C, E, O
	Off site	E
Leaching of contamination from Made Ground	On site	C, E, O
	Off site	E
Movement of contaminants to engineered structures (e.g. water pipes)	On site	C, O, B
Notes: C – Construction. O – Occupation. E – Environmental effect off site. B – Buildings and services.		

Receptors

2.3.23 In the context of the above the following potential receptors have been identified:

TABLE 2.13: POTENTIAL RECEPTORS

Receptor	Description
Construction Workers	Construction and maintenance workers are likely to be exposed in the short term only.
Groundwater	Assumed hydraulic continuity between the groundwater and the River Thames
Surface Water	The site is located on the banks of the River Thames.
Site end users	Residential end users.

2.4 PREDICTING THE IMPACTS OF DEVELOPMENT

2.4.1 The following section assesses the 'pre-mitigated' impacts on the identified receptors during the construction and post-construction phases of the scheme.

CONSTRUCTION PHASE

Construction Workers

2.4.2 The Desk Study has identified the potential pathways whereby remediation workers could be exposed to contamination. In the absence of mitigation, such an impact is considered to be of a large magnitude and the ground workers of medium sensitivity. This equates to a pre-mitigated significance of 'moderate' significance. The adverse effects would be short term.

Groundwater

2.4.3 A limited number of potential sources and pathways exist and contamination could pass into the Principal Superficial Aquifer including migration of dissolved contaminants or hydrocarbon free product from the Made Ground. The foundation and basement works are likely to penetrate the Alluvium and create a pollutant linkage to Principle Aquifer potentially enhancing the polluting linkage.

2.4.4 In the absence of mitigation, such impacts are considered to be of large magnitude, occurring over the short to medium term, and the groundwater of high sensitivity. This equates to a significance of moderate.

Surface Water

2.4.5 Construction activities at the site have the potential to increase the quantity of contaminants entering the River Thames during groundwork construction activities as a result of spillages or fugitive emissions from the site.

2.4.6 The pre-mitigated magnitude of effect is considered to be medium-large given the potential hydraulic connectivity at the site and the assumed presence of localised contamination. The River Thames is considered to be of high sensitivity. The significance of impact is therefore considered to be adverse, short term and of moderate significance.

POST - CONSTRUCTION PHASE (WITHOUT MITIGATION)

End users

2.4.7 The Desk Study has identified the potential pathways whereby end users could be exposed to contamination. In the absence of mitigation, such an impact is considered to be of a large magnitude and the end users of very high sensitivity. This equates to a pre-mitigated significance of substantial significance. The adverse effects would be long term.

Maintenance Works

2.4.8 There is a possibility that some residual ground contamination could be retained on the site and without control present a risk during routine ground works. Such contamination could present a medium to large magnitude effect over the short term to maintenance workers who are of medium sensitivity, resulting in an event of minor to moderate significance.

Ground and Surface waters

2.4.9 Without mitigation the risks to both ground and surface waters would be those considered during the pre-construction phase.

Summary

2.4.10 A summary of the Pre Mitigated Impacts is presented below.

TABLE 2.14: SUMMARY OF IMPACTS WITHOUT MITIGATION

Topic Area Land Contamination	Description of Impact	Geographical Importance					Impact	Nature	Significance Before Mitigation
		N	R	S	D	L			
Construction Workers	During Construction					*	Large	Short term	Moderate

	Post Development					*	Large	Short term	Moderate
Groundwater	During Construction					*	Large	Short - Medium Term	Moderate
	Post Development					*	Large	Short to Medium Term	Moderate
Surface Water	During Construction					*	Medium – Large	Short to Medium Term	Moderate
	Post Development					*	Medium – Large	Short to Medium Term	Moderate
Site End Users	During Construction					*	NA	NA	NA
	Post Development					*	Large	Long Term	Substantial

KEY:

Geographical Level of Importance	Impact	Nature of Impact	Significance
National	Adverse	Long Term	Significant
Regional	Neutral	Short Term	Moderate
Sub-Regional	Beneficial		Low
District			No Effect
Local			

2.5 MITIGATION AND RESIDUAL IMPACTS

CONSTRUCTION PHASE

2.5.1 This section considers the mitigations proposed and the post mitigation ('residual') effects on the receptors (many of which are ultimately beneficial).

2.5.2 The process of mitigation will be implemented by the normal stages for land contamination identified in CLR 11 and BS10175. The principle stages will

comprise: Site Investigation (main / supplementary); Risk Assessment (qualitative and quantitative (generic to detailed)); Remediation Specification; Verification Reporting; and Monitoring.

SITE INVESTIGATION / RISK ASSESSMENT

2.5.3 An intrusive site investigation will be carried out prior to the commencement of development, which will allow further characterisation of contamination within soils and groundwaters. Thereafter assessments will be made for the risk to controlled waters and appropriate remedial targets established for any subsequent remediation.

2.5.4 The findings of the intrusive investigations will allow the potential sources of contamination to be better characterised and in turn appropriate Risk and COSHH Assessments to be established for the main works phase, so as to control risk.

REMEDIATION

2.5.3 A Remediation Specification will be developed to address the risks identified in the site investigation including both short and long term risks to people and the environment.

2.5.4 The Remediation Specification will be agreed with the regulators via the planning process so as to demonstrate the site is, after remediation, "suitable for use". The particular aspects of this and associated impacts are described below.

Construction Workers

2.5.5 Health and safety documentation will be prepared and measures are to be taken to ensure worker safety and public and environmental amenity to be fully compliant with the Health and Safety at Work, Construction and Design (Management) Regulations, Environmental Protection Act and Control of Hazardous Substances Acts.

2.5.6 The design for working protocols will be in general accordance with HSE publication HS(G) 66 and CIRIA Report 132, and include measures to prevent off-site nuisances (such as dust) occurring.

2.5.7 By following the above approach, the magnitude of impact to construction workers will be reduced to small as the pollutant linkage will effectively be removed and therefore impacts are considered to be short-term and of neutral to minor adverse significance.

Groundwater

2.5.8 Features such as the fuel tanks will be removed in a controlled fashion and any associated contamination remediated to ameliorate the risk to groundwaters.

2.5.9 The provision of a modern drainage design will subsequently remove the potential for uncontrolled drainage and percolation through soils which may contain residual contamination. The provision of these measures will recognise the standing comments from the Environment Agency noted in in pre-application discussions (EA Letter Reference SL/2013/111434/01-L01, 7 August 2013) as summarised below:

"*Of the drainage options for a site, infiltration techniques (primarily soakaways) pose the highest risk of polluting the groundwater…. Ultimately, any drainage design must be protective of the groundwater and in line with our Groundwater Protection: policy and practice (GP3) for the use of infiltration techniques to be approved. If contamination is present in areas proposed for infiltration, we will require the removal of all contaminated material and provision of satisfactory evidence of its removal; The point of discharge should be kept as shallow as possible. Deep bored infiltration techniques are not acceptable; The distance between the point of discharge and the groundwater table should be a minimum of five metres; Only clean, uncontaminated water should be discharged into the ground".*

2.5.10 The residual risk from foundations will be controlled by the completion of an appropriate Piling Risk Assessment.

2.5.11 The Remediation Specification will implement Pollution Prevention Guidance and general good practice on site (such as CIRIA C692 (3rd Ed) 'Environmental good practice on site') to minimise the potential for fugitive emissions.

2.5.12 The magnitude of the effect will be therefore reduced to be negligible and the impact is considered to be of neutral significance.

Surface Water

2.5.13 Provisions to control minimise risks to construction workers and groundwaters will also reduce risks to surface waters. In addition, any proposals for new remissions from the site will be controlled under the Environmental Permitting Regulations 2010 (or successors).

2.5.14 The magnitude of the effect will therefore be reduced to negligible and the impact is considered to be of neutral significance.

POST-CONSTRUCTION PHASE

End users

2.5.15 The Remediation Specification will contain an appropriate remedial solution, which could for example comprise: provision of suitable validated soils in garden areas; appropriate gas protection for the structures; and the remediation of contamination which would otherwise present an unacceptable risk.

2.5.16 The magnitude of effect will therefore be reduced to negligible and the significance of effect neutral which will be long term.

Maintenance Workers

2.5.17 Residual ground contamination (if any) will be controlled via the provision of the Health and Safety File for the site and the Verification Report, highlighting any potential areas of risk and the adoption of appropriate working protocols. This will reduce the magnitude of any effects to negligible and of a neutral significance.

Groundwater

2.5.18 As a result of the remediation there will be an associated improvement in site condition which will be of longer term beneficial impact of minor significance to groundwater.

Surface waters

2.5.19 As a result of the remediation there will be an associated improvement in site condition which will be of longer term beneficial impact of minor' significance to groundwater.

TABLE 2.15: SUMMARY OF IMPACTS WITH MITIGATION

Topic Area Land Contamination	Description of Impact	Geographical Importance					Impact	Nature	Significance After Mitigation
		N	R	S	D	L			
Construction Workers	During Construction					*	Small	Short term	Neutral - Minor
	Post Development					*	Negligible	Short Term	Neutral
Groundwater	During Construction					*	Negligible	Short Term	Neutral
	Post Development					*	Minor	Long Term	Beneficial
Surface Water	During Construction					*	Negligible	Short Term	Neutral
	Post Development					*	Minor	Long Term	Beneficial
Site End Users	During Construction					*	NA	NA	NA

	Post Development					*	Negligible	Long Term	Neutral

2.6 SUMMARY AND CONCLUSIONS

2.6.1 A localised risk from Ground Contamination has been identified at the site. This is primarily associated with localised potential sources of contamination inferred by the presence of features such as fuel tanks.

2.6.2 The site is sensitive due to the presence of the adjacent River Thames and Principle Aquifer which underlies the site. In addition a proposed residential development is of high sensitivity.

2.6.3 A Desk Study has so far been completed in order to appraise the potential environmental impacts. In accordance with normal planning and technical procedures a process of site investigation and risk assessment will be completed in due course to determine the scope of appropriate remedial measures. Thereafter a Remediation Specification and Verification Report will be produced so as to implement the required actions. It would be anticipated that normal planning conditions will be attached to such matters.

2.6.4 If no mitigation were completed during development then the effects are considered to be generally Moderate. However, this would not only present a risk, but also fall short of the required planning requirements for contamination and fail to fulfil the Core Policy Objectives to obtain sustainable redevelopment of brownfield land.

2.6.5 Assuming the provisions for investigation, risk assessment, remediation and verification are implemented, any short term impacts will be small or negligible and thereafter longer term benefits will be obtained by a reduction in contamination.