PRELIMINARY RISK ASSESSMENT

SITE DETAILS:

PA Housing Limited
The Strathmore Centre,
Strathmore Road,
Teddington,
TW11 8UH

APPLICANT DETAILS:

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1 EXECUTIVE SUMMARY

Please note that this executive summary forms part of WISER Environment Ltd's Phase I Preliminary Risk Assessment (Ref: K360.1~11~001) and must be read in conjunction with the information contained therein.

At the land residing at The Strathmore Centre, Strathmore Road, Teddington, TW11 8UH, PA Housing Limited (subsequently PA Housing) plan to demolish the existing buildings and develop the site into residential dwellings. The main building at the centre and north of the site was recently used as a childcare nursery. The building in the southern section of the site continues to operate as a childcare nursery and has a car park to serve this function.

The desktop study has revealed that the site has undergone limited historical development. The site functioned as allotment gardens before Strathmore School was constructed in around 1963. The main building is unoccupied, and the southern building is used as a childcare nursery. The site is bound by residential properties and Stanley School lies to the north of Strathmore Road.

The desktop study has highlighted potential sources of contamination with a potential impact on future occupants and/or the environment.

The Unexploded Ordnance (UXO) Threat Assessment (Appendix) identified six high explosive bomb strikes from WWII, the closest was 10 m west of the site. The assessment concluded that the potential for a UXO hazard to occur is **Likely**. The recommended next stage in the risk management framework is to undertake a Detailed UXO Threat & Risk Assessment.

Due to the period the buildings on site were constructed it is likely that they were built with Asbestos Containing Materials (ACM). This Preliminary Risk Assessment concludes there is a **Medium** risk posed by ACM. It is recommended to undertake an asbestos survey to identify any ACM. The removal of any ACM must be carried out by a suitably qualified person and disposed of at an appropriately permitted waste facility. Records must be kept.

Previous land uses include a garage used as storage for car maintenance classes from 1974; a well identified from 1896-1898, this must have been backfilled with unknown material; and the site was identified as allotment gardens in the 1915 map only. The garage to the west of the site was not accessible during the site reconnaissance. This Preliminary Risk Assessment concludes there is a **Low** risk posed by these previous land uses.

The Preliminary Risk Assessment and Conceptual Site Model concludes that there is a **Medium** risk in land use terms posed by potential contamination.

2 INTRODUCTION

2.1 Context

This Preliminary Risk Assessment has been undertaken to ascertain whether there is potential for contaminant sources to be present and to pose a risk to future site occupants or the environment, at land taken by the Strathmore Centre. The report will be utilised as an initial review and characterisation of the site to support the planning application to demolish the current buildings and build a residential development on the site.

The report has been produced by WISER Environment Limited following instruction from PA Housing.

This report is intended to identify and inform as to the extent of any potential land contamination issues that may impact the intended new use. If potential for pollutant linkages is identified, the conceptual site model should be refined. A generic quantitative risk assessment should be undertaken to assess whether pollutant sources are present and significant and, if so, whether linkages exist which may allow contaminants to adversely impact sensitive receptors.

2.2 Objective

The objective of the Phase I Preliminary Risk Assessment was to assess the likelihood of significant contamination being present at the site and any potential pollutant linkages that would adversely affect future receptors. The review was undertaken via a preliminary screening process in the context of land redevelopment under the planning regime.

2.3 Methodology

This report has been compiled in accordance with the guidance given in the Environment Agency / Department of Environment, Food, and Rural Affairs (DEFRA) Contaminated Land Report 11 "Model Procedures for the Management of Land Contamination" (EA 2004); Guideline Principles for Land Contamination (GPLC 2) 2010; 'Land Contamination: Risk Management' (gov.uk 2016); Lewisham Borough Council's 'Contaminated Land Inspection Strategy' (London Borough of Lewisham, 2010), and has been produced on the review of available documents.

This is supplemented by information provided by the Envirocheck Reports (Appendices A, B & C) in respect of; unexploded ordnance, geology, mining & ground stability, historic maps, sensitive land uses, industrial land uses, hydrology, hydrogeology, pollution incidents, waste

facilities, COMAH sites, consents & permits and flooding. Based on this information, an initial conceptual site model was developed for the site.

2.4 Limitations & Exceptions

This report has been prepared by WISER Environment Ltd for the benefit of PA Housing Limited, in accordance with the instruction provided on 27th November 2019. If any third party wishes to rely on the information contained within the report, then written approval must be sought from WISER Environment Ltd.

The information and opinions contained within this report are constrained by the limited data upon which it is based and the timescales within which it was produced. The information reviewed should not be considered as exhaustive and any information provided has been taken in good faith. Where information is not available at the time, which may influence or alter the opinions contained within the report, becomes available at a later date, we reserve the right to review and incorporate such information as an addendum to the original report.

The findings and opinions conveyed via this assessment are based on information obtained from a variety of sources as detailed within this report, and which WISER Environment believes are reliable. Nevertheless, WISER Environment cannot, and does not, guarantee the authenticity or reliability of the information it has relied upon. Where potential or indefinable risks are referred to within the report, further investigation may be required to confirm such risk.

The report represents the findings and opinions of experienced environmental consultants. WISER Environment does not provide legal advice and the counsel of lawyers may also be required. Lastly, it should be noted that the following were not included as part of the agreed scope of works with the client: intrusive investigation, geotechnical assessment, controlled waters assessment, detailed ecological surveys, or liaison with the Local Authority Contaminated Land Officer.

Though drafted according to current guidance, where it is intended to use this information as a basis for discharging contaminated land conditions on any future planning permission, this report and its findings will require review following consultation with the Local Authority Contaminated Land Officer. Any additional information provided at that stage, changes to guidance, legislation or information may alter the findings of this report.

3 SITE DETAILS, HISTORY & LAND USE

Information provided by Landmark through their Envirocheck Professional and Geology Reports have been used to inform this section of the report. Copies of these reports are included in Appendices A and B.

3.1 Site Location

In a regional context, the site is located in Teddington, Southwest London in the Borough of Richmond upon Thames.

Specifically, the site is centred on Ordnance Survey National Grid Reference 515130,171783 (TQ 15130 71783). An aerial view of the 0.65 ha site is provided in Figure 1 below.

The site address is: The Strathmore Centre, Strathmore Road, Teddington, TW11 8UH.

FIGURE 1 Aerial View of Site (boundary shown in red)

3.2 Historic Land Use

Envirocheck Historic Ordnance Survey maps and aerial images were reviewed to identify historic land use (these are reproduced in Appendix B). A total of 37 historic maps at both small and large scale have been reviewed to inform this section, ranging in date from 1869 to 2019.

Table 1 - Historic Land Use

Year	On site	Surrounding Land
1874	The whole site is undeveloped, likely used for agriculture.	Mostly for agricultural use. Teddington centre is approx. 900 m southeast of the site. Twickenham is over 1 km north of the site. The River Thames is approx. 1.2 km east-northeast of the site. The Thames Valley Line Railway is north of the site and runs from northeast to southwest. Teddington Train Station is southeast of site (approx. 1.2 km). Fulwell Train Station is west-northwest of the site.
1896	A well is identified in the western and central area of the site. Some temporary structures (outbuildings) were erected in the northwest and southeast of the site.	Strawberry Hill Train Station is northeast of the site (approx. 750 m). Old gravel pit identified to the north of site and north of the railway line. Old sand pit identified northeast of the site, north of the rail line. Land west-northwest of the site(approx. 500 m), west of the rail line used for agriculture. Houses built immediately adjacent to the site's western boundary. Groups of terraced houses constructed to the south of the site. Allotment gardens and Teddington cemetery located to the east of site on Shacklegate Road. Additional allotment gardens located southwest of the site. Hampton Wick Park southwest of the site (approx. 750 m). Upper Lodge is the main building on the park.
1915	Allotment gardens developed. Well in the western-central part of the site no longer identified (filled in).	School constructed immediately north of the site. The houses had multiplied in the residential area to the south and west of the site Allotment gardens to the east of site expanded and includes a plant nursery. Teddington cemetery expanded northwards. Stanley Road, to the west, now hosts a tram line. The tramway depot is northwest of the site, to the north of the rail line. New railway junction and engine shed joining to the Thames Valley Line to the northwest of the site. St. Michael & St. George Church is constructed to the west of site.

Year	On site	Surrounding Land
1920	No additional development on the site.	The land north of site and north of the rail line is now used as a golf course. Gravel pits identified in Hampton Wick park southwest of site.
1934	No additional development on the site.	Strathmore Road constructed immediately north of the site. Houses constructed immediately to the east of the site. The residential area to the west had expanded up to the railway line to the north. The tram line is no longer shown on Stanley Road. Industrial buildings constructed southwest of the site (approx. 120 m). Gravel pits to the southwest of the site at Hampton Wick park now closed and restored to allotment gardens and parkland. Agricultural land west-northwest of site now used as Fulwell Golf Course. Upper lodge in Hampton Wick now converted to The King's Canadian School. National Physics Laboratory identified south of site (approx. 1.1 km).
1959	Allotment sheds erected.	The old gravel pit north of the rail line is no filled in. Fire station constructed northwest of the site, north of the rail line. Tram shed northwest of site converted to depot and works. Engine shed northeast of site converted to cleaning shed (servicing rail line). More buildings constructed at the school north of site on Strathmore Road. Industrial buildings developed southeast of site.
1960	No additional development on the site.	Training College constructed in Strawberry Hill northeast of the site (approx. 700 m).
1963	Existing buildings erected (Strathmore School (north central), Youth Centre (south) and shed (northwest). Access road from Strathmore Road and car park / turning vehicle turning area constructed. Electricity substation constructed (southeast).	Building constructed adjacent to site to the south. Another building constructed at the school on Strathmore Road, adjacent to site to the north. Stanley County Infant school constructed northeast of the site on Strathmore Road. The old gravel pit, north of the rail line, is now part of the golf course.
1966	No additional development on the site.	The King's Canadian School in Hampton Wick is repurposed for industrial use.
1988	No additional development on the site.	The former tram shed now functions as a bus garage.
1991	No additional development on the site.	The former engine shed to the northeast of the site now functions as a carriage maintenance shed.
1996	No additional development on the site.	Part of the industrial buildings to the southeast (approx. 250 m) now function as garage.

Year	On site	Surrounding Land
1999	No additional development on the site.	Supermarket and garden centre constructed northwest of the site (approx. 800 m), north of the rail line. Training College in Strawberry Hill now identified as St. Mary's University (approx. 600 m).
2006	No additional development on the site.	Ambulance station identified next to the fire station, northwest of the site and north of the rail line. Government offices constructed south of the site (approx. 650 m).
2019	3 no. small buildings / sheds identified in the centre (west) of the site.	Stanley infant school building demolished and the Stanley Primary school formed with an extension of its buildings along Strathmore Road.

3.3 Recent Land Use

The Strathmore Centre comprises of two main buildings. Both buildings were constructed around 1963. The northerly building originally functioned as Strathmore School and was most recently used as a childcare nursery, the building is now out of use. The building to the south originally functioned as a youth centre and continues to function as a childcare nursery. There is a garage/shed on site, erected around 1963, it most likely functioned as a storage building for the school. The buildings are typical of the period that they were built in, taking this into account it is very likely that they were constructed with Asbestos Containing Materials (ACM). It is highly recommended that an asbestos survey is undertaken to identify the hazards related to ACM before any demolition work begins on the site.

The access road and car park that currently serves the nursery was constructed around 1963, this has not been significantly modified since that time.

There are surface water drains on the access road and car park from Strathmore Road, these appeared to be in an adequate working order. There are also surface water drains servicing the land immediately outside of the main buildings, within the fenced area of the site.

An electricity substation was constructed on the site, on the southern boundary, also around 1963. The electricity substation continues to be identified on the most recent maps and most likely remains functional.

Three static caravans are identified on the 2019 maps, these are situated in between the two main buildings on site, west of the access road. The first was present from 2003 and the other two were on the site from 2004. The static caravans are located behind a gated fence and the treeline that surrounds the car park.

3.4 Surrounding Land

The site is positioned in the residential area of Teddington. The Thames Valley Line Railway is approximately 115 m north of the site, this runs from the northeast to the southwest. Fulwell Train Station is approximately 275 m west of the site, Strawberry Hill Train Station is on the Kington Loop Line and is approximately 705 m northeast of the site.

The site lies approximately 800 m northwest of Teddington's commercial centre. It is surrounded by residential properties to the east, south and west. The northern boundary is defined by Strathmore Road and Stanley School. Teddington Cemetery lies 80 m to the east of the site. Stanley Road is 50 m west of the site and is the main road from Fulwell to Teddington.

3.5 Environmental Permits, Incidents & Registers

3.5.1 Historic Integrated Pollution Control (IPC) Authorisations

There are no records of historic IPC authorisations within 500 m of the site.

3.5.2 Part A (1) & Integrated Pollution Prevention Control (IPPC) Authorised Activities

There are no records of Part A (1) or IPPC authorised activities within 500 m of the site.

3.5.3 Red List Discharge Consents

There are no records of a Red List Discharge Consent (potentially harmful discharges to controlled waters) located within 500 m of the site.

3.5.4 List 1 Dangerous Substances Inventory Sites

There are no records of a List 1 Dangerous Substance Inventory Site within 500 m of the study site.

3.5.5 List 2 Dangerous Substances Inventory Sites

There are no records of a List 2 Dangerous Substance Inventory Sites within 500 m of the study site.

3.5.6 Part A (2) & Part B Activities & Enforcements

There are three records of Part A (2) and Part B Activities within 500 m of the site. These are listed in Table 2 below.

Table 2 - Part A (2) & Part B Activities

Distance from site (m)	Direction	Operator	Permit Type	Process	Comment
35	S	Somerfield Service Station	Local Authority Air Pollution Control	Petrol filling station	Authorisation revoked
350	W	H & L Motors	Local Authority Pollution Prevention & Control	Respraying of road vehicles	Permitted

Distance from site (m)	Direction	Operator	Permit Type	Process	Comment
389	SE	Bolingmore & Co. Ltd	Local Authority Air Pollution Control	Waste oil burners	Authorisation revoked

3.5.7 Category 3 or 4 Radioactive Substances Authorisations

There are five records of Category 3 or 4 Radioactive Substances authorisations within 1 km of the site. These are listed in Table 3 below.

Table 3 - Registered Radioactive Substances

Distance from site (m)	Direction	Date	Name	Process Type	Application Ref. / Status
628	SE	31st March 1991	Laboratory Impex Systems Ltd	S13 RSA – disposal of Radioactive waste	AC4180 / revoked
630	SE	28th July 1997	Hybaid Ltd	S13 RSA – disposal of Radioactive waste	AY7500 / revoked
853	SE	31st March 1991	Paint Research Association	S13 RSA – disposal of Radioactive waste	AD2344 / revoked
860	SE	5th December 1997	Paint Research Association	S13 RSA – disposal of Radioactive waste	BA1591 / revoked
863	SE	3rd June 1997	Paint Research Association	S13 RSA – disposal of Radioactive waste	AY2257 / superseded by variation

3.5.8 Licensed Discharge Consents

There are no licensed discharge consents within 1 km of the site.

3.5.9 Water Industry Referrals

There are no records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 1 km of the site.

3.5.10 Planning Hazardous Substance Consents and Enforcements

There is one record of a Planning Hazardous Substance Consent within 1 km of the site. This is listed in Table 4 below.

Table 4 - Planning Hazardous Substance Consents & Enforcements

Distance from site (m)	Direction	Date	Name	Hazardous Substance	Application Ref.
766	NE	14th April 2004	St. Mary's University	Unknown at time of report	04/1085

3.5.11 Dangerous or Hazardous Sites

There are no records of Control of Major Accident Hazards (COMAH) or Notification of Installations Handling Hazardous Substances (NIHHS) sites within 1 km of the site.

3.5.12 National Incidents Recording System, List 2

There are three records of National Incidents Recording System, List 2 pollution incidents within 500 m of the site. These are listed in Table 5 below.

Table 5 - List 2 Pollution Incidents

Distance from site (m)	Direction	Date	Pollutant Type / Description	Impact Category
303	NE	Not supplied	Miscellaneous (unknown) to controlled waters at Strawberry Hill	Category 3 – Minor incident
465	N	26th March 1989	Oils (unknown) to controlled waters at Strawberry Hill	Category 3 – Minor incident
489	N	7th November 1995	Chemicals (unknown) to unknown waters at Twickenham	Category 3 – Minor incident

3.5.13 National Incidents Recording System, List 1

There is one record of National Incidents Recording System, List 1 pollution incidents within 500 m of the site. This is listed in Table 6 below.

Table 6 - List 1 Pollution Incidents

Distance from site (m)	Direction	Date	Pollutant Type / Description	Impact Category
470	N	10th February 1989	Oils (unknown) to controlled waters at Strawberry Hill	Category 1 – Major incident

3.5.14 Contaminated Land under Part 2A EPA 1990

There are no records of sites determined as contaminated land under Section 78R of the Environmental Protections Act 1990 within 500 m of the site.

3.6 Landfill & Other Waste Sites

3.6.1 Environment Agency Landfill

There are no records from Environment Agency Landfill Data within 1000 m of the site.

3.6.2 Environment Agency Historic Landfill

There are no records of Environment Agency historic landfill sites within 1500 m of the site.

3.6.3 BGS/DoE non-operational landfill sites

There are no records of BGS/DoE non-operational landfill sites within 1500 m of the site.

3.6.4 Local Authority and Historical Mapping

There are no records of landfill from Local Authority or Historical mapping records within 1500 m of the site.

3.7 Other Waste Sites

3.7.1 Waste treatment, transfer and disposal sites

There is two record of waste treatment, transfer or disposal sites within 1 km of the site. This is listed in Table 7 below.

Table 7 – Licensed Waste Sites

Distance from site (m)	Direction	Operator	Type	Issue Date	Status
650	SE	A W White	Treatment - Scrapyard	1st June 1993	Surrendered
945	N	J & S M C Armstrong	Transfer	1st June 1993	Surrendered

3.8 Current Land Uses

3.8.1 Current Industrial Uses

There are 59 records of industrial uses within 500 m of the site, 20 of these are active. The nearest 10 are listed in Table 8 below.

Table 8 – Industrial Sites

Distance from site (m)	Direction	Operator	Type	Status
35	S	Conoco Ltd	Petrol filling station – 24 hour	Inactive
36	S	Cos	Commercial cleaning services	Inactive
64	S	T H I	Manufacturers	Inactive
102	S	Gemini Electrical Supplies	Electrical goods – servicing & repairs	Inactive
128	SW	Treadaway Printing	Printers	Inactive
128	SW	Living Rooms	Printers	Inactive
129	S	London Recycling	Electrical goods – servicing & repairs	Inactive
134	S	Phil Irwin Carpets	Rubbish clearance	Inactive
134	S	Pressahead	Floor coverings – manufacturers & wholesalers	Active
139	SE	Teddington Dry Cleaner	Printers	Inactive

3.8.2 Petrol and Fuel Sites

There is one record of a petrol or fuel sites within 500 m of the site. This is listed in Table 9 below.

Table 9 - Petrol & Fuel Sites

Distance from site (m)	Direction	Operator	Type	Status
35	S	Somerfield Teddington - Texaco	Petrol Station	Obsolete

3.8.3 National Grid High Voltage Underground Electricity Transmission Cables

There no records of National Grid high voltage underground electricity transmission cables within 500 m of the site.

3.8.4 National Grid High Pressure Gas Transmission Pipelines

There are no records of National Grid high pressure gas transmission pipelines within 500 m of the site.

3.9 Historic & Current Planning Permissions

There are six planning permissions on the site. These are listed in Table 10 below.

Table 10 – Planning Permissions

Planning Ref	Received	Status	Proposal
83/0938	20th July 1983	Granted permission on 26th September 1983	Use of premises as a playgroup 9:00 – 12:30. Monday – Friday for up to 32 children. (Variation of pp 81/1291)
81/1291	20th October 1981	Granted permission on 20th November 1981	Use of premises as a playgroup 9:00 – 12:30. Monday – Friday for up to 20 children.
80/1521	14th November 1980	Granted permission on 8th January 1981	Extension to main hall
78/1041	23rd August 1978	Granted permission on 4th January 1979	Use of premises as a playgroup 9:00 – 12:30. Monday – Friday for up to 20 children.
77/0819	3rd August 1977	Granted permission on 10th October 1977	Use of premises as a playgroup 9:00 – 12:30. Monday – Friday for up to 20 children.
74/0196	22nd February 1974	Granted permission on 11th June 1974	Erection of a garage for storage purposes in connection with the car maintenance classes.

4 ENVIRONMENTAL SETTING

Information provided by Landmark through their Envirocheck Professional and Geology Reports have been used to inform this section of the report. Copies of these reports are included in Appendix A.

4.1 Geology

4.1.1 Artificial and Made Ground

There are no records of Artificial and Made Ground within 50 m of the site. Though given the history of development in the area the ground immediately underlying the site is likely to be made ground.

4.1.2 Superficial and Drift Geology

The superficial and drift geology on site is Kempton Park Gravel Member (KPGM), deposited during the Devensian glaciation of England in the Last Glacial Period c. 115,000 – c. 11,700 years ago. These deposits consist of sand and gravel.

4.1.3 Bedrock Geology

The bedrock geology on site is London Clay Formation (LC), formed during the Ypresian geologic period, the lowest stage of the Eocene c. 56 – c. 47.8 Ma. This formation consists of clay and silt.

4.1.4 Landslip

There are no records for landslip or landslip permeability within 500 m of the site boundary.

4.1.5 Faults

There are no records of Faults within 500 m of the site boundary.

4.2 Radon

The site is not within a Radon Affected Area, as less than 1% of properties are above Action Level. The site is not within an area where Radon Protection measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment.

4.3 Ground Workings

4.3.1 Historical Surface Ground Working Features

There is one record of a historical surface ground working feature within 250 m of the site. This is listed in Table 11 below.

Table 11 - Historical Surface Ground Working Features

Distance from site (m)	Direction	Site Name	Commodity	Type
159	NW	Blackmoor Farm Gravel Pit	Sand & Gravel	Opencast

4.3.2 Historical Underground Working Features

There are no records of historical underground working features within 1 km of the site.

4.3.3 Current Ground Workings

There are no records of BGS current ground workings within 1 km of the site.

4.4 Mining

4.4.1 Historical Mining

There are no records of historical mining areas within 75 m of the site.

4.4.2 Coal Mining

There are no records of Coal Mining areas within 50 m of the site boundary.

4.4.3 Non-Coal Mining

There are no records for sites where non-coal mining activities may have been undertaken within 1 km of the site boundary.

4.4.4 Non-Coal Mining Cavities

There are no records of any non-coal mining cavities within 1 km of the site boundary.

4.4.5 Natural Cavities

There are no records of Natural Cavities within 1 km of the site boundary.

4.4.6 Brine Extraction

There are no records of any Brine Extraction areas within 75 m of the site boundary.

4.4.7 Gypsum Extraction

There are no records of any Gypsum Extraction areas within 1 km of the site boundary.

4.4.8 Tin Mining

There are no records of any Tin Mining areas within 1 km of the site boundary.

4.4.9 Clay Mining

There are no records of any Clay Mining areas within 1 km of the site boundary.

4.5 Natural Ground Subsidence

The Natural Ground Subsidence rating is obtained through the 6-natural ground stability hazard datasets, which are supplied by the British Geological Survey.

The following Envirocheck data is derived from the BGS Digital Geological map of Great Britain 1:50,000 scale. The maximum hazards rating of natural subsidence within the study site boundary is **Low**.

4.5.1 Shrink-Swell Clays

The hazard rating for shrink-swell clays is **Low**.

Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

4.5.2 Landslides

The hazard rating for landslides is **Very Low**.

Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks unlikely due to potential problems with landslides.

4.5.3 Ground Dissolution of Soluble Rocks

The hazard rating for ground dissolution is **No Hazard**.

Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

4.5.4 Compressible Deposits

The hazard rating for compressible deposits is **No Hazard**.

No indicators for compressible ground identified. No special actions required to avoid problems due to compressible ground. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible ground.

4.5.5 Collapsible Deposits

The hazard rating for collapsible deposits is **Very Low**.

Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

4.5.6 Running Sands

The hazard rating for running sands is **Very Low**.

Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

4.6 Boreholes

There are three records of boreholes within 500 m of the site. These are listed in Table 12 below.

Table 12 - Boreholes

Distance from site (m)	Direction	Borehole Name	BGS Ref.	Drilled Length (m)	Link to Borehole Scan
246	W	Fulwell Tram Depot	Tq17sw526	1.5	http://scans.bgs.ac.uk/sobi_scans/boreholes/18780609
316	W	Fulwell Bus Garage	Tq17sw200	15	http://scans.bgs.ac.uk/sobi_scans/boreholes/581181
507	W	Fulwell Golf Club	Tq17sw137	6	http://scans.bgs.ac.uk/sobi_scans/boreholes/581118

4.7 Urban Soil Chemistry

The Envirocheck Report (Appendix A) uses data within 1 km of the site to calculate the BGS urban soil chemistry averages for the site, these are shown in Table 13 below.

Table 13 - BGS Urban Soil Chemistry Averages

Distance from site (m)	Sample type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
On site	Topsoil	17.00 mg/kg	0.90 mg/kg	79.00 mg/kg	28.00 mg/kg	280.00 mg/kg

4.8 Railways and Tunnels

4.8.1 Railway & Tunnels

There are no records for underground railway lines identified within 250 m of the site boundary. There are no records for railway tunnels identified within 250 m of the site boundary.

4.8.2 Historical Railway and Tunnel Features

There are no records of historic railway and tunnel features within 250 m of the site.

4.8.3 Active Railways

There are two active railway lines within 500 m of the site. The Thames Valley Line is 120 m north of the site and the Kingston Loop Line is 360 m east of the site.

4.8.4 Railway Projects

The closest railway project is the Twickenham Station development 2.12 km northeast of the site.

4.9 Hydrogeology

4.9.1 Aquifer within Superficial Deposits

The underlying superficial geology on the site is classified as a Principal Aquifer. These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

4.9.2 Aquifer within Bedrock Deposits

The bedrock geology underlying the site is classified as Unproductive Strata. These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

4.9.3 Source Protection Zones

The site is not in a SPZ.

4.9.4 Groundwater Abstraction Licences

There are fifteen records of groundwater abstraction licences within 2 km of the site. The closest ten are listed in Table 14 below.

Table 14 - Groundwater Abstraction Licences

Distance from site (m)	Direction	Licence Number	Details	Status
1514	E	28/39/34/0007	Sports Facilities: Spray irrigation – direct	Active
1578	E	28/39/34/0010	Private Water Undertaking: Spray irrigation - direct	Active
1578	E	28/39/34/0010	Sports Facilities: Spray irrigation – direct	Active
1782	SW	28/39/31/0172	Sports Facilities: General use (medium loss)	Active
1839	W	Th/039/0031/013/R01	Schools & Colleges: Spray irrigation – direct	Active
1839	W	Th/039/0031/013	General Agriculture: Spray irrigation - direct	Active
1839	W	Th/039/0031/013	General Agriculture: Spray irrigation - direct	Active
1897	E	28/39/34/0007	Sports Facilities: Spray irrigation – direct	Active
1901	E	28/39/34/0007	Golf Courses: Spray irrigation – direct	Active
1901	E	28/39/34/0007	Sports Facilities: Spray irrigation – direct	Active

4.9.5 Surface Water Abstraction Licences

There are no records of surface water abstraction licences within 2 km of the site.

4.9.6 Potable Water Abstraction Licences

There are no records of potable water abstraction licences within 2 km of the site.

4.9.7 Groundwater Vulnerability and Soil Leaching Potential

The combined groundwater vulnerability on site is classified as **Medium**. Underlying site is a highly vulnerable principal superficial aquifer present in river terrace gravels with only a thin cover of low permeability silts and/or alluvium. See Table 15 below for more detail.

Table 15 - Groundwater Vulnerability

Combined Classification	Pollutant Speed	Bedrock Flow	Dilution Value	Baseflow Index	Superficial Patchiness	Superficial Thickness	Superficial Potential Recharge
Principal Superficial Aquifer – Medium Vulnerability	Intermediate	Mixed	300-550 mm/year	> 70 %	> 90 %	3-10 m	High

4.10 Hydrology

4.10.1 Detailed River Network

There are no records of detailed river network within 500 m of the site.

4.10.2 Biological Quality

There are no records of biological quality data provided by the Environment Agency within 1.5 km of the site boundary.

4.10.3 Chemical Quality

There are no records of river quality data provided by the Environment Agency within 1.5 km of the site boundary.

4.10.4 Surface Water Features

There are sixteen records of surface water features within 500 m of the site provided by Ordnance Survey MasterMap Water Network indicating a centre line following the curve of the waterway.

The watercourse network information indicates an unnamed inland river in the Thames catchment. This is 234 m north of the site and flows from the west of the site to the northeast.

4.11 Flood Risk

4.11.1 Fluvial

The site is not in a flood zone. The nearest flood zone to the site is 980 m east of the site.

4.11.2 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

The RoFRaS flood rating for the site is **Very Low** risk. Each year this area has a chance of flooding of less than 0.1%. This considers the effect of any flood defences in the area.

4.11.3 Flood Defences

The site is not in an area benefitting from flood defences. They are not required based on the level of risk.

4.11.4 Groundwater Flooding Susceptibility Areas

There is potential for groundwater flooding to occur at the surface on the site.

4.12 Designated Environmentally Sensitive Sites

4.12.1 Sites of Special Scientific Interest (SSSI)

There is one record of a SSSI within 1 km of the site. Bushy Park and Home Park is 746 m south of the site. Bushy Park and Home Park SSSI is of special interest for its nationally important saproxylic (dead and decaying wood associated) invertebrate assemblage, population of veteran trees and acid grassland communities.

4.12.2 National Nature Reserves (NNR)

There are no NNRs within 1 km of the site.

4.12.3 Special Areas of Conservation (SAC)

There are no SACs within 1 km of the site.

4.12.4 Special Protection Areas (SPA)

The are no SPAs within 1 km of the site.

4.12.5 Ramsar sites

There are no Ramsar sites within 1 km of the site.

4.12.6 Ancient Woodland

There is no Ancient Woodland within 1 km of the site.

4.12.7 Local Nature Reserves (LNR)

There is a LNR 1.2 km east of the site on the other side of the River Thames.

4.12.8 World Heritage Sites

There are no records of World Heritage sites within 1 km of the site.

4.12.9 Environmentally Sensitive Areas

There are no records of Environmentally Sensitive Areas within 1 km of the site boundary.

4.12.10 Areas of Outstanding Natural Beauty (AONB)

There are no records of Areas of Outstanding Natural Beauty within 2000m of the site boundary.

4.12.11 National Parks

There are no records of National Parks within 1 km of the site boundary.

4.12.12 Nitrate Sensitive Areas

There are no records of Nitrate Sensitive Areas within 1 km of the site.

4.12.13 Nitrate Vulnerable Zones

There are no records of Nitrate Vulnerable Zones within 1 km of the site.

4.12.14 Green Belt Land

There are no records of Areas of Adopted Green Belt within 1 km of the site.

5 SITE RECONNAISSANCE

5.1 Preliminary Site Visit

A site walkover was completed on Thursday 12th December 2019. The purpose of the site visit was to confirm the information gathered in the desk-based study and to observe the site to identify anything that could impact the risk assessment. Refer to Appendix D for the Site Reconnaissance Record and Appendix E for photographs.

The site is bound by residential properties on the eastern, southern and western boundaries. The northern boundary is defined by Strathmore Road and Stanley School.

The site has two main buildings that appear to be built in the 1960s, both buildings are enclosed with 2 m fencing. The northerly and larger building was used as a school and then a childcare nursery, it is currently unoccupied. The building has a main gated entrance on the northern boundary to Strathmore Road. There is a vehicle gate on the north-western site boundary and another pedestrian gate on the eastern fence. The southern building is currently used as a childcare nursery, it has on access gate on its northern fence.

The site is mainly flat, there are some falls into surface water drains on the eastern access road and in the northern entrance yard to the main building. There are multiple pot holes on the eastern access road. Most of the site is surfaced in asphalt, the yard south of the main building is surfaced in paving slabs and the north-eastern area, behind the fence, is natural ground with grass and trees.

There are four surface water drains along the eastern access road, these appeared to be in suitable working order. There is one foul manhole on the access road. In the northern yard there is one foul manhole and a surface water drain. In the yard to the east of the main building there are two foul manholes. There was a sheet of chipboard on the surface where there was a slight fall. It's possible that it was covering a surface water manhole, but this could not be accessed to inspect.

There are large conifers on the northern site boundary and on the fence-line to the south of the main building. To the north and northeast of the main building are large deciduous trees and a cabbage tree. To the northwest of the main building there are a group of silver birch trees. There are overgrown weeds throughout the main building's yards.

Behind the fence of the central area surrounding the main building were discarded materials including: large metal ducting; plastic, metal and timber waste; construction

materials – blocks, insulation, guttering and cladding; sealed commercial bins (one was tipped over); a used gas bottle; flood barriers and a sealed salt container.

There are three small temporary structures, most likely static caravans positioned behind a secure fence and gate. These, along with the western yard of the site and the garage to west of site could not be accessed during the site reconnaissance. There were no obvious signs of spillages on the site. The vegetation appeared to be in good health and normal for the area and no invasive species were observed.

The buildings on site were constructed around 1963, taking this into consideration along with the type of flat roofed structure it is very likely that the structures were built with Asbestos Containing Materials (ACM).

There is a fire hydrant and several service holes on the northeast boundary. The underground services include water, electrical and telephone lines. There are no overhead power or telephone lines crossing the site.

6 INITIAL CONCEPTUAL SITE MODEL

6.1 Introduction

In developing a Conceptual Site Model for the site, possible pollutant linkages are determined by identifying potential sources of contamination, potential receptors, and likely pathways between them. In order for a pollutant linkage to be present all three, i.e. source, pathway and receptor, need to be present. A preliminary risk assessment has been undertaken using the methodology described to establish the degree of risk and which potential pollutant linkages require further consideration.

A source of pollution may be a potentially polluting activity or store of the contaminating substance – for example fuel storage, leaks of liquids to the ground or emission from waste processes. Potential sources of pollution may be present in, on or under the ground or in the vicinity of the site.

Pathways are routes by which a potential source of pollution can or is reaching a receptor – these can be natural pathways through permeable soils or the air, or manmade pathways such as underground pipework.

Receptors are those adversely affected by the contamination. These include but are not limited to; humans (e.g. occupants of nearby industrial or residential properties); groundwater (and aquifers) and surface water that could be contaminated, potentially affecting drinking water and ecology; and buildings.

Assessment of risk is based on the probability of receptor exposure to the identified source and the consequences of such exposure.

Risk management, which can include site surfacing, formal management systems, legal requirements; is then considered to provide an overall residual risk.

A matrix is used to determine overall risk and uses the following definitions:

Table 16 - Probability of Exposure

PROBABILITY OF EXPOSURE	
High	Exposure is probable: direct exposure likely with no / few barriers between hazard, source and receptor.
Medium	Exposure is probable: feasible exposure possible, barriers to exposure less controllable.
Low	Exposure is unlikely: several barriers exist between hazardous source and receptors to mitigate against exposure.
Very Low	Exposure is very unlikely: effective, multiple barriers in place to mitigate against exposure.

Table 17 - Consequences of Exposure

CONSEQUENCES OF EXPOSURE	
High	The consequences are severe: sufficient evidence that short or long-term exposure may result in serious damage.
Medium	Consequences are significant: sufficient evidence that exposure to hazard may result in damage that is not severe in nature and reversible once exposure ceases (e.g. irritant)
Low	Consequences are minor: damage not apparent though reversible adverse changes may occur
Very Low	Consequences are negligible: no evidence of adverse changes following exposure

Comparison between probability and consequence provides the overall risk which is reached as follows:

Table 18 - Assessing Overall Risk

		CONSEQUENCES			
		Very Low	**Low**	**Medium**	**High**
LIKELIHOOD	**High**	Low	Medium	High	High
	Medium	Low	Medium	Medium	High
	Low	Low	Low	Medium	Medium
	Very Low	Very Low	Low	Low	Low

6.2 Initial Conceptual Site Model & Preliminary Risk Assessment

Potential sources of pollution, pathways and receptors, identified primarily through historical records are listed in Table 17 below with potential environmental risk identified.

Table 19 - Initial Conceptual Site Model

RECEPTOR	PATHWAY	SOURCE	RISK
Construction Workers, Occupants, Contractors, Neighbouring Residents & Stanley School	Direct exposure	UXO	Medium
Construction Workers, Occupants & Contractors	Direct exposure (inhalation, ingestion and dermal)	ACM (existing building structures)	Medium
Soil & Groundwater	Through ground	Oil (from car maintenance classes)	Low
Soil & Groundwater	Through ground	Pesticides (allotment gardens)	Low
Construction Workers, Occupants, Contractors, Soil & Groundwater	Direct exposure & through ground	Unknown fill material	Low

Table 20 - Preliminary Risk Assessment

Source			Pathway	Receptor	Risk Assessment			Comment / Risk / Management Potential Contamination	Residual Risk
Potential Contaminating Uses	Potential Contaminating Source	Potential Contamination			Likelihood	Consequences	Risk		
Historic Activities	WWII Bombs	UXO	Direct Exposure	Construction Workers, Occupants, Contractors, Neighbouring Residents Stanley School	Low	High	Med	The Preliminary UXO Threat Assessment (Appendix C) identified the potential for a UXO hazard to occur is **Likely**. A detailed UXO Threat & Risk Assessment is strongly advised.	Med
Historic Site Activities	Vacant Main Building, Western Garage & Southern Nursery Building	ACM	Direct Exposure (Inhalation & Dermal)	Construction Workers Occupants Contractors	Low	High	Med	There has been no survey undertaken to identify the presence of ACM. It is recommended to get the site surveyed for asbestos.	Med
Historic Activities	Car maintenance classes in Garage	Oil	Through Ground	Soil Groundwater	Very Low	Med	Low	In 1974 there was a planning permission for the "Erection of a garage for storage purposes in connection with the car maintenance classes". The garage was inaccessible during the site walkover so the surface in the garage is unknown. Potential oil contamination from this activity.	Low
Historic Activities	Allotment Gardens	Pesticides	Through Ground	Soil Groundwater	Very Low	Med	Low	The site was identified as allotment gardens in the historic map from 1915 only. It is unlikely that pesticides were used.	Low

Source			Pathway	Receptor	Risk Assessment			Comment / Risk / Management Potential Contamination	Residual Risk
Potential Contaminating Uses	Potential Contaminating Source	Potential Contamination			Likelihood	Consequences	Risk		
Historic Site Activities	Historic Well	Fill Material	Direct Exposure Through Ground	Construction Workers Occupants Contractors Soil Groundwater	Very Low	Med	Low	The well identified on historic maps in 1896 disappeared from the map records from 1915. This was filled with **Unknown** material.	Low

7 CONCLUSION & RECOMMENDATIONS

The Preliminary Risk Assessment identifies potentially contaminative sources which have the potential to present a risk to receptors.

The following recommendations should be considered and implemented in order to reduce uncertainty and enable refinement of the conceptual site model.

7.1 UXO

The Unexploded Ordnance (UXO) Threat Assessment (Appendix C) identified six high explosive bomb strikes from WWII, the closest was 10 m west of the site. The assessment concluded that the potential for a UXO hazard to occur is **Likely**. The recommended next stage in the risk management framework is to undertake a Detailed UXO Threat & Risk Assessment.

7.2 ACM

Due to the period the buildings on site were constructed, it is likely that they were built with Asbestos Containing Materials (ACM). This Preliminary Risk Assessment concludes there is a **Medium** risk posed by ACM. It is recommended to undertake an asbestos survey to identify potential ACMs on site. The removal of any ACM must be carried out by a suitably qualified person and disposed of at an appropriately permitted waste facility. Records must be kept.

7.3 Potential Ground Contamination

The historical maps show the existence of a well in the central and western area of the site in the 1890s, this was filled with **Unknown** material. The site was identified as allotment gardens in the 1915 map only, there's a **Low** risk from potential pesticide use. A 1974 planning permission allowed the "erection of a garage for storage purposes in connection with the car maintenance classes". There is a **Low** risk of oil contamination from car maintenance classes. Due to these historic land uses it is recommended to investigate the site further. A Phase II investigation involves taking soil samples from the site, concentrating in the western area. The samples should be analysed for TPH1 (C10 – C40) (oils), pesticides and a standard spectrum suite (including asbestos screen & ID).

It would be prudent to undertake a 'watching brief' as the site is redeveloped and where previously unidentified potentially contaminative sources are identified undertake further investigation, and where necessary remediation.

8 APPENDICES

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Appendix A – Envirocheck Report 9th December 2019

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Appendix B – Envirocheck Historic Maps 9th December 2019

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Appendix C – Preliminary UXO Threat Assessment 9th December 2019

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Appendix D – Site Reconnaissance 12th December 2019

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Appendix E – Site Reconnaissance Photos 12th December 2019

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