



Remediation Strategy

Chapman Way
Tunbridge Wells
TN2 3EF

November 2023

561063.0000.0000

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Table of Contents

1.0	Introduction	1
1.1	Purpose	1
1.2	Proposed Development.....	1
1.3	Scope of Services.....	1
1.4	Previous Reports	1
2.0	Site Summary.....	3
2.1	Site Details	3
2.2	Summary of Adjacent Land Uses	3
2.3	Summary of Site History.....	3
2.4	Summary of Environmental Setting.....	4
2.5	Previous Environmental Assessments, Investigations or Remediation	4
3.0	Remediation Drivers.....	9
3.1	Conceptual Site Model	9
3.2	Summary of Remediation Drivers	11
4.0	Remediation Approach.....	12
4.1	Objectives	12
4.2	Outline Remediation Strategy	12
4.3	Discovery Strategy	12
5.0	Outline Remediation Methodology.....	13
5.1	Discovery Strategy	13
5.2	Permits and Consent	13
5.3	Additional Environmental Controls	13
5.4	Soft Landscaping	14
5.5	Stockpile Management	14
5.6	Unexploded Ordnance (UXO) Risk	14
5.7	Borehole Decommissioning.....	14
5.8	Ground Gas Mitigation	15
6.0	Verification Plan.....	16
6.1	Purpose.....	16
6.2	Verification Actions	16
6.3	Verification Report.....	17
7.0	Assumptions and Reliance	18
7.1	Significant Assumptions	18
7.2	User Reliance	18

Table of Contents: Annexes

Annex A: Figures

1.0 Introduction

1.1 Purpose

TRC Companies Limited (TRC) was commissioned by Tavis House Stellar (Tunbridge Wells) LP (the 'Client') to prepare a Remediation Strategy for the development located at Chapman Way, Tunbridge Wells, TN2 3EF (hereafter referred to as the 'Site').

A Site location plan is provided as Figure 1 in Annex A.

The purpose of this Remediation Strategy is to support the discharge of point 3 of Condition 20 of planning ref. 22/03707/FULL. For ease of reference the condition is presented below:

'No development approved by this planning permission (excluding demolition of the existing buildings) shall commence until a strategy to deal with the potential risks associated with any contamination of the site has been submitted to, and approved in writing by, the Local Planning Authority. This strategy will include the following components:

3. The results of the site investigation and the detailed risk assessment referred to in (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.'

1.2 Proposed Development

The proposed development comprises the demolition of the existing buildings and construction of three large adjoined warehouse units in the northern portion of the Site and two large adjoined warehouse units in the southern portion of the Site. Each unit will have associated car parks, service yards and landscaping, as indicated on PRC Architects drawing reference number 11476 / TE_12-100 Rev T2, dated 28/4/2023.

A proposed development plan is presented as Figure 2 in Annex A.

1.3 Scope of Services

This report aims to present a Remediation Strategy for the Site to ensure appropriate measures are undertaken to mitigate contaminated land risk associated with the Site's historical uses.

The Remediation Strategy has been prepared with due regard to the following guidance:

- The National Planning Policy Framework;
- BS10175 (2017) Investigation of Potentially Contaminated Sites – Code of Practice;
- BS5930 (2020) Code of Practice for Ground Investigations;
- Land Contamination: Risk Management (LCRM);
- BS8485 (2019) Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings;
- Local Planning Policy for the London Borough of Hillingdon; and,
- BS8676:2013 'Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds (VOCs).

1.4 Previous Reports

This report should be read in conjunction with the following documents:

- WSP, Phase I Assessment, Millennium House and Spectrum House, Chapman Way (July 2007, report ref. 12370220/001)
- WSP, Geo-Environmental and Geotechnical Interpretative Report, Millennium House and Spectrum House, Chapman Way (November 2007, report ref. 12370220/002)

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- TRC Companies, Phase I Environmental Site Assessment, Chapman Way, Tunbridge Wells, (December 2021, report ref. 417410)
 - TRC Companies, Phase II Geo-Environmental Site Assessment, Chapman Way, Tunbridge Wells (December 2021, report ref. 417410)
 - TRC Companies, Intrusive Geoenvironmental and Geotechnical Site Assessment, Chapman Way (November 2023, report ref. 561063.0000.0002).

2.0 Site Summary

2.1 Site Details

Table 1: Summary of Site Details

Site Address	Chapman Way, Tunbridge Wells, TN2 3EF
Grid Reference	Easting 559399, Northing 141834
Approximate Size	The Site is approximately 1.58 ha.
Site Location	The Site is located to the north of Chapman Way, which is within the High Brooms Industrial Estate.
Current Site Use	At the time of writing this assessment, the Site was recently demolished. TRC understands that the Site previously contained two warehouses, with associated hardstanding. There is a large stockpile of demolition waste in the northern portion of the Site and an area of hardstanding in the south-eastern portion of the Site. There are three electricity substations remaining on this area of hardstanding.

2.2 Summary of Adjacent Land Uses

Land uses in the immediate vicinity include the following principal features:

Table 2: Adjacent Land Uses

Direction	Land Use
North	Commercial buildings consisting of a floor shop, an insurance company, an aluminium supplier, a music shop and a digital printers.
East	Commercial buildings consisting of a roofing supply shop, a climbing gym and two vehicular garages.
South	Commercial buildings consisting of a chimney sweep, a vehicular garage, a plumber's merchant and a car washing service.
West	Commercial buildings consisting of a gymnastics studio, a vehicular bodyworks garage, a car accessories shop and a builder's merchant.

2.3 Summary of Site History

Earliest available mapping (1867) shows that the Site consisted of woodland and open farmland with a railway line to the east. The Site remained vacant until 1903 when a brick and tile works were constructed to the south. The clay pit associated with the brick and tile works gradually extended onto the Site (1909). Additional industrial buildings were constructed in the surrounding area, consisting of a gas works and a foundry, followed by additional residential buildings to the south. By 1975, the clay pit was listed as a tip, which was subsequently developed into High Brooms Industrial Estate by 1984. This represents part of the latest development at the Site, as well as some surrounding commercial units. By 1993, further development had occurred on the Site to represent the latest development.

2.4 Summary of Environmental Setting

2.4.1 Geology and Hydrogeology

Table 3: Summary of Geology and Hydrogeology

Strata	Description	Aquifer Classification
Made Ground	Greyish brown silty, sandy, gravelly clays or slightly gravelly sand.	Not Classified
Wadhurst Clay Formation	Light bluish grey mudstone locally interbedded with grey clay and dark grey mudstone laminations.	Secondary (B) Aquifer

During the recent investigation Made Ground was encountered in all of the exploratory holes and consisted of greyish brown, silty, sandy gravelly clays or slightly gravelly sand. Pockets of peat were encountered locally at various depths.

Made Ground was encountered from ground level to depths of between 17.0m below ground level (bgl) and 18.5m bgl.

The Wadhurst Clay Formation was encountered to depths in excess of 30.0m bgl. The base of the stratum was not confirmed during the investigation. The Wadhurst Clay Formation generally comprised light bluish grey mudstone locally interbedded with stiff light grey clay with dark grey mudstone laminations.

Values of Standard Penetration Tests (SPT) in the Wadhurst Clay Formation were in excess of 67, highlighting the stiff nature of the material.

2.4.2 Groundwater

During TRC's ground investigations, groundwater was encountered between 2.5m bgl and 4.0m bgl within Made Ground.

During subsequent gas and groundwater monitoring, groundwater resting levels were recorded between 0.44m bgl and 3.68m bgl.

Groundwater may be subject to seasonal variations especially after periods of prolonged rain or drought.

2.5 Previous Environmental Assessments, Investigations or Remediation

A summary of the previous assessments are detailed in Table 4.

Table 4: Summary of Previous Site Assessments

Report Title	Summary of Findings
Phase I Assessment, CSC, Millennium House and Spectrum House, Chapman Way (WSP Report Ref. 12370220/001 dated July 2007)	<p>This report includes a review of the Ordnance Survey maps and available desk study information. This report provides similar information to that included as part of the TRC Phase I Environmental Site Assessment, summarised further below.</p> <p>The report details that at Spectrum House (located in the northern half of the Site) there were three constantly working generators that are supplied by three above ground storage tanks (AST), two of 5000 gallons and one of 2500 gallons, an additional backup generator and diesel storage tank are housed on the back of a lorry trailer, a 625 kilo Volt-ampere (KVA) uninterruptible power supply (UPS) and an underground storage tank (UST)</p>

Report Title	Summary of Findings
	<p>with 50,000 litre capacity. Also present on this land is an electricity substation and two store units (at least one used to store potentially hazardous substances).</p> <p>Information obtained from the Contaminated Land Officer at Tunbridge Wells Borough Council refers to the Site's former use as Chapman's Quarry and details from the Kent Landfill Atlas shows the Site as having received inert material and some slow degradable matter.</p>
<p>Geo-Environmental and Geotechnical Interpretative Report. CSC, Millennium House and Spectrum House, Chapman Way (WSP Report Ref. 12370220/002 dated November 2007) – draft report only</p>	<p>The copy of the report provided at the time of the Phase I TRC Report, was considered draft and did not include a full set of results of the investigation.</p> <p>Made Ground was encountered to at least 12.45m. The boreholes were generally terminated within the Made Ground, although the Wadhurst Clay may have been encountered at the base of BH1. The Made Ground comprised cohesive and granular materials with fragments of concrete, slag, brick, wood, plastic, metal and natural lithologies.</p> <p>WS2 was located in the area of the UST and WS3, WS4 and WS4A were located in the area of the ASTs. Hydrocarbon contamination was noted within the Made Ground across the Site.</p> <p>Groundwater levels ranged between 1.11m bgl and 2.01m bgl.</p> <p>Very high levels of methane were encountered in BH3 and elevated levels were recorded in other wells.</p> <p>The presence of hydrocarbon impacted soil could pose a risk to human health. To ensure that there is no pathway to industrial end users it was recommended that part of any work near surface hydrocarbon impacted soil associated with walled tank enclosures should be excavated and disposed of as hazardous waste.</p> <p>It was concluded that buildings not sensitive to settlement could be founded on a raft foundation. Alternatively, a piled foundation solution would need to be adopted. As the base of the Made Ground was no information on likely pile lengths could be provided.</p> <p>It was concluded in the report that buried dense ordinary Portland cement concrete should not deteriorate due to sulphate or acid attack and concrete should be designed to satisfy strength and workability criteria. As a minimum concrete was recommended to be designed to Class DS1 and AC1s.</p>
<p>Phase I Environmental Site Assessment, Chapman Way, Tunbridge Wells (Report Ref. 417410)</p> <p>Produced by TRC Companies Limited (TRC) in December 2021</p>	<p>Earliest available mapping (1867) shows that the Site consisted of woodland and open farmland with a railway line, located on an embankment, to the east. The Site remained vacant until 1909 when the brick and tile works, that had previously been constructed to the south, extended onto the Site. By 1909 a clay pit associated with the brick and tile works extended across the south-eastern part of the Site and a pond was located in the north of the Site. Additional industrial buildings were present in the surrounding area (consisting of a gas works and a foundry) followed by additional residential buildings to the south. By 1936 the clay pit is indicated to extend across the entire Site and details provided on the 1969</p>

Report Title	Summary of Findings
	<p>OS map indicated that the pit had extended further with numerous high walls associated with the pit and several ponds.</p> <p>The map also indicated that there were two zones where water issued from the highwalls with streams leading to the various ponds in the base of the pit. In 1975, the clay pit was listed as a tip, which was subsequently developed into High Brooms Industrial Estate circa 1984; this coincided with the development of commercial / industrial buildings directly adjacent to the Site in all directions. However, several of the highwalls remained to the north and west of the Site indicating that the pit was not completely backfilled. Further commercial buildings were constructed on the Site in 1984 and 1993.</p> <p>Borehole records suggest that between 5m and 18.8m of infill materials are present above the natural soils located on Site. The British Geological Survey (BGS) geological records indicate that the Site is underlain by natural soils of the Wadhurst Clay Formation (Mudstone). Archive borehole records indicate that the Wadhurst Clay Formation has been proven beneath the Site to a maximum depth of 20m bgl.</p> <p>Made Ground is expected across the Site associated with previous quarrying and land filling activities that are known to have taken place at the Site.</p> <p>The bedrock geology is classified as an Unproductive Strata. The Site is not located within a groundwater Source Protection Zone (SPZ).</p> <p>The closest surface feature to the Site is located 180m southeast of the Site and is referenced as an inland river.</p> <p>The BGS records indicate that the Site is in a lower probability radon area where less than 1% of homes are estimated to be at or above the Action Level.</p> <p>It was concluded in the report, that there could be potential contamination arising from the Made Ground associated with the redevelopment of the Site and landfill.</p>
<p>Phase II Geo-Environmental Site Assessment, TRC Report No. 417410.0001, Dated December 2021</p>	<p>The ground investigation comprised three cable percussive boreholes to a maximum depth of 25m, four window sample boreholes to a maximum depth of 5m, construction of six monitoring wells, laboratory testing, and field monitoring of ground gas and groundwater levels.</p> <p>A bituminous surfacing was encountered at surface overlying the Made Ground in all exploratory locations during the TRC investigation with a thickness of 0.1m. Underlying this, Made Ground soils were encountered in all exploratory locations, with a variable thickness of 9.5m to >15.0m and was encountered to a maximum proven depth of 15m bgl (BH102). The Made Ground was proved to a maximum depth of 18.8m bgl during previous investigation and could be deeper elsewhere on the Site. Wadhurst Clay Formation was encountered below Made Ground. The top of the Wadhurst Clay Formation, were encountered (BH101 and BH103 only), was at around 9.60m bgl. The maximum depth of Made Ground and Wadhurst Clay Formation encountered during past boreholes was</p>

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	<p>presented in Table 5 of that report; that table is repeated below for completeness.</p> <p>Table 5: Summary of Geological Depths</p> <table border="1" data-bbox="576 421 1393 1245"> <thead> <tr> <th>Borehole Reference</th> <th>Location</th> <th>Maximum Depth of Made Ground Recorded (m bgl)</th> <th>Maximum Depth of the Wadhurst Clay Recorded (m bgl)</th> </tr> </thead> <tbody> <tr><td>BH101</td><td>Centre-South</td><td>9.6</td><td>>10.3</td></tr> <tr><td>BH102</td><td>East</td><td>>15.0</td><td>Not Encountered</td></tr> <tr><td>BH103</td><td>Northwest</td><td>9.65</td><td>>10.0</td></tr> <tr><td>WS101</td><td>West</td><td>>5.0</td><td>Not Encountered</td></tr> <tr><td>WS103</td><td>East</td><td>>5.0</td><td>Not Encountered</td></tr> <tr><td>WS104</td><td>Southeast</td><td>>1.3</td><td>Not Encountered</td></tr> <tr><td>WS105</td><td>Southwest</td><td>>5.0</td><td>Not Encountered</td></tr> <tr><td>TP54SE92</td><td>Northeast</td><td>>8.0</td><td>Not Encountered</td></tr> <tr><td>TQ54SE93</td><td>East</td><td>9.8</td><td>>13.5</td></tr> <tr><td>TQ54SE94</td><td>Southwest</td><td>18.8</td><td>>20.0</td></tr> <tr><td>TQ54SE95</td><td>Northeast</td><td>>5.0</td><td>Not Encountered</td></tr> <tr><td>WSP-WS1</td><td>North</td><td>>5.0</td><td>Not Encountered</td></tr> <tr><td>WSP-WS2</td><td>Northwest</td><td>>1.2</td><td>Not Encountered</td></tr> <tr><td>WSP-WS3</td><td>Centre</td><td>>4.5</td><td>Not Encountered</td></tr> <tr><td>WSP-WS4A</td><td>Centre</td><td>>11.45</td><td>Not Encountered</td></tr> <tr><td>WSP-WS6</td><td>Southeast</td><td>>0.9</td><td>Not Encountered</td></tr> <tr><td>WSP-WS7</td><td>South</td><td>>5.0</td><td>Not Encountered</td></tr> <tr><td>WSP-WS8</td><td>South</td><td>>0.85</td><td>Not Encountered</td></tr> <tr><td>WSP-BH1</td><td>Northeast</td><td>11.45*</td><td>*Wadhurst Clay possibly encountered between 11.45 and 11.5mbgl.</td></tr> <tr><td>WSP-BH2</td><td>Northwest</td><td>>12.45</td><td>Not Encountered</td></tr> <tr><td>WSP-BH3</td><td>Centre-South</td><td>>11.65</td><td>Not Encountered</td></tr> </tbody> </table> <p>Notes:</p> <ol style="list-style-type: none"> I. Where > is noted, this is because the depth of the specified stratum extends greater than the maximum depth recorded. II. Note Encountered – In these locations the referenced stratum was not encountered as the full extent of the overlying stratum was not penetrated. <p>During the window sampling, groundwater was encountered at depths of between 3.5m bgl and 4.0m bgl. Groundwater was also encountered during the drilling of BH102 at a depth of 3.0m rising to 2.5m after 20 minutes. During subsequent gas and groundwater monitoring, groundwater resting levels were recorded at between 0.44m bgl and 1.38m bgl.</p> <p>Heavy metals, speciated Polycyclic Aromatic Hydrocarbons (PAH), and petroleum hydrocarbons were detected at the Site in concentrations that do not exceed the relevant screening values for the proposed development. It is not considered that these concentrations require widespread remediation for the proposed development and risks to future users could be readily managed through breaking of pathways via the placement of engineered hardstanding barriers such as building floor slabs and external yards. Areas of soft landscaping should be capped with an appropriate clean capping layer with a geotextile membrane installed as a marker layer.</p> <p>Whilst some exceedances were identified when screened against the UK Drinking Water Standards (DWS), the concentrations were not considered to be significant. There are no drinking water abstractions in close vicinity of the Site, and the Site is not located within an Environment Agency (EA)</p>	Borehole Reference	Location	Maximum Depth of Made Ground Recorded (m bgl)	Maximum Depth of the Wadhurst Clay Recorded (m bgl)	BH101	Centre-South	9.6	>10.3	BH102	East	>15.0	Not Encountered	BH103	Northwest	9.65	>10.0	WS101	West	>5.0	Not Encountered	WS103	East	>5.0	Not Encountered	WS104	Southeast	>1.3	Not Encountered	WS105	Southwest	>5.0	Not Encountered	TP54SE92	Northeast	>8.0	Not Encountered	TQ54SE93	East	9.8	>13.5	TQ54SE94	Southwest	18.8	>20.0	TQ54SE95	Northeast	>5.0	Not Encountered	WSP-WS1	North	>5.0	Not Encountered	WSP-WS2	Northwest	>1.2	Not Encountered	WSP-WS3	Centre	>4.5	Not Encountered	WSP-WS4A	Centre	>11.45	Not Encountered	WSP-WS6	Southeast	>0.9	Not Encountered	WSP-WS7	South	>5.0	Not Encountered	WSP-WS8	South	>0.85	Not Encountered	WSP-BH1	Northeast	11.45*	*Wadhurst Clay possibly encountered between 11.45 and 11.5mbgl.	WSP-BH2	Northwest	>12.45	Not Encountered	WSP-BH3	Centre-South	>11.65	Not Encountered
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Report Title	Summary of Findings
	<p>designated groundwater SPZ. In addition to this, the Wadhurst Formation is classified as an Unproductive Strata which will likely limit the migration of groundwater which is likely to remain within the Made Ground in the backfilled pit. Therefore, it is considered unlikely that the Site poses a significant risk to controlled waters.</p> <p>The gas monitoring results has identified that there are considerably elevated concentrations of methane present in more than one monitoring well. Based on the results, the Site would be classified as Characteristic Situation 4 (moderate to high risk).</p> <p>For foundation purposes a deep foundation solution like piling or Controlled Modulus Column (CMC) ground treatment was recommended in the report subject to the input of specialist contractors to confirm viability of such methods. Additional deep ground investigation to support design was recommended.</p>
<p>Intrusive Geoenvironmental and Geotechnical Site Assessment, TRC Companies, Report No. 417410, Dated November 2023</p>	<p>Made Ground was encountered between ground level and 18.50m bgl, recording a maximum thickness of 18.50m bgl.</p> <p>Bedrock geology comprising the Wadhurst Clay Formation was encountered underlying the Made Ground to a maximum proven depth of 30m bgl.</p> <p>Groundwater was not encountered during this investigation.</p> <p>Concentrations of hydrocarbons within the soil (Made Ground) exceeded the Generic Assessment Criteria (GAC) for the proposed commercial / light industrial end use.</p> <p>Asbestos fibres were identified within two samples of Made Ground, with a quantification recorded <0.001%.</p> <p>Concentrations of hydrocarbons and heavy metals within groundwater exceeded the UK DWS and Environmental Quality Standards (EQS).</p> <p>Gas monitoring indicates that the Site would be classified as Characteristic Situation 5.</p> <p>Geotechnical hazards include Made Ground, buried obstructions, ground aggressive to buried concrete, volume change potential of soils, and shallow groundwater.</p> <p>Ground improvement by way of Controlled Modulus Columns could be applied followed by shallow foundations, subject to confirmation of viability of the method by a specialist contractor.</p> <p>A design sulphate class of DS-2 and ACEC Class of AC-2 is recommended for both Made Ground and Wadhurst Clay Formation.</p> <p>It was recommended that further gas assessment is undertaken for the Site. It was also recommended that there should be consultation with a specialist contractor to discuss the viability of the CMC ground treatment method.</p>

3.0 Remediation Drivers

3.1 Conceptual Site Model

The proposed development will comprises the construction of three large adjoined warehouse units in the northern portion of the Site and two large adjoined warehouse units in the southern portion of the Site. Each unit will contain associated car parks, service yards and landscaping.

Based on the intrusive investigation results and the proposed development design, TRC has prepared a revised Conceptual Site Model (CSM) to include the findings from the Site investigation, which is presented in Table 5 below.

Past historical land uses on and off-site, including the brick and tile works facility, clay pit / tip, gas works, foundry, and industrial estate were considered to present a potential contaminated land risk. The potential contaminants included asbestos, heavy metals, Total Petroleum Hydrocarbons (TPH), PAHs, and ground gases.

During TRC’s previous investigation (report ref. 561063.000.0002), concentrations of hydrocarbons within soil (Made Ground) exceeded the GAC for the proposed commercial / light industrial end use.

Asbestos in soil was identified within two samples analysed at the Site. Asbestos fragments were identified in one location.

Groundwater was not encountered during the investigation possibly due to masking from the flushing medium during the drilling process. However, during subsequent monitoring, perched groundwater was typically encountered between 0.80m bgl to 3.68m bgl within the Made Ground.

The Wadhurst Clay Formation is classified as a Secondary (B) Aquifer. The Site does not lie within a groundwater source protection zone (SPZ), and there are no active groundwater abstractions within 1km of the Site.

The nearest surface water feature is a small pond and inflowing stream 180m to the east of the Site.

During TRC’s previous investigation (report ref. 561063.0000.0002), groundwater was analysed, and the results were compared against relevant Drinking Water Standard (DWS) and Environmental Quality Standards (EQS). Exceedances for hydrocarbons, speciated PAHs, and heavy metals were identified. TRC considers that the concentrations recorded do not pose a significant risk to controlled waters receptors.

Ground gas monitoring indicated that the Site would be classified as Characteristic Situation 5 (high risk). Based on these results, it is considered that gas protection measures would be required at the proposed development, which may include floor design and / or the installation of gas membranes and / or implementing ventilation measures.

TRC consider that the environmental sensitivity of the Site is moderate.

Table 5: Revised Conceptual Site Model

Source	Pathway	Receptor	Risk
On-Site Sources			
Concentrations of hydrocarbons in the soil.	Dermal contact, ingestion and inhalation pathways	Future Site users	Low to Moderate Exceedance of contaminants and asbestos fibres were identified within the soil.
Asbestos fibres identified within the			The proposed Site will primarily be covered in buildings and hard standing,

Source	Pathway	Receptor	Risk
Made Ground in the south of the Site.			<p>providing a physical barrier against contact with contaminants.</p> <p>It is recommended that localised soft landscaping areas are managed by an appropriate capping layer with a geotextile marker layer installed at the base of the capping layer.</p>
		Neighbouring site users	<p>Low</p> <p>Neighbouring site users could be exposed to contaminated soil dust and / or respirable fibres of asbestos, particularly during the construction phase. Mitigation measures could include construction site management solutions such as dust control.</p>
		Construction and maintenance workers	<p>Low to Moderate</p> <p>Risk pathway to be mitigated via Personal Protective Equipment (PPE), good hygiene practices and construction site management.</p> <p>Any works which may disturb asbestos must be undertaken in accordance with the Control of Asbestos Regulations (CAR) 2012 and a Plan of Work will be required to manage risks from asbestos.</p>
	Contact with buried services	Buried services	<p>Low to Moderate</p> <p>Proposed development to consider risk of residual contamination and incorporate protective measures as appropriate.</p> <p>This may include clean service corridors and / or use of chemically resistant pipework.</p>
Heavy metals and speciated PAHs contamination exceeding the EQS and DWS screening criteria for groundwater.	Leaching of contaminants and vertical migration into groundwater	Groundwater underlying the Site	<p>Low</p> <p>The underlying bedrock is classified as Unproductive Strata therefore migration of contaminants will likely be limited.</p>
	Lateral migration in groundwater/surface runoff	Surface Water	<p>Low</p> <p>The Site is directly underlain by low permeability clays of the Wadhurst Clay Formation and groundwater is considered unlikely to be in hydraulic</p>

Source	Pathway	Receptor	Risk
			connection with off-site surface water features.
Ground gas concentrations indicative of Characteristic Situation 5 (high risk).	Migration of ground gases onto Site and ingress into buildings	Future Site users	High The Site is classified as Characteristic Situation Level 5 (high risk). It is recommended that further gas risk assessment is undertaken, and / or possible remedial mitigation measures to reduce and / or remove the source of ground gas.
		Construction workers	Moderate to High Pathway to be managed through good construction practices and mitigation of risks when working in confined spaces.

3.2 Summary of Remediation Drivers

Based on the findings of the environmental assessment to date, it is considered that no active remediation is required at the Site. Residual contaminant risks to future site users will be addressed through development design actions as follows:

- The presence of hardstanding / buildings across the majority of the Site, providing a physical barrier against contact with potential contaminants; and,
- Placement of engineered clean capping over a geotextile marker layer in areas of proposed landscaping – to remove potential pathways between underlying soils that may contain elevated contamination and future Site users. This capping layer will also serve to provide a suitable growing medium for landscaping purposes. The capping layer should be a minimum of 300mm thick comprising 150mm topsoil 150mm subsoil.
- Installation of ground gas mitigation measures i.e. floor design and / or ground gas membrane installation and / or implementing ventilation measures.

TRC notes that the following issues will be mitigated during construction:

- Risks to construction workers during redevelopment: worker exposure will be appropriately managed via PPE and good hygiene practices, and an asbestos watching brief;
- Risks to neighbouring Site users during groundworks / construction phase: dust mitigation measures will be appropriately followed;
- Use of appropriate materials for buried services in accordance with statutory provider requirements; and,
- Appropriate sealed drainage design to prevent potential infiltration of contaminants.

4.0 Remediation Approach

4.1 Objectives

The development design shall remove any pollutant linkages through severing of risk pathways to ensure that residual contaminant risks to human health and controlled waters are mitigated. The remediation approach for this Site does not include the protection of demolition or construction workers, as this will be managed through a health and safety plan, and the protection of buried services.

4.2 Outline Remediation Strategy

Based on the findings from the previous investigations at the Site, it is considered that the following remediation actions will be required at the Site.

4.2.1 Active Remediation

It is not considered that active remediation is required at the Site; therefore, no remediation options appraisal will be required as part of this remediation strategy.

4.2.2 Development Led Remediation

Key development characteristics will complete the remediation via the removal of risk pathways. This will eliminate the key pollutant pathways ensuring protection of the future Site users and underlying soil and groundwater conditions. The design considerations will include:

- Construction of hardstanding across the majority of the Site including building footprints, paved roadways and footpaths;
- Placement of engineered capping across area of proposed landscaping including a clean cover of 300mm (150mm topsoil and 150mm subsoil) overlying a geotextile membrane;
- Installation of ground gas mitigation measures i.e. floor design and / or installation of ground gas membrane and / or implementing ventilation measures in the proposed development;
- Use of appropriate materials for buried services in accordance with statutory provider requirements; and,
- Appropriate sealed drainage design to prevent potential infiltration of contaminants.

4.3 Discovery Strategy

TRC recognise that there may be unidentified contamination encountered during the groundworks phase of the development. Risks associated with this potentially variable ground conditions will be managed via a discovery strategy, as detailed in Section 5.1.

5.0 Outline Remediation Methodology

The following section provides an outline of the requirements for the Client to manage the required remediation works and appropriately mitigate contaminant risks. It is recommended that there is appropriate oversight and verification, where applicable.

5.1 Discovery Strategy

Due to the heterogeneous nature of Made Ground soils beneath the Site, consideration should be given towards the potential for the development works to encounter previously unidentified contamination. A discovery strategy will be employed to ensure that groundworkers identify and manage suspected areas of ground contamination should they be encountered.

In order to manage previously unidentified contamination, TRC recommends the following procedure if suspected contamination is identified:

1. Stop Works – cease current works to allow assessment and report to environmental manager;
2. Isolate – isolate the area of work to contain the contamination and minimise exposure to unauthorised persons and surrounding users;
3. Protect – take necessary actions to mitigate risks to surrounding environmental receptors through run-off, leaching or contamination of surrounding materials. Actions may include covering of materials, use of spill kits or containment and temporary sealing of drainage;
4. Report – notify the Local Planning Authority (LPA) within 48 hours of discovery;
5. Assess – investigate contaminated materials and identify an appropriate course of action which may comprise a revised risk assessment; and,
6. Record – record findings and any changes in working method statements as necessary to mitigate risks in the Site files.

Findings of any contamination discovery would be documented and reported to regulatory stakeholders including the Local Planning Authority (LPA) and the Environment Agency (EA). Any further assessment and remediation would be performed in consultation with those stakeholders to ensure compliance with regulatory, planning and permitting requirements as relevant.

5.2 Permits and Consent

Various environmental permits and consents may be required as part of any remediation / demolition / enabling works. These would include, but are not limited to, a Materials Management Plan (MMP) to manage movement of materials around the Site and off-Site, abstraction licence if groundwater is to be abstracted and discharge consents for disposal of perched water in excavations. The contractor should apply for and manage these consents and permits as relevant to ensure compliance.

5.3 Additional Environmental Controls

The contractor should implement management procedures to ensure the highest level of environmental management at the Site. Key considerations for the Site are:

- Management of potentially contaminated materials;
- Controls of dust and debris;
- Noise;
- Odours;
- Vibration;
- Control of debris on highways;
- Vehicle movements;
- Access / egress; and,
- Working hours.

5.4 Soft Landscaping

Soft landscaping is proposed within the development plans issued to TRC. Any soft landscaping within areas of Made Ground should be capped with a minimum thickness of 300mm of clean material over a geotextile marker layer (150 mm topsoil and 150 mm subsoil).

Imported or re-used Site won materials should be validated via sampling and laboratory testing for the following: heavy metals, PAH, Total Petroleum Hydrocarbons – Criteria Working Group (TPH-CWG) and asbestos screening. Testing frequency should also be one sample for every 250 m³ (with a minimum of three per source). In addition to chemical testing, any imported topsoil to be used for the Site should be tested in accordance with BS3882:2015 to determine its suitability for use.

Hand pits shall be excavated within any soft landscaped areas to verify the thicknesses of the topsoil and subsoil. The frequency of this should be discussed with a qualified environmental professional.

5.5 Stockpile Management

It is anticipated that as part of the enabling works stockpiles will be generated. As mentioned previously, materials generated from the Site require suitability testing to verify their appropriateness for re-use within the development or classification for disposal.

A management plan should be adopted detailing the location and content of each stockpile (including source) and volumes of stockpiles. Should suspected contamination be present in the stockpile, these need to be bunded and covered to prevent contamination run-off.

Stockpiles should be managed in a manner that does not cause a nuisance to surrounding land users or create a risk to subsidence or surround properties.

5.6 Unexploded Ordnance (UXO) Risk

According to Zetica UXO Risk maps, the Site is located within a low risk zone. As such, UXO risk assessments nor mitigation measures are not considered necessary for the Site.

5.7 Borehole Decommissioning

There may be a need to decommission the existing boreholes on the Site in order to prevent potential preferential pathways for gas migration.

In preparing this document, TRC has consulted the publication of 'Good Practice for Decommissioning Redundant Boreholes and Wells'. The decommissioning methodology requires the backfilling of the entire borehole annulus from the base back to ground level with a low permeability bentonite / cement grout. This methodology usually requires some time for the grout to settle in the well which may require more grout after decommissioning.

The headworks should be removed (if possible) and if not contaminated these will be removed from the Site as general waste. The final 2 m to ground surface will be filled with a concrete cap that extends 1 m around the surface of the borehole. The borehole will be reinstated at surface to the same standard as the surrounding ground, which will include a concrete/aggregate or topsoil finish, depending upon the surrounding landscape.

Detailed records will be written during monitoring which will include:

1. The reason for the abandonment;
2. Groundwater level prior to decommissioning;
3. Any removal of pipework or attempt to remove the pipework;
4. The depth, position and nature of backfill materials; and,
5. Problems encountered during decommissioning.

5.8 Ground Gas Mitigation

Ground gas monitoring undertaken by TRC in 2023 identified elevated concentrations of ground gas which resulted in the Site being classified as Characteristic Situation 5 (high risk), and therefore requiring further ground gas assessment and / or possible remedial mitigation measures to reduce and / or remove the source of ground gas. As stated in the recent TRC Intrusive Geoenvironmental and Geotechnical Site Assessment report, guidance from CIRIA C665 lists the following typical scope of protective measures:

- Reinforced concrete cast in-situ floor slab (suspended, non-suspended or raft).
- All joints and penetrations sealed.
- Proprietary gas resistant membrane and actively ventilated or positively pressurised underfloor sub-space with monitoring facility, with monitoring.
- In ground venting wells and reduction of gas regime.

At the time of writing this Remediation Strategy, continuous ground gas monitoring is being undertaken at the Site to provide a greater dataset and to confirm the ground gas classification. As a result, this Remediation Strategy will be updated accordingly once the assessment has been completed.

6.0 Verification Plan

6.1 Purpose

A verification plan is required to document and record the work completed at the Site. The verification plan may serve to meet data requirements of future planning condition discharges and warranty providers.

6.2 Verification Actions

The following verification actions are proposed for the Site. It should be noted that the Site will undergo enabling works which are not covered within this environmental specific remediation strategy.

6.2.1 Action Triggered by the Discovery Strategy

Any actions triggered by the discovery strategy should be reported in full. This will include investigation, risk assessment and remediation as required to mitigate risks. These actions will be reported under separate cover and once complete would be summarised within the verification report.

6.2.2 Buried Services

The contractor should contact the local water supplier to confirm that materials used for water pipe supply are compatible with ground conditions as well as the water supplier's requirements.

6.2.3 Materials Import

Regraded soft landscaping is proposed within areas of Made Ground, the construction contractor shall complete the works through the placement of capping in areas of soft landscaping. This capping shall be formed of 300 mm layer of clean imported material (comprising 150 mm subsoil and 150 mm topsoil). In addition to this, a geotextile marker layer should be installed beneath the capped layer.

Should there be any material import, documentary evidence would be provided to confirm the source, materials quality (including chemical and geotechnical testing), acceptance procedures and use within the property development. The following testing for environmental suitability should be undertaken: heavy metals, PAH, TPH-CWG and asbestos screening. Sampling frequency of this material should be approximately 1 sample per 250 m³ (minimum of three samples per source). This information would be included in the verification report.

6.2.4 Materials Re-use

If site won material is to be re-used on Site, then this re-use materials should be carried out under a Site MMP.

For any material's re-use, the material needs to be tested both environmentally and geotechnically to confirm its suitability for the development and proposed re-use. The following testing for environmental suitability should be undertaken: heavy metals, PAH, Total Petroleum Hydrocarbons – Criteria Working Group (TPH-CWG) and asbestos screening. Testing frequency should be one sample for every 250 m³ (with a minimum of three per source) and results should be screened against the GAC for a commercial end use.

6.2.5 Materials Disposal

For materials disposal during the construction phases, a comprehensive materials management plan with waste records should be maintained by the Principal Contractor managing the phase of work. The documentary evidence shall include a minimum of materials testing, waste consignment and disposal documentation to demonstrate appropriate duty of care and compliance with relevant waste regulation. This information should be made available to the LPA.

6.2.6 Soft Landscaping

Hand pits shall be excavated in the soft landscaped areas to verify the thicknesses of the topsoil and subsoil. Photographs of each pit will be taken to show the thicknesses of the capped areas.

6.2.7 Verification Criteria

Should any materials be either imported to Site or re-used on Site, suitable testing should be undertaken as stated in Sections 6.2.3 and 6.2.4. Results should be screened against the GAC for a Commercial End Use to confirm suitability.

The soil results should be screened against verification criteria based upon the following :

- Land Quality Management Limited and Chartered Institute of Environmental Health (November 2014), the LQM/CIEH S4ULs for Human Health Risk Assessment. Document reference: S4UL3435.
- Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010 (September 2014).
- LQM S4ULs: evaluation of 2017 USEPA Toxicological Review of Benzo[a]pyrene.
- LQM/CIEH S4ULs for Nickel according to land use (Revised August 2015).

6.3 Verification Report

A verification report should be prepared to confirm that all necessary remediation actions have been satisfactorily completed at the Site. The report will contain the following key information:

- Summary of works carried out;
- Drawings showing the proposed building design;
- Field records including records of borehole decommissioning;
- Photographic and other media records;
- Findings of any actions triggered in association with the discovery strategy;
- Verification of ground gas mitigation measures;
- Confirmation of materials compatibility for buried services; and,
- Confirmation of any material's re-use import or disposal from Site as may be relevant during the construction works.

TRC considers that the verification report will be prepared and submitted following the main phase of remediation action completed during Site clearance.

7.0 Assumptions and Reliance

7.1 Significant Assumptions

This Remediation Strategy presents TRC's observations, findings, and conclusions as they existed on the date that this report was issued. This report is subject to modification if TRC becomes aware of additional information after the date of this report that is material to its findings and conclusions.

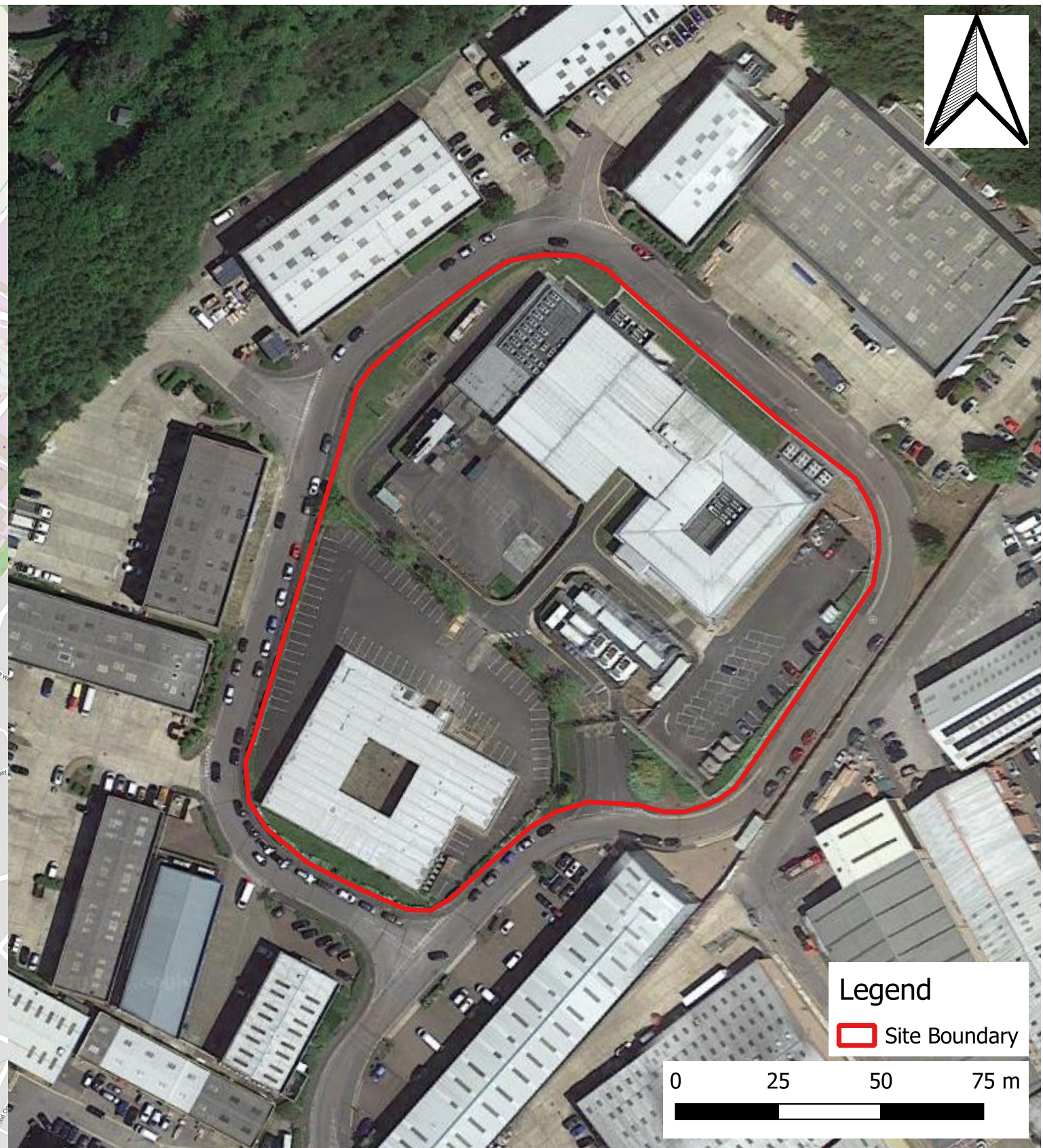
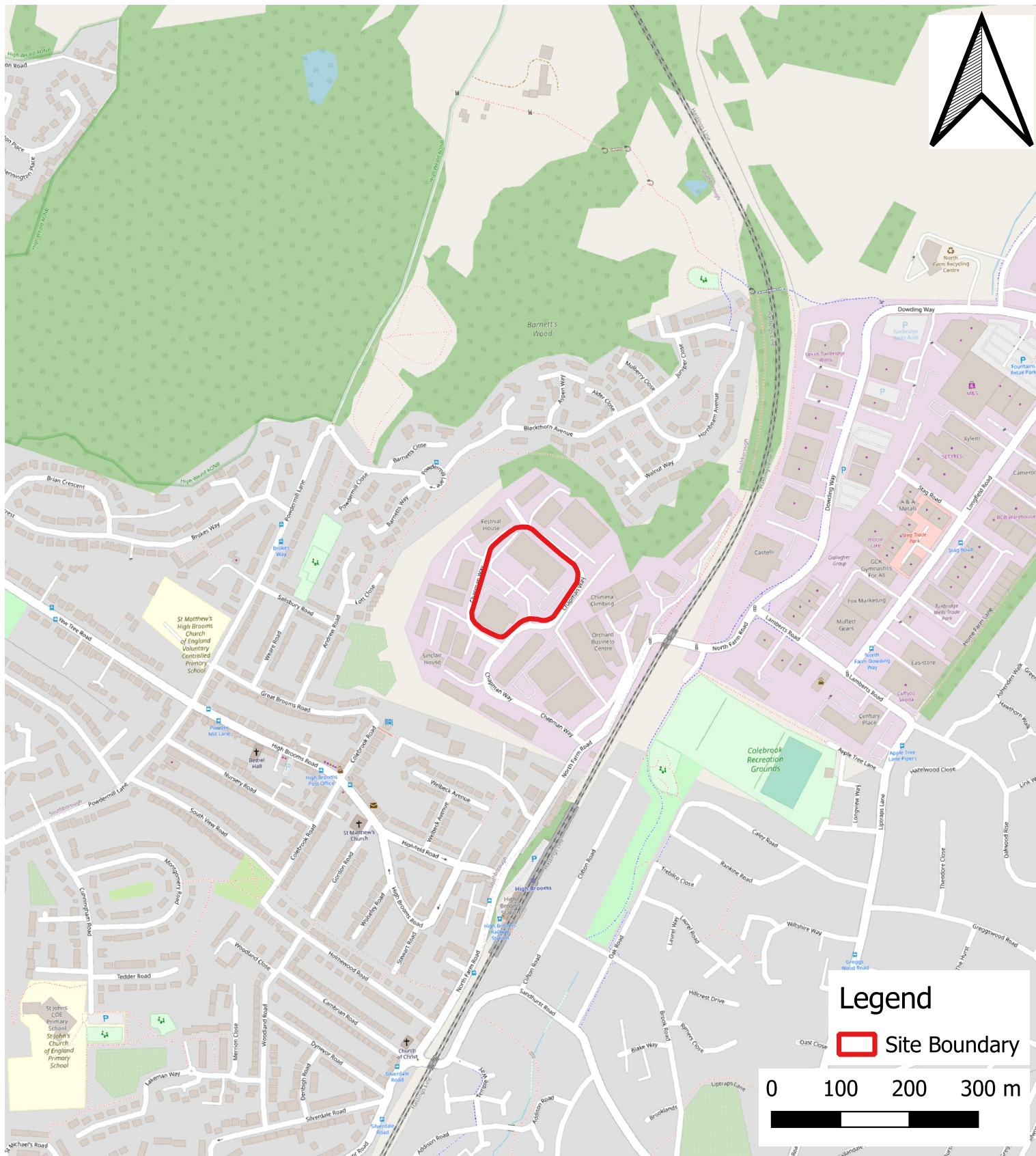
The reliability of information provided by others to TRC cannot be guaranteed to be accurate or complete. Performance of this Remediation Strategy is intended to reduce, but not eliminate, uncertainty of environmental conditions associated with the subject Site; therefore, the findings and conclusions made in this report should not be construed to warrant or guarantee the subject Site, or express or imply, including without limitation, warranties as to its marketability for a particular use. TRC found no reason to question the validity of information received unless explicitly noted elsewhere in this report.

7.2 User Reliance

This report was prepared for Tavis House Stellar (Tunbridge Wells) LP. Reliance on the Report by any other third party is subject to requesting and fully executing a reliance letter between TRC and the third party that acknowledges the TRC Standard Terms and Conditions with the Client, to the same extent as if they were the Client thereunder.

TRC has been provided with information from third parties for information purposes only and without representation or warranty, express or implied as to its accuracy or completeness and without any liability on such third parties part to revise or update the information. Where reliance has been provided by third parties to potential purchasers this is noted in our report.

Annex A: Figures




NOTES

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REVISIONS

P01	FIRST ISSUE			
	Initials	TS	TS	30/08/23
REV.	REVISION NOTES/COMMENTS			
	Initials			



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GLENNY LLP

PROJECT
 CHAPMAN WAY, TUNBRIDGE WELLS

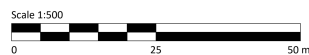
TITLE SITE LOCATION PLAN	
TRC PROJECT NO. 561063	SCALE 7500:1 @ A3 1250:1 @ A3
PURPOSE OF ISSUE SUITABLE FOR INFORMATION	STATUS
DRAWING NO FIGURE 01	REVISION PO1



Figural dimensions only are to be used. All dimensions to be checked onsite. Differences between drawings and between drawings and specification or bills of quantities to be reported to the PRC Group.

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Revisions:	Drawn / DAG:	Date:
T1 PRELIMINARY ISSUE	DF/GW	13.04.2023
T2 SITE LAYOUT AMENDED		28.04.2023



Preliminary Issue

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Project:
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Drawing Title:
SITE LAYOUT

Architecture
Planning
Master Planning
Urban Design
Interiors

Scale @ A1: 1:500
Checked by: GW
Date: 23.03.2023

Job No: 11476
Stage_Drawing No: TE_12-100
Rev: T2

Issue Status:
Construction Preliminary
Information Approval
Tender


Offices:
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London
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28/04/2023 12:47:35

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P01	FIRST ISSUE			
	Initials	LS	LS	06/11/23
REV.	REVISION NOTES/COMMENTS			
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TAVIS HOUSE STELLAR (TUNBRIDGE WELLS)
LP

PROJECT
CHAPMAN WAY, TUNBRIDGE WELLS

TITLE	
PROPOSED DEVELOPMENT PLAN	
TRC PROJECT NO. 561063	SCALE N/A
PURPOSE OF ISSUE SUITABLE FOR INFORMATION	STATUS
DRAWING NO FIGURE 02	REVISION PO1