Hampshire Water Transfer and Water Recycling Project

Environmental Statement - Appendix 11.2 Geotechnical and geo-environmental reports - 10 of 18 documents - Geotechnical and Geo-environmental Interpretative Report for Ground Investigation in Section M (Phase 2 and Phase 3B/3C) Addendum to Summary Report

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1 Introduction and Objectives

1.1 Background and Scheme Overview

Water for Life Hampshire (WfLH) is a programme being undertaken by Southern Water Services Limited (hereafter referred to as 'the Applicant') to address the sustainability objectives of reduced abstractions on Hampshire's two main rivers, the River Test and River Itchen and ensuring a resilient water supply for the Applicant's customers during times of drought. The Hampshire Water Transfer and Water Recycling Project (HWTWRP) (hereafter referred to as the 'Proposed Development') is the Strategic Resource Option project being delivered as part of the WfLH programme (Southern Water, 2024). An overview of the Proposed Development, at the time of this report production, is provided in the Applicant's HWTWRP Technical Document Technology Guide (Southern Water, 2024).

1.2 Terms of Reference

Strategic Solutions Partner (SSP) has been instructed by the Applicant as part of the Proposed Development, to produce a Geotechnical and Geo-environmental Interpretative Report for ground investigations (GI) completed for the construction of the proposed underground pipeline within the Draft order Limits (DoL). The Proposed Development has been divided into 12 Sections by the Applicant, these are referred to as Sections A to M (excluding I).

1.3 Ground Investigation Programme

The GI for the Proposed Development is being completed utilising a phased approach as shown in **Table 1.1**. This document reports the findings of the GI works completed during Phase 2 and Phase 3B/3C within Section M only.

Table 1.1: Ground investigation programme

GI Phase	Description
Phase 0	This, with Phases 1 and 3A, was completed between July 2022 and October 2023 by SOCOTEC for Clancy (Principal Contractor) and as specified by SSP (AECOM) primarily for the purpose of tunnel and shaft design (Sections B, C, D and M only) and comprised 11 boreholes.
Phase 1	This, with Phases 0 and 3A, was completed between July 2022 and October 2023 by SOCOTEC for Clancy (Principal Contractor) and as specified by SSP (AECOM) primarily for the purpose of tunnel and shaft design (Sections B, C, D, L and M only) and comprised 35 exploratory hole locations.
Phase 2	This is part of a wider phased GI conducted along the route between February 2023 and July 2023 by SOCOTEC for Clancy (Principal Contractor) and as specified by SSP primarily for the purpose of investigating areas for non-pipeline infrastructure, trenchless crossings and potential sources of contamination (PSC).
Phase 3A	This, with Phases 0 and 1, was completed between July 2022 and October 2023 by SOCOTEC for Clancy (Principal Contractor) and as specified by SSP (AECOM) primarily for the purpose of tunnel and shaft design (Sections B, C, D, L and M only) and comprised 14 exploratory hole locations.
Phase 3B/3C	This, with several Phase 2 GI locations was completed between May 2023 and May 2024 by SOCOTEC for Clancy (Principal Contractor) and as specified by SSP primarily for the purpose of investigating areas for non-pipeline infrastructure, trenchless crossings, PSCs and the linear route.

1.4 Phase 2 and Phase 3B/3C Section M Ground Investigation Objectives

The Phase 2 and Phase 3B/3C works in Section M investigated the following:

- Two locations associated with proposed launch/reception locations at the proposed trenchless crossing beneath an unnamed tributary of the River Itchen in the northern part of Section M (2M6507SA and 2M6508SA).
- Two locations associated with the linear route to prove the geology (3M6517HP and 3M6601HP).

Seven exploratory hole locations from the Phase 3A GI (BH505, BH506, BH507, BH507A, BH507B, BH507C and BH507D) were completed within Section M as part of the proposed shaft and tunnels GI, for the Otterbourne Tunnel. Borehole BH507 was completed within the former historical landfill (Bugle Farm Landfill, PSC 209) and potentially infilled land. The ground conditions and geoenvironmental testing are included in the Geo-environmental Interpretative Report for Ground Investigation at Proposed Tunnels and Shafts (Phase 1 and Phase 3A) (SSP, 2025) and are therefore not assessed herein from a geo-environmental perspective. The scope and objectives of the Phase 3A GI was to investigate proposed shaft and tunnel locations and did not determine the nature and extent of PSCs. Phase 3A exploratory hole logs have not been included or interpreted as it is outside the scope of this report. Phase 3A exploratory hole logs are presented in the Phase 3A Factual GI Report (SOCOTEC, 2024b).

Within the southern part of Section M, south of the River Itchen, several proposed investigation locations were not completed during Phase 2 and Phase 3B/3C GI due to land access issues. These included GI locations within areas of PSCs assessed to have a risk rating of Moderate/Low or higher as identified within HWTWRP Geotechnical and Geo-Environmental Desk Study Version 4 (SSP, 2024). A historical landfill (Bugle Farm Landfill, PSC 209), potentially infilled ponds and channels (PSC 206, 210, 215 and 216) and infilled land (worked ground and made ground) as recorded by the British Geological Survey (BGS) (PSC 437, 438) were present in this area.

Other PSCs identified within a 50m radius of the DoL in Section M were not investigated during Phase 2 and Phase 3B/3C. The proposed GI location at filter beds (PSC 220) was removed due to ground works at the time of the GI making the area inaccessible. Previous GIs have been completed at the Otterbourne Water Supply Works (WSW) (PSC 208). No GI was undertaken during Phase 2 and Phase 3B/3C at the request of the Applicant due to the risk of increased turbidity in groundwater from the drilling works.

1.5 Report Format

This report comprises both geotechnical and geo-environmental interpretation of data collated during the GI as outlined below:

Section 1	Introduction and report objectives.
Section 2	Description including the location and Site description.
Section 3	Summary of the GI's (SOCOTEC, 2024), (SOCOTEC, 2023), and (SOCOTEC, 2024a).
Section 4	Ground Model.
Section 5	GI results, data interpretation and geo-environmental risk assessment, and geo-environmental considerations for the outline proposed works.
Section 6	Development of the land contamination risk assessment model from the GI.
Section 7	Geotechnical Testing and Assessment including geotechnical summary tables and figures and design parameters.

Section 8 Geotechnical Considerations including hazard and mitigation table, discussions on ground conditions, foundation design, excavations, groundwater control, flotation, trenchless construction and concrete aggressivity.

Section 9 Conclusions.

Section 10 Recommendations based on the results of the GI.

This report provides a summary of encountered ground conditions, existing GI results, geotechnical and geo-environmental interpretation of analysis undertaken to inform design of potential future structures and pipeline, health and safety of construction and future ground workers (construction), and excavated materials (waste) management.

A land contamination risk assessment for other potential future receptors such as farmers/ farm workers or members of the public accessing and working within the Proposed Development is outside the scope of this report. Further ground investigation and human health risk assessment may be required to determine the risk to these, and any other identified potential future receptors, particularly in regard to appropriate excavated materials management (e.g. proposed reuse of soils).

Assessment of the GI data collected across the other Proposed Development Sections is included in the separate relevant sectional reports which are collated in one summary Geotechnical and Geo-environmental Interpretative report (Ref.710166-SWS-XX-XX-RP-GE-00100).

2 Section M Description

2.1 Location and Description

The Section M pipeline route is shown in the **Figures** section.

Section M extends from Highbridge Road (B3335) in the southeast under the River Itchen, railway line and then north towards Kiln Lane through predominantly arable fields, and beneath small watercourses terminating at Otterbourne WSW.

The majority of the approximate 2.2 km length of Section M ductile iron (DI) pipeline will be 1200 mm diameter.

The pipeline within Section M will be installed with a combination of open-cut and trenchless construction techniques.

Open-cut construction will be between 3 and 6 m below ground level (bgl) across arable fields and minor roads, while trenchless construction between 10.00 and 13.00m bgl under major roads and watercourses such as the River Itchen. Temporary launch and reception Shafts at the trenchless crossing locations will be excavated; launch shaft dimensions will range between 9.00 – 9.50 m diameter and reception Shafts will range between 5.00 – 5.40 m diameter.

Section M starts at an elevation of approximately 19 m Ordnance Datum (OD) at Highbridge Road (National Grid Reference (NGR) 446900E, 121623N) and ends on the southern side of Batsford Lane (446685E, 123242N) at an elevation of approximately 27 m OD, the maximum elevation along Section M.

3 Section M Ground Investigation

3.1 Rationale for Ground Investigation Locations

Four GI locations from Phase 1 (BH504, TP507, TP508 and TP509) investigation location in Section M were originally completed for a proposed shaft (up to 40.0m deep) for the construction of the Otterbourne Tunnel. These are located in a grass field to the south of Kiln Lane, west of the railway line.
The rationale for the Phase 2 and Phase 3B/3C GIs is presented in **Table 3.1.**

Table 3.1: Rationale for Locations in Section M

BH ID	Rationale for GI Location
BH504	These holes provide summary ground and groundwater conditions for which the geology and geotechnical results are incorporated into this report as additional information
TP507	
TP508	
TP509	
2M6507SA	These boreholes were required to confirm ground and groundwater conditions at proposed locations where a trenchless crossing beneath an unnamed watercourse between these two boreholes that would inform the launch and reception shaft design. Launch shaft is to be 10.0 m depth and the reception shaft 13.0 m deep.
2M6508SA	
3M6517HP	To confirm the geology along the linear route.
3M6601HP	

Deviations from scope
Within Section M, some locations were cancelled due to land access permissions, this affected (2M6500TP, 2M6502TP, 2M6504TP, 2M6501SA, 2M6503SA, 2M6505SA, 2M6506SA and 3M6519DS) which were locations originally supplied to the GI contractor to investigate PSCs prior to GI commencing (SSP, 2022) (SSP, 2023b) (SSP, 2023c).

3.2 Section M Ground Investigation

Phase 1 GI: A GI was carried out as part of Phase 1 at presented locations by SOCOTEC between 11th January 2023 and 15th February 2023.

Phase 2 GI: A GI was carried out for Phase 2 at selected locations across Section M of the proposed pipeline by SOCOTEC between 29th March 2023 and 5th April 2023.

Phase 3B/3C GI: A GI was carried out for Phase 3B/3C at selected locations across Section M of the proposed pipeline route by SOCOTEC on the 2nd May 2023 and 11th March 2024.

The GI scopes were specified in multiple Specifications by SSP (SSP, 2022) (SSP, 2023b) (SSP, 2023c) . The following exploratory holes were completed:

Phase 1:
- One borehole (BH504) by cable percussion and rotary core follow-on to 50.50 m bgl (Phase 1).
- Three machine excavated trial pits (TP507, TP508 and TP509) to 4.0 m bgl (Phase 1).

Phase 2:

- Two inspection pits (3M6517HP and 3M6601HP) hand dug to a depth of 1.20 m bgl (Phase 3B/3C).
- Two boreholes (2M6507SA and 2M6508SA) by cable percussion boring to a drilled depth of 20.0m and 20.45 m bgl respectively (Phase 2).

Phase 3B/3C:

- Two inspection pits (3M6517HP and 3M6601HP) hand dug to a depth of 1.20 m bgl (Phase 3B/3C).
- One borehole (BH504) by cable percussion and rotary core follow-on to 50.50 m bgl (Phase 1).
- Three machine excavated trial pits (TP507, TP508 and TP509) to 4.0 m bgl (Phase 1).

A plan showing the exploratory hole locations (including the four relevant Phase 1 exploratory holes) is presented in the **Figures** section. The scope of the GI also included: in-situ geotechnical tests, volatile headspace testing by photoionisation detector (PID), geotechnical and geo-environmental sampling and testing, falling head permeability testing and follow-up groundwater and gas monitoring.

The details of the GI, tests and laboratory analysis are presented in the SOCOTEC Ground Investigation Final Factual report (SOCOTEC, 2024), (SOCOTEC, 2023), and (SOCOTEC, 2024a). A description of GI locations is shown in **Table 3.2**.

Table 3.2: Description of GI Locations

GI Locations	National Grid Reference [1]	Location Description
BH504	446192, 122316	Located within a grass field to the south of Kiln Lane, west of the railway line. Investigations are approximately 1 km southeast of Otterbourne, Hampshire.
TP507	446168, 122320	
TP508	446183, 122323	
TP509	446176, 122310	
2M6507SA	446369, 123012	Located within a grass field to the north of Kiln Lane, on the southern side of an unnamed watercourse that flows eastwards into the River Itchen. The borehole is approximately 0.5 km east of Otterbourne, Hampshire.
2M6508SA	446510, 123140	Located within a grass field to the southwest of Batsford Lane, on the northern side of an unnamed watercourse that flows eastward into the River Itchen. The borehole is approximately 0.75 km northeast of Otterbourne, Hampshire.
3M6517HP	446315, 122612	Located within a grass field to the south of Kiln Lane. The hand pit is approximately 40 m east of Otterbourne, Hampshire.
3M6601HP	446329, 122866	Located within a grass field to the north of Kiln Lane. The hand pit is approximately 0.5 km east of Otterbourne, Hampshire.

[1] Provided in the Final factual GI reports (SOCOTEC, 2024), (SOCOTEC, 2023), and (SSP, 2025).

3.3 Exploratory Holes and Monitoring Well Installations

The exploratory hole locations and borehole logs for Phase 2 and Phase 3B/3C are presented in SOCOTEC Ground Investigation Reports (SOCOTEC, 2024), (SOCOTEC, 2023). Details of the Phase 1 exploratory hole logs are presented in the SOCOTEC Phase 1 Factual Report (SOCOTEC, 2024a) (SOCOTEC, 2024a).

Table 3.3 provides a summary of the locations and installation response zones. A 19mm standpipe piezometer was installed in 2M6507SA (1), whilst 50mm standpipes with gas taps were installed in 2M6507SA (2) and 2M6508SA (1). 50mm (1) and 38mm (2) standpipes were installed in BH504. A datalogger to record the depths to groundwater continuously was installed in monitoring well 2M6507SA (1) at 3.0m bgl on 20th June 2023 during the fourth groundwater monitoring event, and at the time of writing is still in operation. A plan showing the exploratory hole locations is presented in the **Figures** section.

Table 3.3: Summary of Groundwater and Ground Gas Monitoring

BH ID	Response Zones (m bgl)	Groundwater Monitoring Rounds	Gas Monitoring Rounds	Groundwater Samples Collected
BH504 (1)	12.0 – 17.60 (London Clay Formation)	13 No. 9 March 2023 to 10 November 2023	-	-
BH504 (2)	0.90 – 3.00 (River Terrace Deposits & London Clay Formation)	3 No. 9 March 2023 to 14 April 2023	9 No. 30 March 2023 to 5 October 2023	-
2M6507SA (1)	9.7-10.0 (Lambeth Group)	12 No. 18 April 2023 to 7 February 2024	No Monitoring	-
2M6507SA (2)	1.0-4.0 (River Terrace Deposits)	13 No. 18 April 2023 to 4 April 2024	13 No. 18 April 2023 to 4 April 2024	3 No. 20 July 2023, 14 September 2023, 9 January 2024
2M6508SA (1)	7.0-20.0 (Culver Chalk Formation)	12 No. 18 April 2023 to 7 February 2024	11 No. 18 April 2023 to 4 April 2024	5 No. 4 April 2023 (2 samples), 20 July 2023, 14 September, 9 January 2024

[1] A data logger was installed in borehole 2M6507SA (2) at 3.00 m bgl on 20th June 2023 (i.e., during the fourth monitoring visit). Groundwater logger data was reported between 19th July 2023 and 10th November 2023. Readings were taken every 15 minutes. Interpretation of data collected from data loggers installed in this monitoring well is outside the scope of this GIR and the monitoring data has not been provided with this report.

Response zone depths are taken from Table D1 in the SOCOTEC Phase 1 and 2 Ground Investigation Report (SOCOTEC, 2023), (SOCOTEC, 2024a) and Phase 3b/3c Ground Investigation Report (SOCOTEC, 2024).

3.4 Geo-Environmental Testing

Geo-environmental laboratory testing was scheduled by SSP on selected soil and groundwater samples recovered during the GI works. The testing was carried out by SOCOTEC at their UKAS-accredited environmental chemistry laboratory at Bretby, near Burton-on-Trent, in accordance with MCERTS accreditation (where applicable) test methods as stated within the laboratory test reports. The scope of testing is listed in **Table 3.4** and shows that several requested chemical analyses were not included in either AGS format or the Ground Investigation Report (SOCOTEC, 2024) and (SOCOTEC, 2023) at the time of report production.

Table 3.4: Summary of Geo-environmental Laboratory Tests

Exploratory Hole ID	Sample Depth (m)	Analysis Suites [1]								
		Soils				Soil Leachates (including Suite 3.0 Leachate Preparation)			Groundwaters	
		Suite 1.1 Made Ground	Suite 1.3 Natural	Suite 1.7 Pesticides	Suite 1.8 Herbicides	Suite 3.1 Standard leachate	Suite 3.6 Pesticides	Suite 3.7 Herbicides	Suite 3.1 Standard	Suite 3.9 Hydrogeology
2M6507SA	0.5		✓[2 3]			R			N/A (See below)	
	3.0		✓[2 3]			R				
	6.5		✓[2 3]							
2M6508SA	1.0		✓[2 3]			✓			N/A (see below)	
	3.2		✓[2 3]							
	5.0		✓[2 3]							
	11.0		✓[2 3]							
2M6507SA (2)									20/07/23 14/09/23 09/01/24	14/09/23 20/07/23 09/10/24
2M6508SA (1)									1.7m 04/04/23 4.97m 04/04/23 20/07/23 15/09/23 09/01/24	 20/07/23 15/09/23 09/01/24
3M6601HP	0.2		✓[2]						N/A	
	0.5									
3M6517HP	0.3		✓[2]	✓	✓	R	R	R		
	1.0	✓							N/A	

Summary based on laboratory results in SOCOTEC Ground Investigation Report (SOCOTEC, 2023), (SOCOTEC, 2024), AGS dataset and Schedules
[1] List of analytes included in each suite is presented in **Appendix B**.
[2] No nickel analysis included in metals suite
[3] GRO (C6-C10) completed but not requested
✓ Requested and completed.
R Requested and not received. Not received in either AGS format or Final Factual GI report due to lab instrumental error.
N/A Not applicable
Note: Boron concentration missing for 3M6517HP at 1.0m bgl due to an instrumental lab error.

3.5 Geotechnical Testing

Geotechnical testing was scheduled by SSP on selected soil samples recovered during the GI works. The testing was carried out by nominated UKAS-accredited geotechnical laboratories including: GEOLABS, near Watford, The Testing Lab (TTL) near Doncaster and Derwentside Environmental Testing Services Ltd (DETS) near Durham. Depending on the samples available, the testing comprised a combination of moisture content, Atterberg limits, density (linear), particle size distribution, unconsolidated undrained triaxial, compaction, chalk carbonate content, BRE testing, organic matter content and loss on ignition. The tests completed are presented in the SOCOTEC final factual reports (SOCOTEC, 2023) (SOCOTEC, 2024).

Similar suites of geotechnical analysis were completed for the relevant Phase 1 exploratory holes. The tests completed are presented in the SOCOTEC Phase 1 Ground Investigation final factual report (SOCOTEC, 2024b).

4 Ground Model

4.1 Geological Setting

Superficial deposits are present across Section M apart from lengths of pipeline to the north and south of Kiln Lane. From Highbridge Road in the southeast, superficial Alluvium and River Terrace Deposits are present at ground level, associated with deposition from the River Itchen. Superficial Alluvium and River Terrace Deposits are again present at the trenchless crossing, associated with deposition from the tributary, while Head Deposits are present in the far north of Section M at the connection with the Otterbourne WSW adjacent to Batsford Lane. Superficial Deposits extent is summarised in **Table 4.1.**

Table 4.1: Summary of Mapped Superficial Deposits at Ground Level

Chainages	Geology	Typical Description
35900 - 36360	River Terrace Deposits	Undifferentiated sand and gravel.
36360 - 36625	Alluvium	Clay, silt and sand, locally organic with gravel.
36625 - 36905	River Terrace Deposits	Undifferentiated sand and gravel.
36905 - 37000	Not present	-
37000 - 37100	River Terrace Deposits	Undifferentiated sand and gravel.
37100 - 37710	Not present	-
37710 - 37750	River Terrace Deposits	Undifferentiated sand and gravel.
37750 - 37835	Alluvium	Clay, silt and sand, locally organic with gravel.
37835 - 38070	River Terrace Deposits	Undifferentiated sand and gravel.
38070 - 38140	Head Deposits	Variable deposits of sandy silty clay, locally gravelly; chalky and flinty in dry valleys.

The chainages have been provided by the Applicant as of 12 March 2024 as part of the Summer 2024 Design Consultation Route.

These superficial deposits are underlain by bedrock of the London Clay Formation, Lambeth Group and White Chalk Subgroup. From Highbridge Road in the southeast, superficial deposits are underlain by the London Clay Formation. South of Kiln Lane the London Clay Formation is mapped at ground level and underlain by the Lambeth Group, which is found at ground level further north around Kiln Lane. The Lambeth Group is underlain by the White Chalk subgroup which underlies superficial deposits in the north of section M. Bedrck extents are summarised in **Table 4.2.**

Table 4.2: Summary of Mapped Bedrock at Ground Level

Chainages	Geology	Typical Description
35900 – 37260	London Clay	Silt, clay and sand
37260 - 37650	Lambeth Group - Sand	Mottled clay, locally sandy
37650 - 37820	Lambeth Group – Clay silt and sand	
37820 - 38140	White Chalk Subgroup	White chalk with flints

The chainages have been provided by the Applicant as of 12 March 2024 as part of the Summer 2024 Design Consultation Route.

Three historic boreholes were drilled along Section M (SU42SE30, SU42SE184 and BH-E SOCOTEC 2019). These progressed to between 3.50m and 20.0m bgl. Each borehole encountered varying thicknesses of Made Ground, Alluvium, Head Deposits and River Terrace Deposits with London Clay and White Chalk Subgroup bedrock. The boreholes generally agreed with the geological sequence anticipated from the geological mapping.

4.2 Section M Ground Investigation Results

4.2.1 Encountered Ground

A summary of the ground conditions encountered during the GI is provided in **Table 4.3**. Exploratory hole logs are presented in SOCOTEC's Phase 1 Ground Investigation Report (SOCOTEC, 2024a), SOCOTEC's Phase 2 Ground Investigation Report (SOCOTEC, 2023) and SOCOTEC's Phase 3B/3C Ground Investigation Report (SOCOTEC, 2024). Superficial deposits include Alluvium, Head Deposits, River Terrace Deposits. Bedrock comprises London Clay Formation, Lambeth Group and White Chalk Subgroup.

Chainages across the pipeline route for Section M are between 35900 and 38140.

The encountered ground conditions differed from mapping at several locations, as follows.

- Made Ground was encountered at TP509 but was not mapped.
- BH504, TP507, TP508 and TP509 are on the contact of River Terrace Deposits and London Clay, with all investigations encountering River Terrace Deposits underlain by the London Clay Formation.
- 2M6507SA was mapped as Lambeth Group being present at ground level but River Terrace Deposits were encountered.
- 2M6508SA is mapped with River Terrace Deposits at ground level, however Alluvium was found.
- 3M6517HP mapping indicated no superficial deposits with Lambeth Group at ground level, however Made Ground was encountered at ground level and underlain by Alluvium and Head.

Table 4.3: Summary of Encountered Ground Conditions for Section M Exploratory Holes

Exploratory Hole ID		BH504*	TP507*	TP508*	TP509*	3M6517HP	3M6601HP	2M6507SA	2M6508SA
Chainage (m)		36960	36960	36960	36960	37280	37540	37695	37880
Ground Level (m OD)		+24.01	+25.76	+24.39	+23.75	+22.70	+25.27	+26.15	+23.25
Strata	Typical Description	Depth range (m bgl)							
Topsoil	Brown clayey gravelly SAND with rootlets and cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine flint.	-	-	-	-	-	-	0.00 – 0.30	-
	Soft to firm dark brown sandy gravelly CLAY with rootles. Sand is fine to coarse. Gravel is subrounded fine to medium chert and brick.	-	0.00 – 0.25	0.00 – 0.35	-	-	0.00 – 0.25	-	0.00 – 0.30
	Soft dark brown sandy silty GRAVEL with rootlets. Sand is fine, Gravel is subangular to subrounded fine to coarse chert.	0.00 – 0.25	-	-	-	-	-	-	-
Made Ground	Soft dark brown sandy gravelly CLAY. Sand is medium. Gravel is of chert, chalk and brick.	-	-	-	0.00 – 0.36	0.00 – 0.48	-	-	-
Alluvium	Soft to firm orangish brown silty sandy gravelly CLAY. Sand is fine to medium. Gravel is subrounded fine extremely weak chalk.	-	-	-	-	0.48 – 0.65	-	-	0.30 – 2.55
Head	Soft brown sandy gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse chert.	-	-	-		0.65 – 1.20	-	-	-
River Terrace Deposits	Medium dense brown gravelly clayey SAND/ gravelly sandy clayey SILT. Sand is fine to coarse. Gravel is angular to subangular fine to medium flint.	-	-	-	-	-	-	0.30 - 5.70	2.55 – 4.50
	Soft to firm brown sandy gravelly silty CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse chert.	0.25 – 2.89	0.25 – 1.40^	0.35 – 1.40^	0.36 – 1.00^	-	-	-	-

Exploratory Hole ID		BH504*	TP507*	TP508*	TP509*	3M6517HP	3M6601HP	2M6507SA	2M6508SA
Chainage (m)		36960	36960	36960	36960	37280	37540	37695	37880
Ground Level (m OD)		+24.01	+25.76	+24.39	+23.75	+22.70	+25.27	+26.15	+23.25
Strata	**Typical Description**	**Depth range (m bgl)**							
London Clay Formation (Division D)	Stiff orangish brown grading to dark grey sandy gravelly silty CLAY with occasional shell fragments. Sand is medium. Gravel Is medium to coarse mudstone.	2.89 – 9.50	1.40 – 4.00	1.40 – 4.00	1.00 – 4.00	-	-	-	-
London Clay Formation (Division A)	Very dense grey glauconitic fine silty SAND with rare gravel. Sand is fine to medium. Gravel is angular to subangular fine to coarse sandstone.	9.50 – 30.80	-	-	-	-	-		
Lambeth Group	Firm to very stiff grey CLAY / silty sandy gravelly CLAY at base of strata. Gravel is angular to rounded fine to coarse flint.	30.80 – 35.00	-	-	-	-	0.25 – 1.20	5.70 – 14.10	-
	Grey glauconitic fine SAND with rare shell fragments.	35.00 - 40.30	-	-	-	-	-	-	-
White Chalk Subgroup	Yellow white and white CHALK recovered as gravelly SILT. Gravel is subangular to subrounded dine to medium extremely weak low-density chalk.	-	-	-	-	-	-	-	4.50 – 7.40
	White CHALK recovered as silty GRAVEL with rare subangular fragments of flint. Gravel is very weak to weak low to medium density subangular fine to coarse chalk.	40.30 – 40.60	-	-	-	-	-	14.10 – 15.00	7.40 – 17.45
	White CHALK recovered as sandy gravelly SILT. Gravel is extremely weak to very weak low density of chalk with rare flint.	-	-	-	-	-	-	15.00 – 20.00	17.45 – 20.45
	Weak high density white CHALK with rare small to large fragments of flint.	40.60 – 50.50	-	-	-	-	-	-	-
Depth of investigation (m bgl)			50.50	4.00	4.00	4.00	1.20	20.00	20.45

*BH504, TP507, TP508 and TP509 were completed in Phase 1 of Section M and are presented in this report.
^ Reclassified to River Terrace Deposits from the SOCOTEC logs.

4.2.2 Groundwater Levels

Groundwater monitoring took place in selected boreholes specified by SSP. Monitoring was carried out by SOCOTEC during and after the main fieldwork period. **Table 4.4** summarises the groundwater strikes and groundwater level measurements.

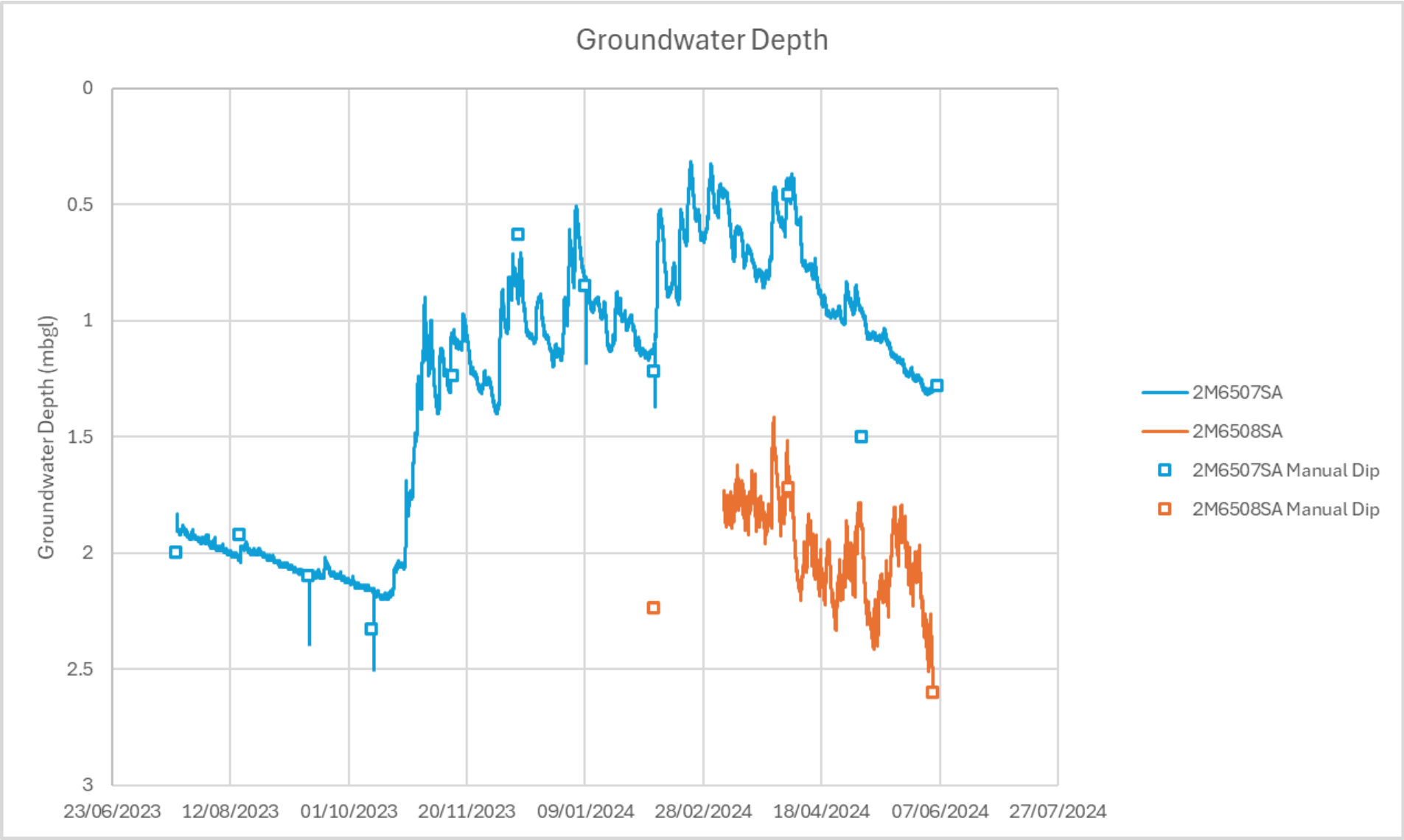
Table 4.4: Summary of Groundwater Strikes and Spot Monitoring Records

Exploratory Hole	Response zone (m bgl)	Strike During Drilling – Depth and Elevation (m OD)	Stratum Within Which Strike Was Recorded	Spot Monitoring – Depth and Elevation m bgl (m OD)	Data Logger – Minimum/ Maximum Depth and Elevation m bgl (m OD)
BH504 (1)	12.0 – 17.60	2.70	River Terrace Deposits	3.17 – 4.15 (+20.84 to 19.86)	-
BH504 (2)	0.90 – 3.00			1.17 to 2.31 (+20.84 to +21.70)	-
TP507	N/A	Not observed	-	-	-
TP508	N/A		-	-	-
TP509	N/A		-	-	-
2M6507SA (1)	9.70 – 10.00*	3.00 Rising to 1.89 14.00 Rising to 13.17 15.00 Rising to 3.34	River Terrace Deposits, Lambeth Group and White Chalk Subgroup	2.94 – 4.03 (+23.21 to +22.12)	-
2M6507SA (2)	1.00 – 4.00**			0.46 – 2.33 (+25.69 to 23.82)	0.32 – 2.50 (+23.65 to +25.83)
2M6508SA (1)	7.00 – 20.00	2.80 Rising to 1.70	River Terrace Deposits	1.72 – 2.60 (+21.53 to +20.65)	1.42 – 2.60 (+21.83 to +20.65)
		6.00 Rising to 4.97	White Chalk Subgroup		
3M6517HP	N/A	Not observed	-	-	-
3M6601HP	N/A			-	-

2M6507SA (2) – Standpipe Piezometer Installation. Data logger installed at 3.0 m, Baro logger installed at 0.30 m bgl.
*2M6507SA (1) is the 19mm standpipe piezometer
** 2M6507SA (2) is the 50mm standpipe

Graph 4.1 shows the groundwater levels for selected Phase 2 boreholes at trenchless crossings across the proposed pipeline route within Section M. **Graph 4.1 i**s based on data (SOCOTEC, 2023) (SSP, 2023a) provided by SOCOTEC. 2M6508SA has a smaller monitoring period due to being installed at a later date. Further interpretation on the groundwater levels is not the focus of this GIR.

Graph 4.1: Datalogger groundwater levels for Section M Monitoring



4.2.3 Visual and/or Olfactory Contamination

There was no visual and/or olfactory evidence of contamination recorded on the exploratory hole logs in Section M.

5 Generic Quantitative Risk Assessment (GQRA)

This section assesses the soil, soil leachate and groundwater concentrations collected at the selected Phase 2 and Phase 3B/3C GI locations within Section M only[1].

In accordance with the guidance given in 'Land Contamination Risk Management' (LCRM) (Environment Agency, 2023) the results of the geo-environmental laboratory testing undertaken on the samples of soil and groundwater recovered during the 2023 and 2023/2024 SOCOTEC GI have been compared to current published generic assessment criteria (GAC) to identify potential hazards to the plausible receptors.

The eleven soil samples included one sample of Topsoil, one sample of Made Ground, one sample of Alluvium, three samples of River Terrace Deposits, one sample of Head deposits, two samples of Lambeth Group (Clay) and two samples of Chalk.

5.1 Soil Chemical Results

5.1.1 Assessment of Potential Risk to Human Health Receptors

There are no reported exceedances of the human health GAC (commercial land use). Details of the GAC used for screening are provided in **Appendix G**.

5.1.2 Notable Soil Contaminant Concentrations

GAC are not available for all determinands analysed. There were no concentrations which appear to be elevated compared to other chemical results recorded during the GI.

5.1.3 Soil Sample Deviations

Deviations arose due to the acceptable (holding) time between the sampling date and laboratory analysis being exceeded. Further details of the soil sample deviations are provided in **Appendix C**.

5.2 Soil Leachate and Groundwater Results

5.2.1 Comparison of Soil Leachate Results Against GAC

Of the three soil leachate (2:1 ratio) analysis requested, only one result has been reported - 2M6508SA from 1.0m (Alluvium). Concentrations were compared to the Drinking Water Inspectorate Drinking Water Standards guidance (2021), the withdrawn Water Supply (Water Quality) Regulations (1989) for petroleum hydrocarbons and Environmental Quality Standards (EQS). Details on the selection of water GAC are provided in **Appendix G**.

No contaminant concentrations detected in soil leachate exceeded the Drinking Water Standards (DWS) GAC. There are no TPH thresholds included in the Water Supply (Water Quality) guidance. **Table 5.1** shows that TPH concentrations exceeded the TPH threshold value of 10 µg/l as presented within the Withdrawn Water Supply (Water Quality) Regulations 1989 which has been used for reference purposes; these thresholds are

[1] Information regarding the intrusive works that were undertaken as part of the Phase 1 and Phase 3A ground investigation for tunnel and shaft design can be found in the Phase 1 / 3A Geo-environmental Interpretative Report (SSP, 2025).

considered protective of human health. **Table 5.2** shows contaminant concentrations detected in soil leachate exceeding the Environmental Quality Standards (EQS).

Table 5.1: Soil Leachate Sample Exceedances of Withdrawn Water Supply (Water Quality) Regulations 1989

BH ID	Depth (m bgl)	Ground Conditions	Determinand	Concentration (µg/l)	GAC (µg/l)
2M6508SA	1.00	Alluvium	TPH	**<176***	10

* - Laboratory result was <176 ug/l. The method detection limit was <110. No detail was provided from the laboratory explaining the increase the detection limits. There is potential for the result to be an exceedance of the criteria.

Table 5.2: Soil Leachate Sample Exceedances of Freshwater EQS

BH ID	Depth (m bgl)	Ground Conditions	Determinand	Concentration (µg/l)	GAC(µg/l)
2M6508SA	1.00	Alluvium	Cadmium	**0.10**	0.08
			Copper	**3.00**	1.00

Further details on the selection of GAC protective of human health and aquatic ecosystems (controlled waters) are provided in **Appendix G.**

5.2.2 Comparisons of Groundwater Results Against GAC

Exceedances of the groundwater GAC are shown in **Table 5.3** and **Table 5.4.**

Table 5.3: Groundwater Exceedances of Withdrawn Water Supply (Water Quality) Regulations 1989

BH ID	Sampling Date and Depth (m bgl)	Determinand	Concentration (µg/l)	GAC (µg/l)
2M6507SA (2)	20/07/23	TPH	**140***	10
	09/01/24	TPH	**130**	10
2M6508SA (1)	04/04/23	TPH	**130***	10
	15/09/23	TPH	**70***	10

*Clean up not reported

Table 5.4: Groundwater Exceedances Freshwater EQS

BH ID	Sample Date and Depth (m bgl)	Determinand	Concentration (µg/l)	GAC (µg/l)
2M6507SA (2)	20/07/23	Chromium (VI)	**6.0**	3.4
	14/09/23	Anthracene	**0.80**	0.1
	09/01/24	Chromium (VI)	**5.0**	3.4
	09/01/24	Zinc	**20.0**	10.9
2M6508SA (1)	04/04/23 (1.7 m)	Fluoranthene	**0.02**	0.0063
		Benzo(g,h,i)perylene		0.0082
	04/04/23 (4.97 m)	Zinc	**24.0**	10.9
	20/07/23	Zinc	**17.0**	
	15/09/23	Zinc	**12.0**	

Groundwater sample deviations and determinands for which the method detection limit (MDL) exceeded the corresponding GAC are presented in **Appendix C**. It is noted that testing with a MDL lower than the GACs for the PAHs listed is typically not offered by standard commercial laboratories. For all determinands analysed, but not listed in the **Appendix C**, the MDLs were below the relevant GAC.

Further details on the selection of water assessment criteria protective of human health is provided in **Appendix G**.

5.3 Excavated Materials (Waste) Management

5.3.1 Hazardous Properties

Soil analytical results for the four soil samples (Phase 3b/3c) and seven soil samples (Phase 2) have been screened for hazardous properties as identified in Technical Guidance WM3 - Waste Classification – Guidance on the Classification and Assessment of Waste First Edition Version 1.2 (Environment Agency, 2021). These screens were carried out using Hazwasteonline™ (5TIWE-DPJCW-634HJ) (Hazwaste Online, 2024) and (TX7M4-BIOUY-0FPNO) (HazWasteOnline, 2024a). The reports with the results are provided in **Appendix E.**

The soil samples analysed showed no hazardous properties.

5.3.2 Waste Acceptance Criteria (WAC)

WAC testing was carried out for 3M6517HP at 1.00 m bgl (sandy gravel clay – HEAD deposits). The WAC results for the sample are non-hazardous hence, excavated materials can be offered to an inert landfill.

5.4 Ground Gas Monitoring

Ground gas monitoring between 18th April 2023 and 20th July 2023 are tabulated in SOCOTEC's Ground Investigation Report (SOCOTEC, 2024), the subsequent monitoring events are provided in AGS format and are also presented in **Appendix F**. The maximum peak concentrations are summarised in **Table 5.5**. Thirteen gas monitoring rounds were completed for 2M6507SA (2) and 11 monitoring rounds were completed for 2M6508SA (1) between 18th April 2023 to 4th April 2024.

For gas monitoring rounds on 18th April 2023, 11th May 2023, 9th January 2024 and 4th April 2024 within 2M6507SA (2) and all of the monitoring rounds within 2M6508SA (1) the groundwater level was above the top of the installation response zone (flooded). In view of the flooded well the gas data recorded during these dates are assessed as indicative as:

"The response zone of the gas monitoring standpipe should be wholly or partly above groundwater level to provide valid data... [and] gas standpipes with flooded response zones might exhibit measurements of elevated methane or carbon dioxide… due to dissolved gases or the presence of biodegradable material in the groundwater" (BS8485: 2015 + A1: 2019).

Generally, gas concentrations within these boreholes were low, though some low concentrations of oxygen and elevated concentrations of carbon dioxide were encountered.

Oxygen concentrations recorded during the 12-month monitoring programme in 2M6507SA (2) ranged between 4.2% and 21.2% with nine of the 13 monitoring occasions reporting a minimum oxygen concentration <19%. The minimum concentration (4.2 %) was recorded on 25th May 2023. Borehole 2M6507SA (2) is screened in the River Terrace Deposits. This borehole is close to the proposed location for a trenchless crossing. There are no identified PSCs within 50 m of this borehole.

A maximum carbon monoxide concentration was recorded in 2M6507SA (2) at 12 ppm during 18th April 2023, the remainder of the 12-month monitoring programme recorded concentrations ranging between <1 and 4 ppm. Similarly, a carbon monoxide concentration of 10 ppm was reported in 2M6508SA (1) during the same monitoring date with the remaining concentrations also ranging between <1 and 4 ppm.

5.4.1 Gas Thresholds

Maximum concentrations (minimum for oxygen) recorded in monitoring wells have been compared to the following gas threshold concentrations:

- BSI (The British Standards Institution) Health and Safety in tunnelling in the construction industry - Code of Practice [BS 6164:2019] (BSI, 2019).
- EH40/2005 (fourth edition 2020) Workplace Exposure Limits (WELs) (HSE, 2020).

Exceedances of these thresholds are shown in **Table 5.6** and the maximum (minimum for oxygen) recorded concentrations were compared to these thresholds.

Table 5.5: Ground Gas Monitoring Results Summary

Peak Gas Concentrations (minimum for Oxygen)									
Area	**Borehole**	**Response Zone and Stratum**	**CH_4 %vol**	**CO_2 %vol**	**O_2 %vol**	**CO ppm**	**H_2S ppm**	**VOC ppmv**	**Max Gas Flow Rate (pk) l/hr**
Open field (agricultural). Trenchless crossing – Unnamed tributary of the River Itchen	**2M6507SA (2)**	1.0-4.0 (River Terrace Deposits)	0.2	7.5	4.2	12.0	1.0	30.2	-5.7
	2M6508SA (1)	7.0-20.0 (Culver Chalk Formation)	0.1	0.8	15.8	10.0	1.0	0.7	2.0

CH_4 - Methane, CO_2 – Carbon Dioxide, O_2 – Oxygen, CO – Carbon Monoxide, H_2S – Hydrogen Sulphide, VOC – Volatile Organic Compounds, ppmv - Part per Million Volume

Table 5.6: Exceedances of Gas Thresholds

Area	**BH ID**	**CH_4**	**CO_2**	**O_2**	**CO**	**H_2S**	**VOC**
Location / Substance (threshold)		**4.4% vol (LEL) to 17 % vol (UEL)**	**0.5 % vol (LTL) 1.5 % vol (STL)**	**<19% by volume**	**20 ppm (LTL) 100 ppm (STL)**	**5 ppm (LTL) 10 ppm (STL)**	**Approx. 10,000 ppmv (LEL)**
Open field (agricultural). Trenchless crossing – Unnamed tributary of the River Itchen	**2M6507SA (2)**	N/A	**Yes**	**Yes**	N/A	N/A	N/A
	2M6508SA (1)	N/A	**Yes (LTL only)**	**Yes**	N/A	N/A	N/A

LEL – Lower explosive limit, UEL – Upper explosive limit,
STL – Short Term Limit (15-minute reference period), LTL – Long Term Limit (8-hour reference period)
N/A – not applicable due to no exceedances

6 Land Contamination Risk Assessment Model

6.1 Approach and Outline Conceptual Site Model

The land contamination risk assessment presented in this section is a revised risk assessment. A summary of the guidance for the assessment of land contamination and the approach developed and adopted by SSP is presented in **Appendix G**. This revised risk assessment uses information collated as part of the Phase 2 and 3B/3C GI and builds on the existing preliminary risk assessment completed as part of the desk study. The revised risk assessment will allow for recommendations to be made based on the identification and assessment of potential contaminant linkages.

6.2 Potential Sources of Contamination

There were no PSCs identified in Section M west of the railway line within DoL with the exception of the Otterbourne water supply works and former filter beds. The two handpits, 3M6517HP and 3M6601HP were targeting the geology along the linear route. Boreholes 2M6507SA and 2M6508SA along Section M were at trenchless crossing locations.

The key results are as follows:

- The Phase 2 and Phase 3B/3C GI identified no exceedances of commercial GAC protective of human health within soil samples collected at these GI locations.
- Soil leachate concentrations of cadmium and copper exceeded EQS and TPH exceeded Withdrawn Water Supply (Water Quality) Regulations 1989 GAC for the one leachate sample tested.
- Groundwater samples exceeded the TPH withdrawn Water Supply (Water Quality) Regulations 1989 GAC and anthracene, fluoranthene, benzo(g,h,i)perylene, chromium (VI), and zinc exceeded the EQS.

The results as stated above are not associated with identified PSCs; therefore, there is potential for this to have been caused by off site sources.

6.3 Identification of Potential Contaminant Pathways

During and post construction works in Section M, the following potential pathways are considered:

- Dermal contact, ingestion and inhalation of dusts, fibres, gases and vapours.
- Gas and vapour migration through permeable materials/strata and accumulation in voids and below ground chambers/receptor pits.
- Surface water runoff from stockpiles to surface watercourses and migration through groundwater.
- Leaching through unsaturated soil to underlying groundwater.
- Migration of contamination through proposed pipe bedding.

6.4 Identification of Potential Contaminant Receptors

Based on the proposed construction works, end use and surrounding land uses, the following potential receptors previously identified in the desk study preliminary risk assessment have been further assessed following Phase 2 and 3B/3C GI data:

- Construction and maintenance workers.
- Future Site users (workers and maintenance workers).
- Adjacent land users.
- On Site existing and future property (buildings and below ground chambers / receptor pits).

- Surface water (River Itchen, a Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC)).
- Groundwater (Principal Aquifer and Secondary A Aquifers).

The proposed pipeline has not been included as a potential receptor to contaminants that could be present in soils or groundwaters because the pipe material selection is to be made during design to prevent impact from existing PSCs.

There are no proposed permanent buildings at the areas investigated in Phase 2 and 3B/3C of Section M DoL.

6.5 Risk Assessment

An evaluation of the above pollutant linkages has been used to undertake a qualitative risk assessment. The method of risk evaluation adopted is consistent with LCRM (Environment Agency, 2023a) and is being carried out in accordance with CIRIA C552 (CIRIA, 2001) using probability, consequence and risk classifications as shown in **Appendix I.**

Preliminary risk estimation is based on the evaluation of both desk study information collated for the Section route together with the Phase 2 and 3B/3C GI data.

Table 6.1 summarises the risk classification (without mitigation measures) for the Phase 2 GI location at the proposed trenchless crossing in Section M. The risk classicisation ratings are taken from the risk assessment tables (**Appendix H**). The table presents the risk classification for potential receptors of Moderate/Low or above. Where more than one pathway has been evaluated, the pathway with the highest risk rating is presented in **Table 6.1**. The detailed risk assessment table which contains information pertaining to probability and consequence can be found within **Appendix H**. Definitions for probability and consequence are in **Table 4** and **Table 5** of **Appendix I** (respectively).

No COCs were identified in Phase 3B/3C GI hand pit locations and therefore a risk assessment at these locations is not required.

Table 6.1: Summary of Risk Classification for Construction and Maintenance Activities for Areas Investigated in Section M

Location description	COCs encountered	Risk Classification (without mitigation measures) for Potential Receptors		
		Construction, maintenance workers and future Site users	On Site existing and future property	Groundwater and Surface Waters
Trenchless crossing at an unnamed tributary of the River Itchen. Open field (agricultural). GI locations 2M6507SA and 2M6508SA.	Soil leachable concentrations of cadmium and copper exceeded EQS and TPH exceeded Withdrawn Water Supply (Water Quality) Regulations 1989 GAC for the one leachate sample tested. Groundwater samples exceeded the TPH GAC, PAHs (anthracene, fluoranthene, benzo(g,h,i)perylene) and metals (chromium VI, zinc) exceeded the EQS. Carbon dioxide concentrations during monitoring exceeded STL and LTL workplace thresholds. Low oxygen levels were also encountered.	Moderate/Low	Moderate/Low	Moderate

6.6 Summary

The Phase 2 boreholes advanced within Section M only targeted the trenchless crossing in the north. There are no PSCs within 50m of this trenchless crossing location.

The Phase 3B/3C exploratory holes advanced within Section M targeted an open cut excavation in the north. There are no PSCs within 50m of this open cut location.

It should be noted that several PSCs in the south of Section M are located on the current DoL route; due to access restriction no Phase 2 and Phase 3B/3C proposed boreholes were able to target these, and it is possible subsequent phases of GI may target these in the future.

At this stage a risk cannot be determined for PSCs identified within Section M until further information is obtained. Other PSCs identified within a 50m radius of the proposed Section M DoL were not investigated during Phase 2 and 3B/3C GI. Risk Assessments for these PSCs are presented in the Desk Study (SSP, 2024).

7 Geotechnical Testing and Assessment

7.1 Geotechnical Testing and Assessment Summary Tables for Section M boreholes

Table 7.1 shows the varying geotechnical tests per strata specific to Section M.

Table 7.1: Geotechnical Testing and Assessment Summary for Section M

	Geotechnical Property																				
Strata	**Moisture (%)**			**Plasticity (%)**			**Particle Size Distribution (Average of values)**		**Triaxial Shear Strength (kPa)**			**SPT Results (uncorrected N value)**			**Uniaxial Compressive Strength, UCS (MPa)**	**Compaction – Max Dry Density (Mg/m³) (Optimum Moisture content, %)**			**Linear (Bulk) Density (kg/m³)**		
Alluvium	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	**Particle Size**	(%)	None			**Min**	**Av**	**Max**	Not Applicable	**Min**	**Av**	**Max**	None		
							Cobbles	0													
							Gravel :	6													
	12	17	23	22	23	23	**Sand :**	17				7	11	14		None					
							Silt :	36													
							Clay	42													
Total No. of tests	**2**			**2**			**1**		**0**			**2**			**0**	**0**			**0**		
River Terrace Deposits	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	**Particle Size**	(%)	None			**Min**	**Av**	**Max**	Not Applicable	**Min**	**Av**	**Max**	None		
							Cobbles	0													
							Gravel :	14													
	16	26	28	21	34	47	**Sand :**	21				5	11	15		1.84 (13)	1.93 (11)	1.98 (9.4)			
							Silt :	34													
							Clay :	31													
Total No. of tests	**8**			**7**			**9**		**0**			**9**			**0**	**3**			**0**		
London Clay Formation Division D	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	**Particle Size**	%	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	Not Applicable	None			**Min**	**Av**	**Max**
							Cobbles:	0													
							Gravel :	0													
	22	26	30	22	34	46	**Sand :**	4													
							Silt :	53	69	160	250	24	24	24					2.08	2.12	2.16
							Clay :	43													
Total No. of tests	**6**			**6**			**5**		**2**			**1**			**0**	**0**			**2**		
London Clay Formation Division A							**Particle Size**	%													

	Geotechnical Property																							
Strata	**Moisture (%)**			**Plasticity (%)**			**Particle Size Distribution (Average of values)**		**Triaxial Shear Strength (kPa)**			**SPT Results (uncorrected N value)**			**Uniaxial Compressive Strength, UCS (MPa)**			**Compaction – Max Dry Density (Mg/m^3) (Optimum Moisture content, %)**			**Linear (Bulk) Density (kg/m^3)**		
	Min	**Av**	**Max**				Cobbles	0				**Min**	**Av**	**Max**	Not Applicable			None			None		
							Gravel :	1																
							Sand :	74																
	24	25	26				**Silt :**	18				>50	>50	>50										
							Clay :	7																
Total No. of tests	**3**			**0**			**3**		**0**			**8**			**0**			**0**			**0**		
Lambeth Group*	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	**Particle Size**	(%)	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	Not Applicable			**Min**	**Av**	**Max**	**Min**	**Av**	**Max**
							Cobbles	0																
							Gravel :	7																
	22	25	32	27	38	53	**Sand :**	39	74	124	180	20	38	>50				1.56 (23)	1.64 (18)	1.72 (13)	2.05	2.12	2.22
							Silt :	19																
							Clay:	35																
Total No. of tests	**9**			**8**			**3**		**4**			**8**			**0**			**2**			**4**		
White Chalk Subgroup*	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	**Particle Size**	(%)	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**	**Min**	**Av**	**Max**
							Cobbles	None																
							Gravel :																	
	21	26	31	6	9	17	**Sand :**		None			2	18	>50	1.9	2.8	4.0	None			1.93	2.01	2.1
							Silt :																	
							Clay :																	
Total No. of tests	**13**			**7**			**0**		**0**			**22**			**5**			**0**			**6**		

* For both Lambeth Group 4No.SPT's, White Chalk Subgroup 1No. SPT were a refusal and did not achieve a full 0.45m penetration depth due to hard material.

Table 7.2: Porosity and Additional Geochemical Testing

Geochemical Testing							
Geology	**Porosity**	**Chalk Carbonate Content**	**Organic Matter Content (%)**	**BRE SD1 values[1]**			
Alluvium	-	-	5.1	**Test type**	**Min**	**Max**	**Characteristic Value**
				Water soluble SO4 (mg/l)	Below limit of detection		
				Acid soluble SO4 (%)	0.01	0.01	0.01
				Total Sulphur (%)	Below limit of detection		
				Total Potential Sulphate (%)	Below limit of detection		
				pH	8.8	8.8	8.8
No. Tests	0	0	1	1			
River Terrace Deposits	-	-	0	**Test type**	**Min**	**Max**	**Characteristic Value**
				Water soluble SO4 (mg/l)	Below limit of detection		
				Acid soluble SO4 (%)	Below limit of detection.	0.01	0.01
				Total Sulphur (%)	Below limit of detection		
				pH	8.7	8.9	8.7
No. Tests	0	0	1	2			
London Clay Formation Division A	-	-	0	**Test type**	**Min**	**Max**	**Characteristic Value**
				Water soluble SO4 (mg/l)	110	110	<500
				Acid soluble SO4 (%)	0.02	0.14	0.14
				Total Sulphur (%)	0.04	0.04	0.04
				Total Potential Sulphate (%)	0.12	0.12	0.24 – 0.6
				pH	8	8.1	8
No. Tests	0	0	0	2			
London Clay Formation Division B	-	-	-	**Test type**	**Min**	**Max**	**Characteristic Value**
				Water soluble SO4 (mg/l)	10	120	<500
				Acid soluble SO4 (%)	0.21	1.1	1.1
				Total Sulphur (%)	0.15	1.38	1.38
				Total Potential Sulphate (%)	0.45	4.14	>2.4
				pH	7.1	8.2	7.1
No. Tests	0	0	0	3			
Lambeth Group	-	-	-	**Test type**	**Min**	**Max**	**Characteristic Value**
				Water soluble SO4 (mg/l)	Below limit of detection		<500
				Acid soluble SO4 (%)	Below limit of detection	0.23	0.23

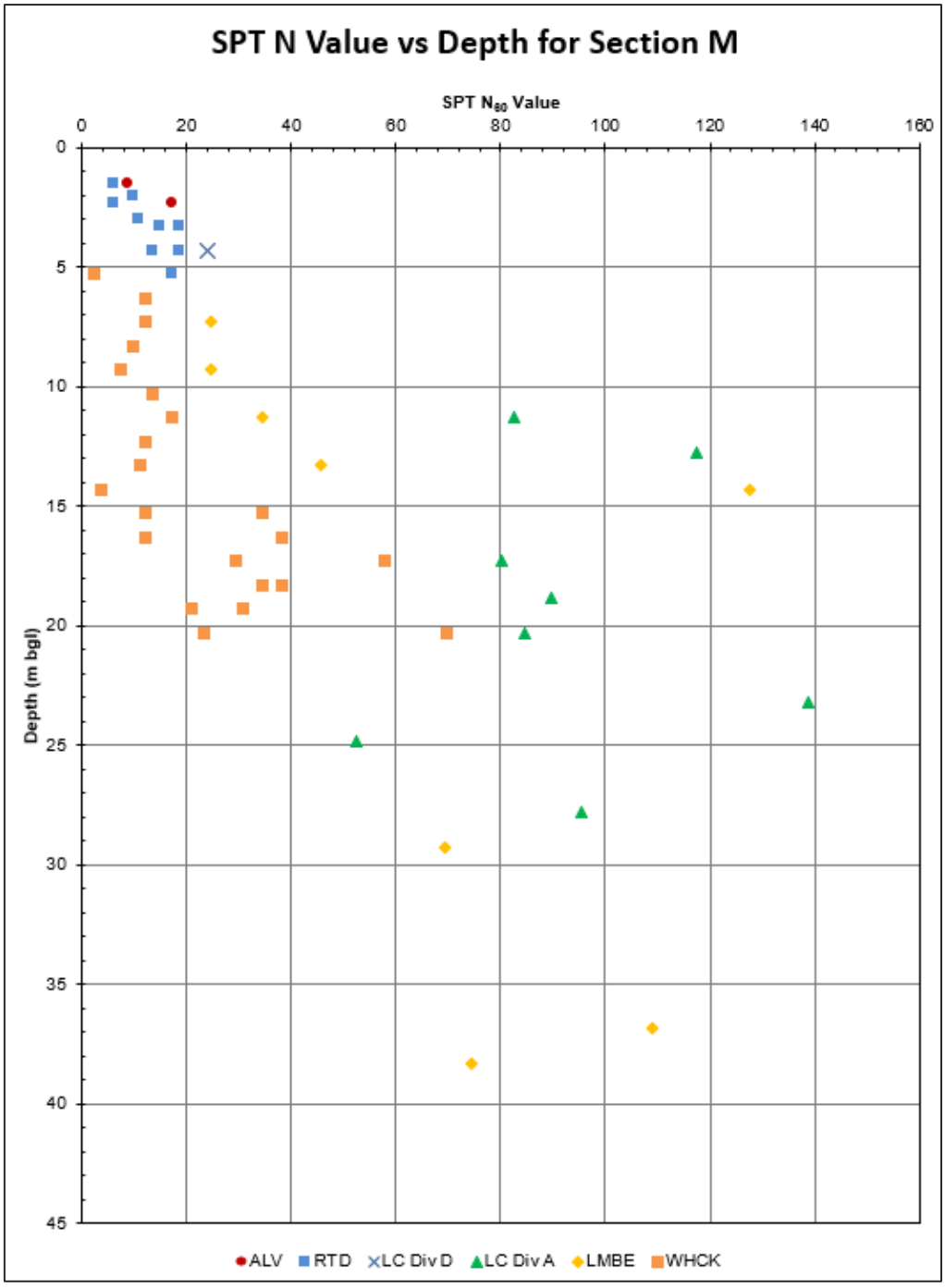
Geochemical Testing							
Geology	**Porosity**	**Chalk Carbonate Content**	**Organic Matter Content (%)**	**BRE SD1 values[1]**			
				Total Sulphur (%)	Below limit of detection	0.05	0.05
				Total Potential Sulphate (%)	Below limit of detection	0.15	<0.24
				pH	8.2	8.9	8.2
No. Tests	0	0	0	4			
White Chalk Subgroup	40%	23 – 44%	0	**Test type**	**Min**	**Max**	**Characteristic Value**
				Water soluble SO4 (mg/l)	Below limit of detection		<500
				Acid soluble SO4 (%)	0.02	0.03	0.03
				Total Sulphur (%)	0.01	0.03	0.03
				Total Potential Sulphate (%)	0.03	0.09	<0.24
				pH	8.8	9.6	8.8
No. Tests	6	2	3	6			

[1]Total Potential Sulphate is calculated from section *C5.1.2* (BRE, 2005)

7.2 Standard Penetration Test (SPT) vs Depth Relationship

Graph 7.1 shows Alluvium, and London Clay Formation Division D do not show enough values to define a clear relationship between depth and SPT N values. White Chalk Subgroup shows a relatively consistent value to ~15m and then increases with depth, London Clay Formation Division A shows no relationship, while River Terrace Deposits and Lambeth Group show an increase in SPT N value with depth.

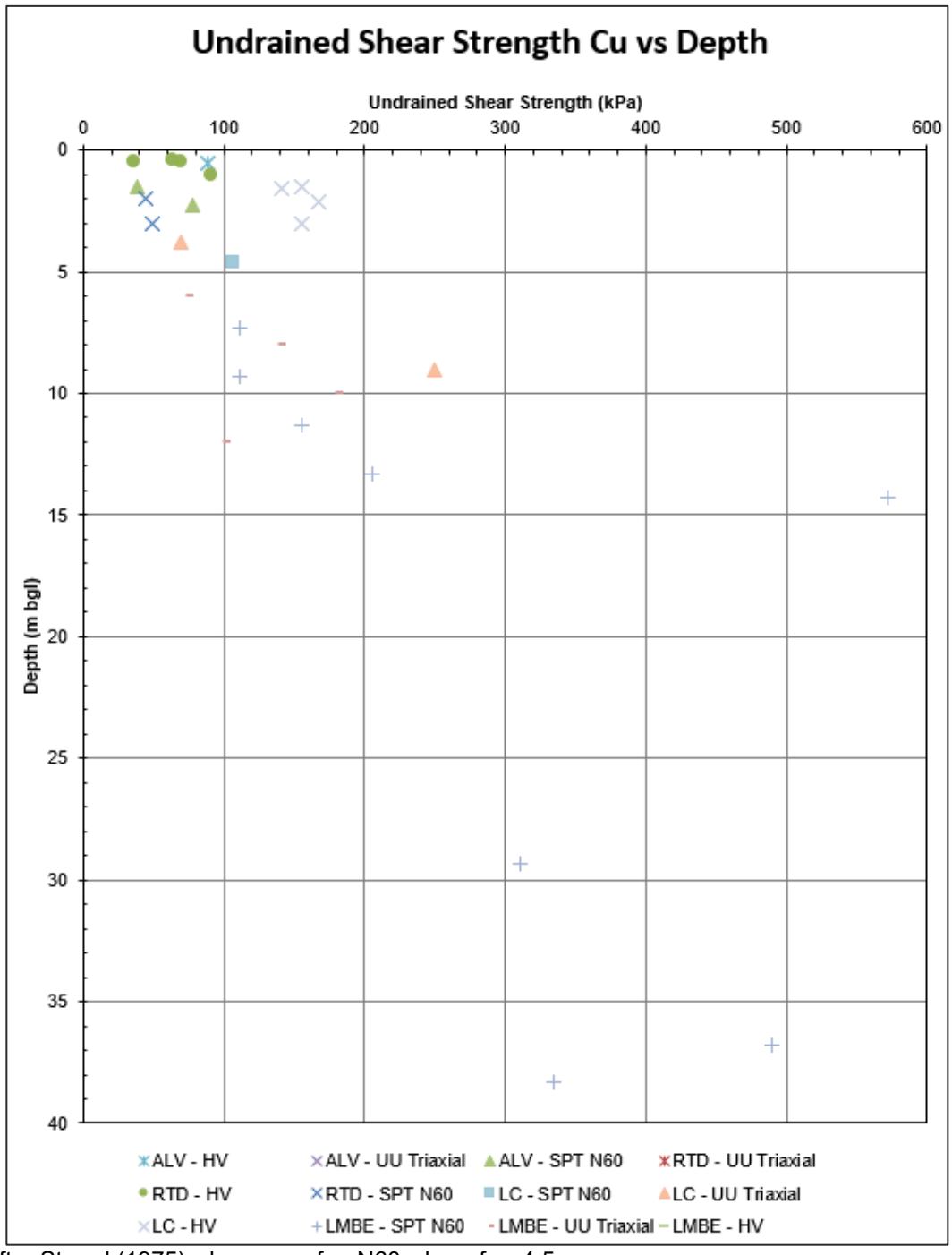
Graph 7.1: SPT vs Depth per strata for Section M boreholes.



7.3 Undrained Shear Strength C_u vs Depth Relationship

Graph 7.2 shows that Alluvium, River Terrace Deposits and London Clay Division A and D does not enough values to define a clear relationship between depth and undrained shear strength, while Lambeth Group shows an increase in undrained shear strength with depth (however, C_u >300 is considered unrealistic and is due to extrapolation of SPT N values). The White Chalk Subgroup was not assessed for shear strength relationship due to the unreliability of SPT's in Chalk due to the presence of flint, fractures and fracture spacing.

Graph 7.2: Undrained Shear Strength Cu vs Depth per strata from Section M boreholes

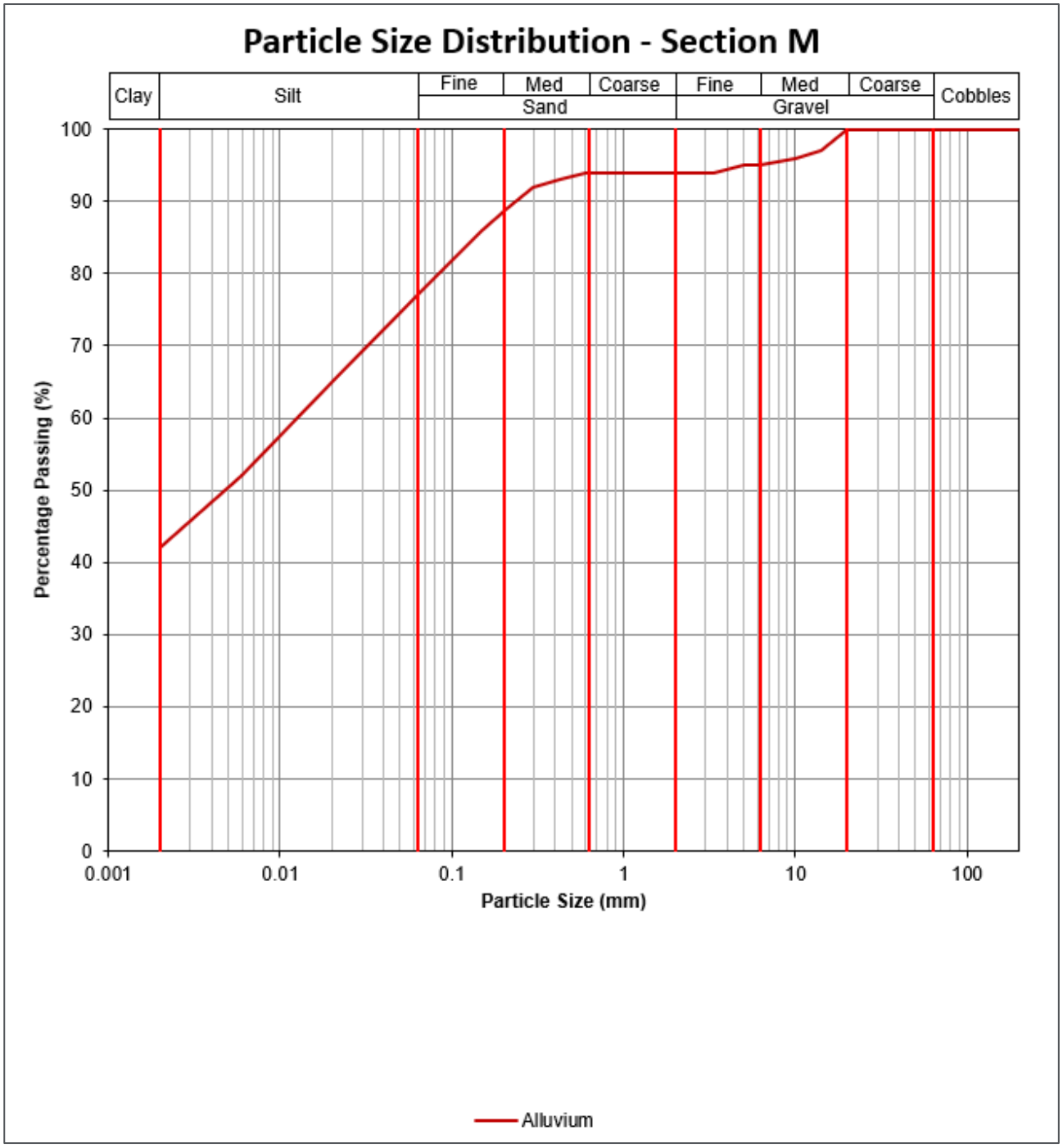


After Stroud (1975) where cu = f_1 x N60 where f_1 = 4.5

7.4 Particle Size Distribution

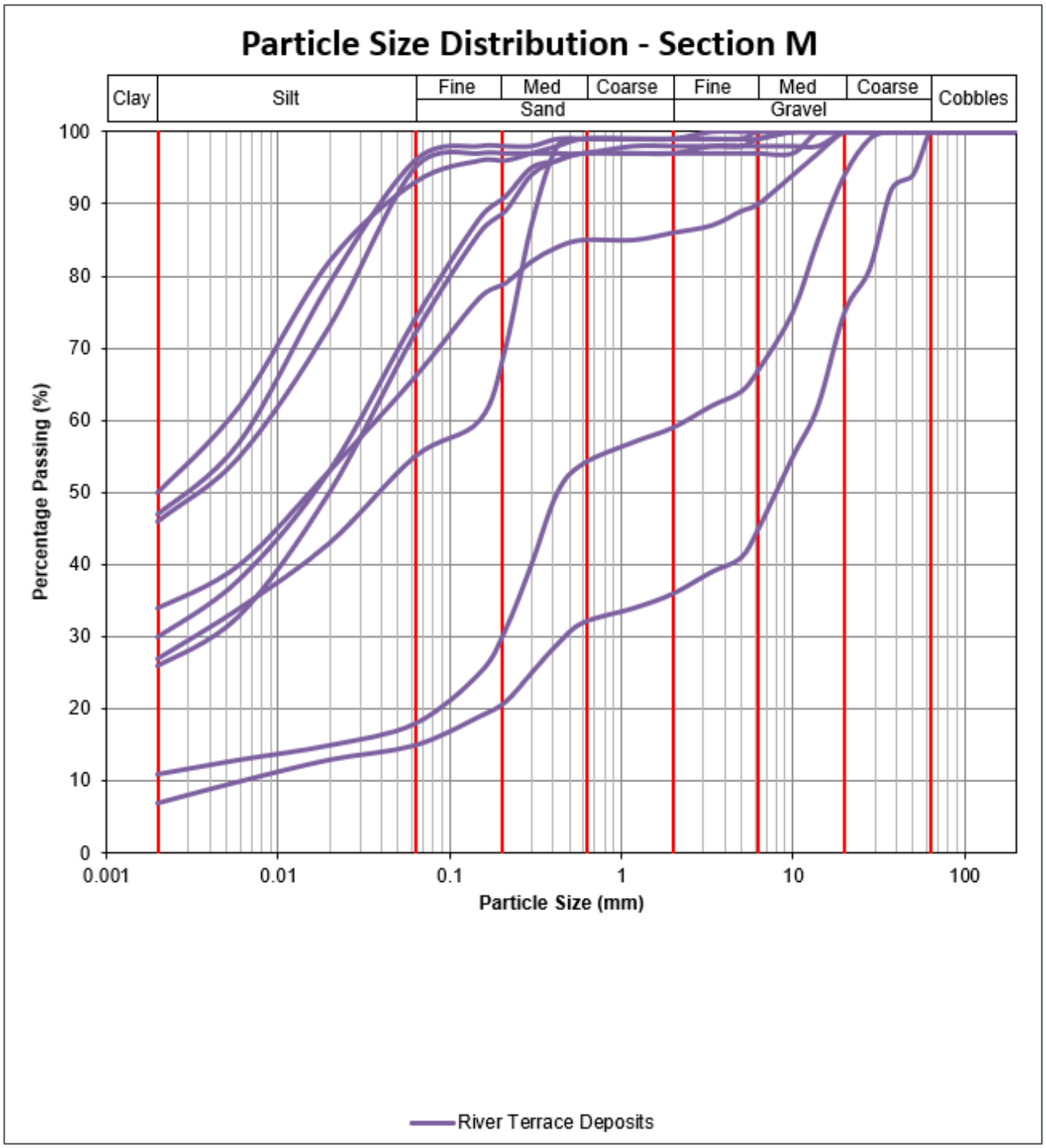
Graph 7.3 shows Alluvium to fall within silt and clay particle size distribution.

Graph 7.3: Particle Size Distribution for Alluvium from Phase 1 and 2 Section M boreholes



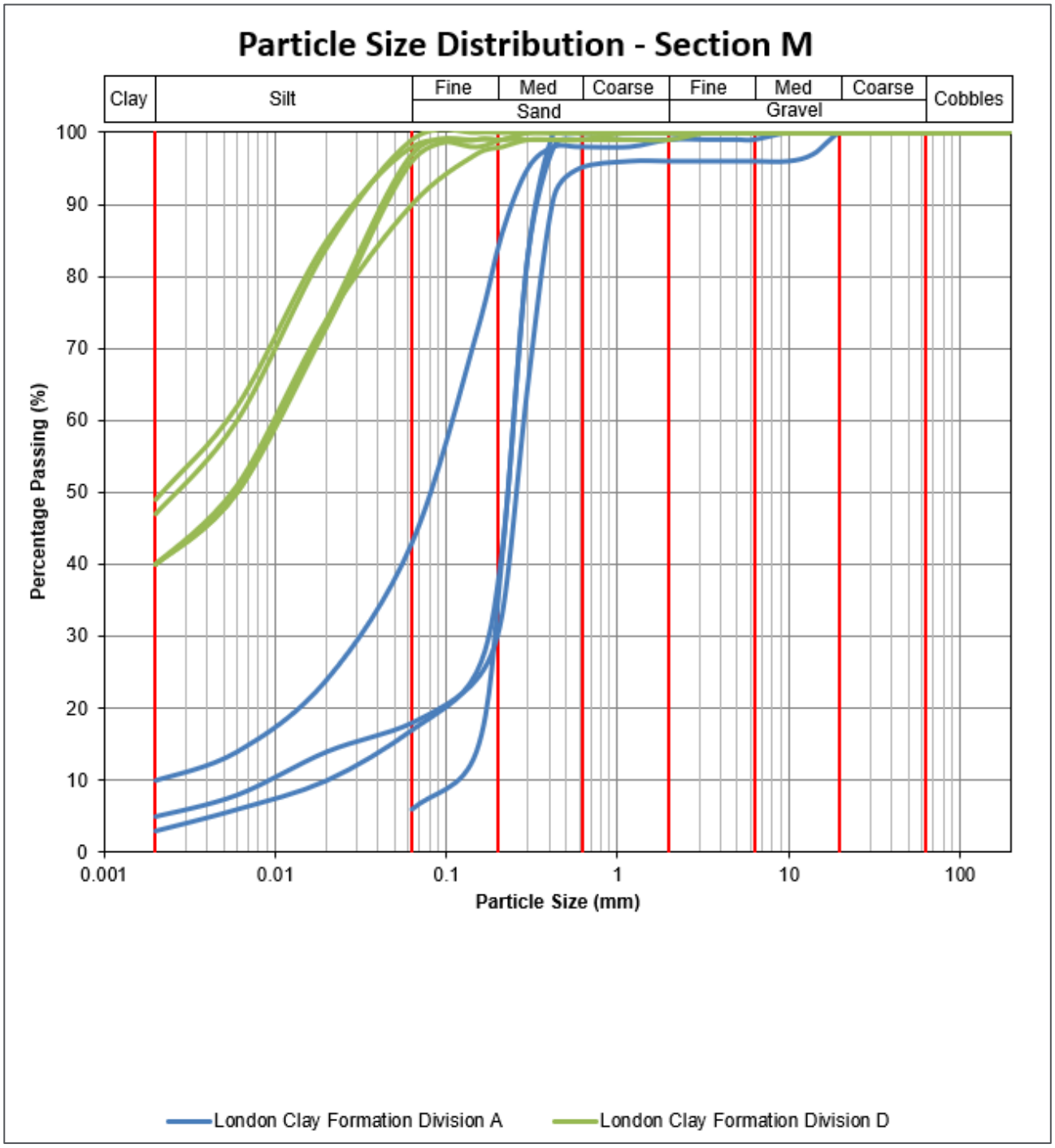
Graph 7.4 shows River Terrace Deposits to be variable, falling within gravel, sand, silt and clay particle size distribution.

Graph 7.4: Particle Size Distribution of River Terrace Deposits from Phase 1 and 2 Section M boreholes



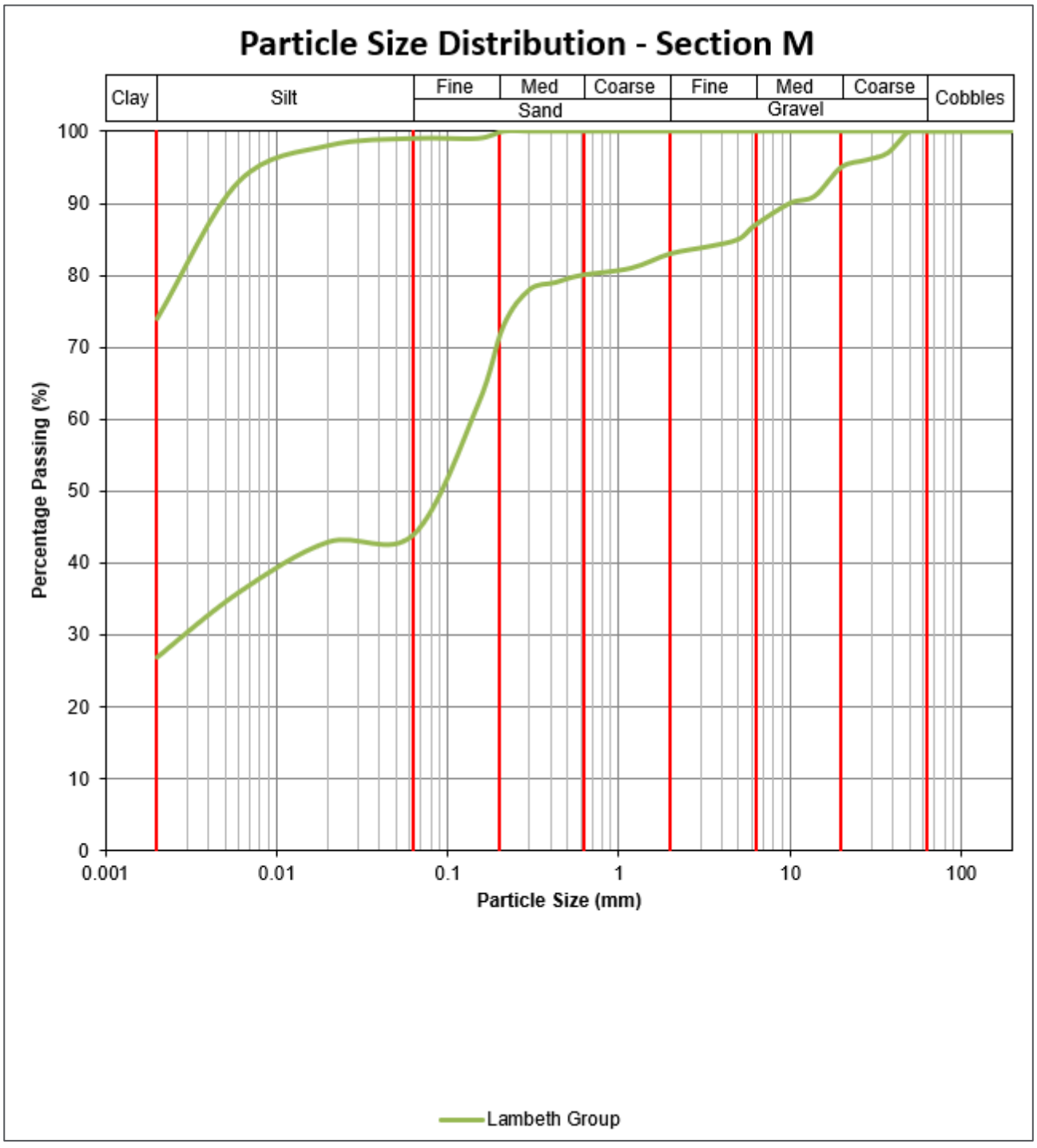
Graph 7.5 shows London Clay Formation Division A to fall within sand particle size distribution for three results and for silty sand for one result. Division D falls within silt and clay particle size distribution.

Graph 7.5: Particle Size Distribution of London Clay Formation from Phase 1 and 2 Section M boreholes



Graph 7.6 shows the Lambeth Group to fall within sand, silt and clay particle size distribution with up to 16% gravel.

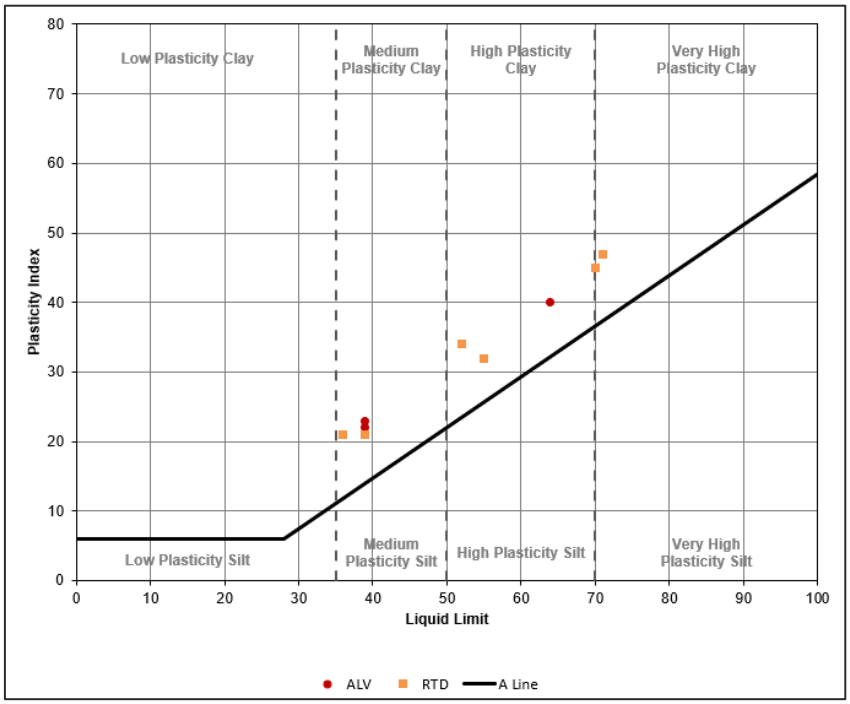
Graph 7.6: Particle Size Distribution of Lambeth Group from Phase 1 and 2 Section M boreholes



7.5 Plasticity

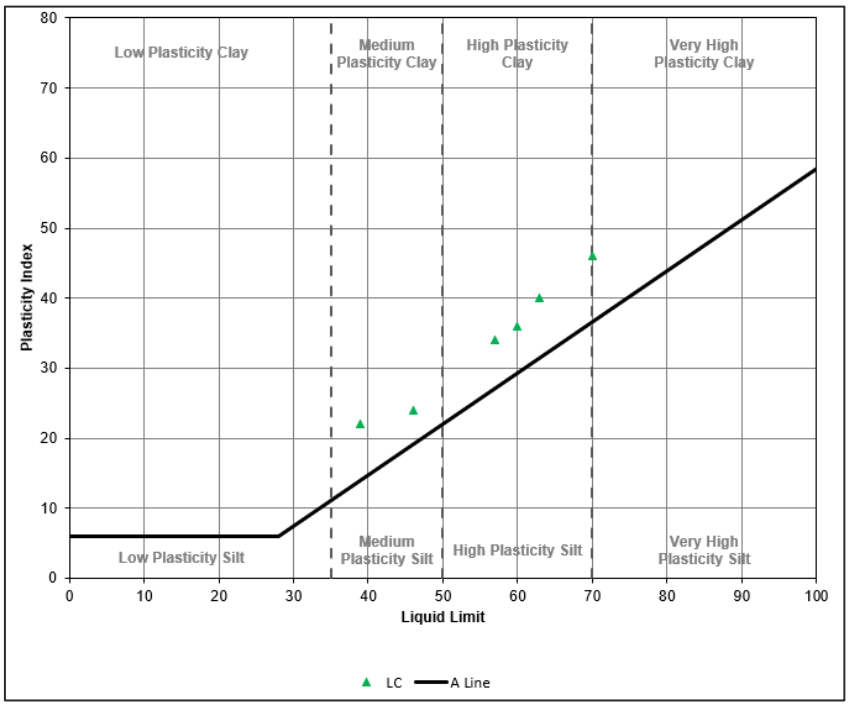
Graph 7.7 shows Alluvium to be medium to high plasticity clay and River Deposits to be medium to very high plasticity clay (one plasticity test was undertaken within a coarse horizon of River Terrace Deposits, showing to be medium plasticity clay).

Graph 7.7: Plasticity across Alluvium and River Deposits from Phase 1 and 2 Section M boreholes



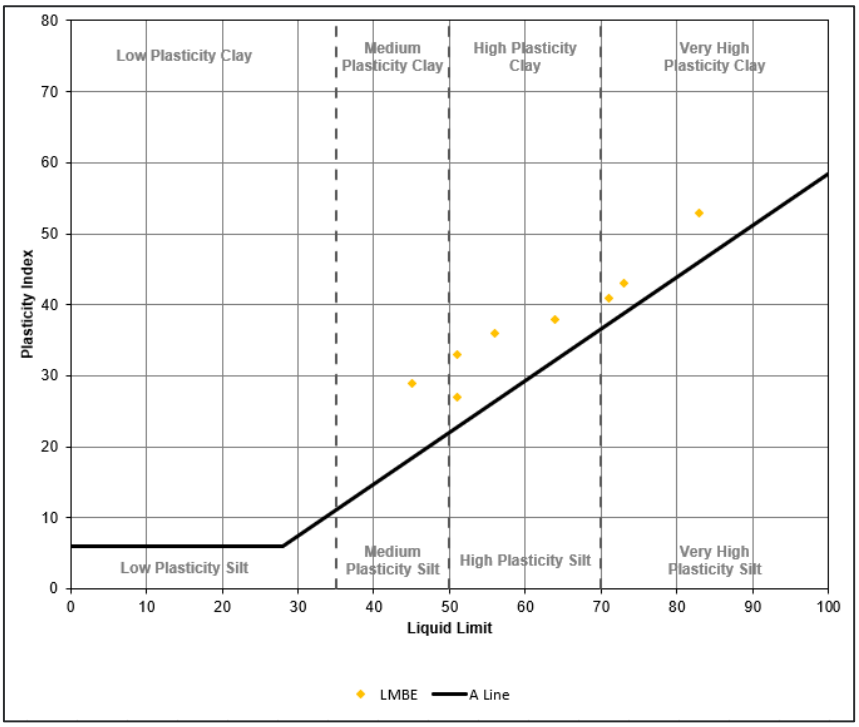
Graph 7.8 shows the London Clay Formation Division D to be medium plasticity to high plasticity clay. Division A is non plastic and was not tested.

Graph 7.8: Plasticity of London Clay Formation Division D from Phase 1 and 2 Section M boreholes



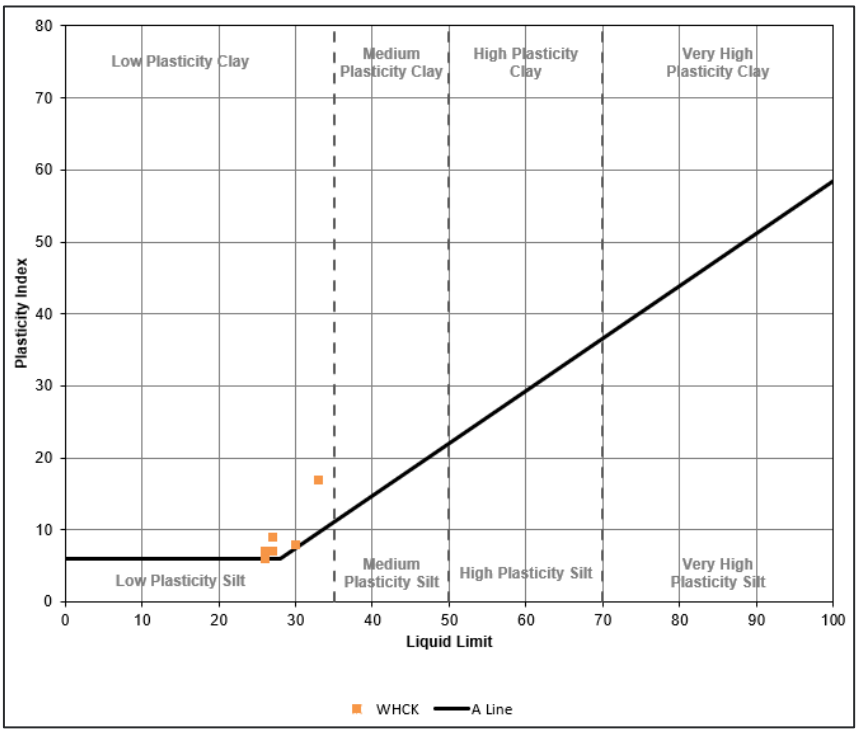
Graph 7.9 shows the Lambeth Group to be medium to very high plasticity clay.

Graph 7.9: Plasticity of Lambeth Group in Section M



Graph 7.10 shows the White Chak subgroup to class as a low plasticity clay.

Graph 7.10: Plasticity of White Chalk Subgroup in Section M



7.6 Geotechnical Design Parameters

Table 7.3: Geotechnical Design Parameters for Section M

	Geotechnical Design Parameters									
Strata	**Native Soil Modulus E'_3 (MN/m²) [a]**	**Elastic Modulus E_u [b2]**	**Bulk weight density γ (kN/m³) [c]**	**Constant angle of shearing resistance φ (°) [c]**	**Undrained Shear Strength C_u (kPa) [b1]**	**Coefficient of Volume Compressibility m_v (m²/MN) [b1]**	**Uniaxial Compressive Strength (MPa)**	**Concrete Aggressivity [d]**	**Earthworks [b2]**	**From PSD results Embedment corresponding From Table A.3 WIS 4-08-02 [e]**
Alluvium (ALV)	Soft to firm clay: 1.5	Short Term: 10-25 MPa Long Term: 7-20 MPa	15 – 20	Based on average plasticity result of 23%, φ = 25°	20	0.1	Not Applicable	DS-1 AC-1	1 V: 2.5H	Fine grained with less than 25% coarse grained material. Unsuitable for reuse.
Head Deposits (HEAD)	Firm clay: 3 - 4	Short Term: 5 MPa Long Term: 4 MPa	16 - 20	Not available for Section M, from nearby section20 - 25°	25 - 50	0.1 – 0.3	Not Applicable	Not available for Section M, from Section L: DS-1 AC-1	1 V: 2.5 – 3 H	Fine grained, liquid limit > 50% and more than 50% fines. Unsuitable for re-use
River Terrace Deposits (RTD)	Medium dense sand and / or gravel: 4	8-30 MPa	18 - 20	Based on 1 plasticity result of 22%, φ = 23°	Not Applicable	Not Applicable	Not Applicable	DS-1 AC-1	1 V: 2.5 – 3.0H	S2 - subject to further classification testing including liquid limit and PSD. Is a coarse-grained soil with more than 12% fines.
River Terrace Deposits (RTD)	Soft to firm clay: 1.5 - 4	Short Term: 2 - 12 Long Term: 1 - 8	15 - 20	Based on average plasticity result of 34%, φ = 23°	12 - 50	0.1 – 1.0	Not Applicable	DS-1 AC-1	1 V: 2.5H	Fine grained, liquid limit > 50% and more than 50% fines. Unsuitable for re-use
London Clay Formation Division D (LC)	Firm to very stiff clay: 6 - 10	Short Term: 5 - 50 MPa Long Term: 4 - 35 MPa	20 - 22	20 - 25°	50 - 100	0.1	0.07 – 0.34	DS-2 AC-2	1 V: 2.5H	Fine grained, liquid Limit > 50% with < 25% fines. Unsuitable for re-use
London Clay Formation Division A (LC)	Very dense sand: 10 - 15	25 – 50 MPa	20 - 22	30º	Not Applicable	Not Applicable	Not Applicable	DS-5 AC-5	1 V: 2.5 – 3.0H	S2 - subject to further classification testing including liquid limit and PSD. Is a coarse-grained soil with more than 12% fines.
Lambeth Group (LMBE)	Very stiff clay: 6	Short Term: 20 MPa Long Term: 15 MPa	20 - 22	Based on average plasticity result of 38%, φ = 22°	150	0.05	Not Applicable	DS-1 AC-1	1 V: 2.5H	Fine grained, liquid limit generally >50%. Unsuitable for re-use
White Chalk Subgroup	Silty Gravel / gravelly SILT and very weak rock >40	Elastic Modulus: Not Applicable. Secant Modulus, E_s: CIRIA Grade B2 medium density chalk: 1500 – 2000MN/m² [f]	20 - 23	34 - 39°	Not Applicable	Not Applicable	2.8	DS-1 AC-1	Based on the remoulded friction angle of 34° within CIRIA Grade Dc (structureless) chalk, typical stable batters of chalk fill slopes are expected to be up to around: 1 V : 2 H For structured chalk, CIRIA Grade B, typical stable batters of chalk fill expected to be up to: 1 V : 1 H	Imported granular sidefill materials S1, S2

[a] (BSI, 2020) Table 13, [b1] Laboratory testing presented in Table 7.1. (Tomlinson, 2001) Table 2.5,Table 2.11, Figure 2.33, Section 2.6.6, [b2]Laboratory Testing presented in Table 7.1. (Look, 2007) Table 11.7, Table 11.8, Figure 14.1, Table 14.10
[c] (BSI, 2015) Figure 2 and Section 4.3.1.3.5 & 4.3.1.4.8, [d] (BRE, 2005) Table C1, [e] (BSI, 2020) Table 24 of BS9295:2020 corresponds to Table A.3 from the Water Industry Specification for Bedding and Side fill Materials for buried pipelines WIS 4-08-02 February 1994: Issue 1 document.

For Head Deposits (HEAD), geotechnical design parameters are not derived from geotechnical results from Section M boreholes (not encountered during drilling). The nearest encountered HEAD from Phase 2 is within adjacent Section L to the southeast along the pipeline route. HEAD geotechnical design parameters will be taken from Section L results, the desk study Version 4 SSP, 2024), British Standards and published reference literature itemized above within the footnotes below **Table 7.4.**

7.7 Electrical Resistivity Testing

In situ apparent resistivity testing was undertaken at 3M6601HP, where Lambeth Group was recorded from 0.25 – 1.20 m bgl (hole terminated at 1.20 m bgl) the results are presented in **Table 7.4**.

Table 7.4: Electrical Resistivity Results for Section M

BH ID	Depth (m bgl)			
	4.0m	3.0	2.0	1.0
	Apparent Resistivity (mean) (Ω.m)			
3M6601HP	**90**	94	110	140

A characteristic apparent resistivity value of 10 Ωm should be taken, which indicates that the ground is highly aggressive towards ferrous metals.

7.8 Permeability Testing

Falling permeability testing was undertaken at 2L6011SR. The results are presented in **Table 7.5.**

Table 7.5: Falling head permeability testing results.

BH ID	Depth of Test (m bgl)	Test Type	Borehole / Standpipe	Permeability (k)	Strata
2M6508SA	7.00 – 20.45	Falling Head Permeability	Standpipe	1.4×10^{-6}	White Chalk Subgroup

8 Geotechnical Considerations

8.1 Ground Conditions

The ground conditions recorded at the GI locations are generally in line with geological mapping for the area.

- On the southern side of the crossing (Chainage 37690) River Terrace Deposits were encountered beneath Topsoil at 0.30 m, but were not recorded by BGS mapping, these deposits are underlain by Lambeth Group at 5.70 m which overlies White Chalk Subgroup at 14.10 m.
- The northern side (Chainage 37880) of the river Topsoil is underlain by Alluvium at 0.30 m; not mapped by BGS mapping. This is underlain by River Terrace Deposits at 2.55 m and White Chalk Subgroup bedrock at 4.50 m.
- To the south of Kiln Lane along a proposed open cut section of the pipeline (Chainage 37280), Topsoil is underlain by River Terrace Deposits at 0.25 and 0.35 m. This is underlain by London Clay Formation (Division D) from between 1.00 and 2.90 m. The London Clay Formation (Division A) underlies Division D at 9.50 m, Lambeth Group at 30.80 m and White Chalk Subgroup at 40.30 m.

Across Section M, superficial deposits including, Alluvium and River Terrace Deposits are present with London Clay Formation, Lambeth Group and White Chalk Subgroup bedrock underlying. Head Deposits were not encountered during drilling but may be encountered in the north of Section M at ground level.

The majority of the open cut trench will be in the London Clay Formation moving into the Lambeth Group heading in a northerly direction.

South of Kiln Lane the open cut trench will be constructed within solid geology of the London Clay Formation Division D; stiff sandy gravelly silty clay. Towards the north and Kiln Lane the London Clay Formation will grade to Division A, a very dense silty sand. Between Kiln Lane and the trenchless crossing, the open cut trench will be within firm to very stiff clay and glauconitic sand of the Lambeth Group.

The trenchless crossing at the River Itchen (Chainage 37695 – 37880) is adjacent to 2M6507SA and 2M6508SA are expected to be founded within the Lambeth Group and White Chalk Subgroup bedrock.

Further investigations are required to characterise ground conditions north of the trenchless crossing within Alluvium, River Terrace and Head Deposits.

8.2 Foundation Design

Open-cut pipeline sections are expected to be founded within all strata discussed within Section M and the ground will be capable of supporting all required plant. Cohesive Alluvium and River Terrace Deposits encountered prior to pipeline construction may potentially be removed due to low strength and granular imported fill placed beneath the pipeline.

For the approximate 2.2 km length of pipeline proposed across Section M; bearing resistance or settlement issues are not anticipated – the pipeline is expected to result in a net reduction in ground bearing pressure at formation level.

8.3 Shallow Excavation

8.3.1 Excavation

Shallow excavations for the proposed open-cut pipeline route are expected to be constructed between 3 m to 6 m bgl, within Alluvium and River Terrace superficial deposits, London Clay Formation, Lambeth Group and White Chalk Subgroup bedrock. Excavations are expected to be within the capability of conventional plant.

Full excavation support would likely be required in superficial deposits.

Where space permits (e.g. in open land), it may be possible to construct the shallow pipework within unsupported battered trenches though sides of the excavation may be prone to drying out and weathering could cause sides to slip if left open for long periods of time (CIRIA, 1992).

Shallow groundwater is anticipated, beneath which finer materials may be washed out resulting in reduced stability. Sand will be encountered beneath the groundwater table within granular deposits of the River Terrace Deposits, London Clay Formation (Division A) and Lambeth Group, and running sands may develop. Where excavations are proposed near existing structures (i.e. solar farm in the north), full temporary excavation support is recommended to mitigate unacceptable ground displacements.

8.3.2 Groundwater Control

Based on the GI records, groundwater is likely to enter excavations adjacent to 2M6507SA and 2M6508SA. Groundwater was encountered during drilling between 0.98 and 4.03 m bgl which is the river level at the adjacent tributary.

At the proposed River Itchen tributary trenchless crossing groundwater is expected to be encountered within River Terrace Deposits with further strikes within the White Chalk Subgroup. These groundwater entries are expected to be controllable by conventional sump pumping.

2M6507SA struck groundwater at 15.0 m rising to 3.34 m, indicating a high volume of sub-artesian water, however this is below proposed depth of construction.

Groundwater levels during monitoring were higher than those encountered during drilling; this should be considered prior to construction.

Control of groundwater will be required in granular deposits of the London Clay Formation and Lambeth Group. Further investigation will be necessary to establish whether well pointing and/or ejector wells will be necessary in these deposits.

8.4 Flotation

There were no instances of artesian groundwater conditions above ground level during investigation, but high groundwater levels were encountered as well as a sub artesian strike within the White Chalk Subgroup. Therefore, the pipeline should be designed based on groundwater at ground level and structures should be designed to resist flotation in all stages of temporary and permanent works.

8.5 Trenchless Construction

The Applicant has confirmed that pipejacking is the preferred method of trenchless construction across the proposed pipeline with the current trenchless crossing pipeline and shaft dimensions and depths. Launch shaft dimensions will range between 9.0 m – 9.5 m diameter and reception Shafts range between 5.0 m – 5.4 m diameter with a 700 mm – 800 mm diameter ductile iron (DI) pipe within a 1200 mm internal diameter pipe jack. Trenchless crossings are presumed to be driven west to east, so the launch Shafts are to be the westerly shafts.

The depths of the trenchless crossing of the tributary of the River Itchen (Chainage 37695 - 37880) are yet to be confirmed however, it is expected to be constructed at a maximum depth of between 10.0 m (launch shaft at northern side) and 13.0 m bgl (reception shaft at southern side), while a minimum of 2.5m under the lowest point of the river bed. It is expected that trenchless construction will be undertaken within Lambeth Group and White Chalk Subgroup.

Lambeth Group and White Chalk Subgroup are considered to be the appropriate materials for soft-ground tunnelling as they are generally self-supporting and of low permeability. Both open-face and closed face tunnelling methods are likely to be suitable though it should be noted however that gravelly clay may be present at the base of the Lambeth Group.

It is approximately 190 m between the two boreholes 2M6507SA and 2M6508SA, therefore, variable unexpected ground conditions may be encountered between the launch and reception shafts such as the depth of the alluvial channel at its deepest point (possibility of granular alluvial material being encountered). Such uncertainties could lead to face collapse if variable ground conditions are encountered. It is recommended that further intrusive investigation (i.e. cable percussion borehole with rotary core follow on) is completed between the two proposed Shafts.

Other issues that require further consideration include:

- The presence of flints within the River Terrace Deposits, Lambeth Group and White Chalk Subgroup getting caught on the string.
- The permeability may change if there is a transition between structureless and structured chalk (structureless chalk as noted would probably be of lower permeability), or alluvial material.
- Slurry pressures would need to be carefully controlled to ensure the bore remains stable whilst not over pressurizing (risking blow out of fluid at the surface).

8.6 Ground Aggressivity

8.6.1 Concrete

The results of the pH and sulphate tests (SO_4) undertaken on all strata on all natural ground material samples recovered present the following design sulphate class and aggressive chemical environment for concrete (ACEC) classes:

- Alluvium: DS-1 AC-1
- Head Deposits: DS-1 AC-1
- River Terrace Deposits: DS-1 AC-1
- London Clay Formation Division D: DS-2 AC-2
- London Clay Formation Division A: DS-5 AC-5
- Lambeth Group: DS-1 AC-1
- White Chalk Subgroup: DS-1 AC-1

8.6.2 Ferrous Metals

Strata across the proposed pipeline route has the potential to be aggressive towards ferrous metals.

Following guidance published by TRL (Eyre, D., & Lewis, D.A., 1987) if the ground has the below characteristics, it is considered aggressive towards ferrous metals:

- Characteristic apparent resistivity value of 10Ωm
- Organic content greater than 0.2%
- Plasticity index greater than 15
- Poorly drained area or groundwater above pipework level
- Moisture content greater than 20%
- pH greater than 6

- Soluble sulphate 500 to 1000mg/l
- The presence of aggressive compounds in Made Ground (e.g. cinder or coke).

Eyre and Lewis' (1987) Contractor Report has two soil corrosivity assessment methods; Table A1 and B1. These two assessments class Section M as aggressive (Table A1) and very aggressive (Table B1) respectively (Eyre, D., & Lewis, D.A., 1987).

8.7 Natural Cavities

Dissolution is a common weathering mechanism in chalk. Typical features associated with dissolution in chalk include an irregular interface with the cover material, downward tapering pipes infilled with compressible material and voids. If undetected, dissolution features pose a risk to construction through differential settlement or collapse.

The highest risk areas are generally found where surface water originates on Tertiary beds and soft water infiltrates through those into the chalk – e.g., the Lambeth Group overlying Chalk, though the overall risk is dependent not only on stratigraphic sequence but also on hydrogeological and geomorphological factors. The SHR_N (Subsidence Hazard Rating number) determined by the approach proposed by Edmonds would, at its worst case, be 580, indicating a high hazard category (i.e., statistically 22.8% solution features recorded in the natural cavity database occurred in at Sites with these characteristics, >466 solution features per 100km^2) (Edmonds, 2001).

Caution is advised when constructing the proposed pipeline in these areas to be mindful of potentially unrecorded, buried or unmapped cavities below ground affecting construction. Further details can be found within the desk study Section 3.2 produced by SSP (SSP, 2024) and the Groundsure Report (Groundsure, 2024).

It should be noted that no evidence of dissolution features was identified within the boreholes drilled in Section M.

8.8 Geotechnical Hazard Assessment

Table 8.1 summarises potential geotechnical hazards associated with the Site during and post construction.

Table 8.1: Potential Hazards

Hazard	Source of information/comment	Mitigation method
Unforeseen Ground Conditions	Project specific ground investigation undertaken in 2023 and 2024 to inform outline design. Trenchless bore collapse and uncontrolled ground settlement, very soft / loose material present that is inadequate for founding of pipework / chambers. Only 8 exploratory locations completed for Section M.	Exploratory holes have been undertaken at around 200 – 250 m intervals of the proposed pipeline route. The Applicant and Principal Contractor agreed on potential exploratory locations including a Site visit, reviewing utility drawings and geological maps. Where inadequate, additional appropriate exploratory holes to be constructed.
Groundwater	Lack of knowledge of groundwater conditions. Potentially result inappropriate/inadequate choice of dewatering techniques, excessive sump pumping causing settlement, unstable ground, inappropriate bore support and flotation	Ensure appropriate groundwater measurements and appropriate monitoring are undertaken. Groundwater levels are checked for boreholes 2M6507SA, 2M6508SA and BH504 throughout post-fieldwork monthly monitoring visits. Groundwater results should be reviewed over a minimum period of 6 months.
Trench collapse	Other sections within Phase 2 (Section E & K) fracture indices during rotary coring highlighting areas of assumed zones of core loss and instability. Probable high groundwater in granular deposits	When excavating, assess the degree of fracturing and structure as the excavation progresses in depth and lateral extent. Check to see if the excavation remains intact or blocky. If the ground becomes increasingly laminated and irregular, excavate in reduced thicknesses rather than larger blocks at a time to prevent the likelihood of collapse. Superficial deposits such as Head Deposits have relic shear surfaces, which may be within soft clay or loose sand may be encountered. Use vertical sided trench support: trench sheets or boxes, where required.

Hazard	Source of information/comment	Mitigation method
Excessive settlement of structures, pipe failure / bursts	Geological logs displaying strata to a maximum of 50 m BGL. Subsidence and hidden soft areas of ground previously not identified during the GI.	Ensure that proposed pipework avoids areas of unsuitable ground and buried structures where possible. If structures are within the route alignment, arrange with the Applicant and appropriate asset landowners that the impact of the proposed construction is reviewed, and appropriate mitigation undertaken. Ensure that the design includes for the use of appropriate groundwater control and excavation support methods to be employed for the encountered ground to minimise any impacts.
Unexploded ordnance (UXO) risk	Wider Site was impacted by bombing in WWII.	Preliminary Risk Assessments were conducted specific to each exploratory hole location to reduce the section-wide greater UXO risk. Detailed UXO assessment undertaken with the following findings (Zetica, 2024): ■ No significant sources of UXO hazard have been identified. ■ Proceed with works; however, a UXO awareness briefing is prudent for staff involved in excavations. LOW UXO hazard level is applied to Section M
Risk of concrete degradation, failure of concrete structures/ / ferrous materials and proposed DI pipe	BRE test results on all strata from the GI show the maximum available design sulphate class is DS5. The corresponding Aggressive Chemical Environment for Concrete (ACEC) is AC5. Potential for excessive corrosion of ductile iron.	Ensure that additional testing is carried out on future investigations across the pipeline route. Perform resistivity testing
Buried chalk cavities	Groundsure report showed Section M to contain buried chalk cavities that could impact construction.	Undertake electromagnetic (EM) surveys to detect the likely presence of chalk cavities/dissolution features followed by Electric Resistivity Tomography (ERT) surveys in areas where strategic structures are proposed (e.g. pumping station Sites). ERT will be able to determine potential chalk cavities based on high/low resistivity results indicating cavities filled with air or water that will impact any potential dewatering or imported granular fill to be required.

9 Conclusions

9.1 Geotechnical

Open-cut construction of the pipeline is likely to encounter River Terrace Deposits, Alluvium, London Clay Formation and Lambeth Group.

The trenchless crossing at the River Itchen tributary is expected to be founded within the Lambeth Group and White Chalk Subgroup bedrock. High water levels were encountered at the exploratory holes and groundwater control will be necessary.

Pipejacking is the proposed trenchless construction technique considered by the Applicant..

Across all encountered strata the design sulphate class and aggressive chemical environment for concrete varies. The worst-case design sulphate class is DS-5 and the worst case aggressive chemical environment for concrete (ACEC) class AC-5. No BRE testing was undertaken on Head Deposits within Section M and values from Section L have been used.

The majority of the open cut trench will be in the London Clay Formation and Lambeth Group, and excavated materials will be largely unsuitable for reuse from a geotechnical standpoint, however more testing is required to determine the extents of the London Clay Formation Division A and confirmation of its embedment class.

Granular River Terrace Deposits have an embedment class of S2, while cohesive deposits are unsuitable for reuse, both require further classification testing.

White Chalk Subgroup has an embedment class as S1 or S2 using granular sidefill materials.

All materials encountered in future investigations will require particle size distribution tests performed on samples across Section M to assess suitability for re-use.

All the strata in Section M (superficial and bedrock) are highly / very aggressive towards ferrous metals.

9.2 Geo-environmental

These conclusions are based on the data obtained during Phase 2 and Phase 3B/3C GI works. Geo-environmental assessment of data collected during Phase 1 and Phase 3A ground investigation for the proposed tunnels and shafts within Section M are presented in a separate Phase 1 / 3A GIR report (SSP, 2025).

Soil: There were no exceedances of commercial GAC protective of human health in the tested soil samples.

Leachate: Leachable concentrations of cadmium and copper exceeded EQS and TPH potentially exceeded the withdrawn Water Supply (Water Quality) Regulations 1989 GAC for the one leachate sample tested (2M6508SA).

Groundwater: TPH concentrations exceeding the GAC were recorded in both monitoring wells at the trenchless crossing (2M6507SA and 2M6508SA). Exceedances of the EQS for chromium (VI), zinc and anthracene were recorded in borehole 2M6507SA. Exceedances of the EQS for zinc and benzo(g,h,i)perylene and fluoranthene were recorded in borehole 2M6508SA. The source of these concentrations is unconfirmed.

An area recorded by the local council as infilled land (artificial) is located approximately 110 m northwest of borehole 2M6507SA and is within 250m of the DoL. It is possible for identified PSCs within surrounding area at this location to be impacting on groundwater, but with the limited data it is difficult to delineate sources.

Ground Gas: Carbon dioxide concentrations during monitoring exceeded STL and LTL workplace thresholds. Low oxygen levels were also recorded. Ground gas is unlikely to pose a risk within areas of Section M undergoing open cut excavations in the northern parts of Section M as any gas accumulated will quickly dissipate. Although there are no permanent building structures proposed for this area of the scheme, the ground gas data recorded at this location should be considered at the pre-construction phase as temporary deep excavations are planned as reception pits for the trenchless crossing beneath the tributary of the River Itchen.

Groundwater levels were recorded above the top of the installation response zone (flooded) during the first two rounds (18th April 2023, 11th May 2023, 9th January 2024 and 4th April 2024) within 2M6507SA and the one ground gas monitoring round for 2M6508SA therefore the data has been considered as indicative.

Risk Classification: Moderate risk to groundwater and surface water has been determined based on the presence of adjacent watercourses which may be in hydraulic continuity with groundwater beneath the area of the proposed trenchless crossing reception pits, and the presence of contaminants detected in groundwater and soil leachate samples. In addition, the watercourse in which the trenchless crossing is to be constructed beneath flows into the River Itchen, approximately 500m southeast. This is an ecological sensitive receptor designated as a SSSI and SAC.

Moderate/Low risks to human health of construction workers and future site users have been assessed for the trenchless crossing location based on potential exposure to identified contaminants in groundwater and potential for exposure to gases.

10 Recommendations

10.1 Geotechnical

Further Ground Investigation is recommended.
It is recommended that further GI works are completed to obtain ground conditions and geotechnical information as detailed below:

- BRE concrete aggressivity testing to be undertaken upon Head Deposits, currently no BRE testing has been conducted on Head Deposits within Section M.
- Further intrusive investigation (i.e. cable percussion borehole with rotary core follow on is completed between the two proposed shafts of the trenchless crossing of the tributary of the River Itchen.

Ground Preparation
A processing plant should be used on Site to screen out and remove the particles exceeding 40 mm within fine and coarse-grained soil across the pipeline. Only material with embedment class of S4 or less are recommended to be used for as – dug soils surrounding semi-rigid pipes or the proposed 1200 mm ductile iron pipeline across the route.

10.2 Geo-Environmental

Further Ground Investigation is recommended.

- In areas of the Proposed Development where there are currently data gaps from the Phase 2 and Phase 3B/3C GI, in both the northern area (PSC 220, Water Works – Filter Beds and PSC 208, Otterbourne WSW) and southern area (PSC 209, Landfill-Bugle Farm Landfill and infilled land, PSCs 209, 210, 215, 216, 437, 438 and 516) of Section M where PSCs within the DoL could not be investigated due to access restrictions. It is recommended that the contractor will assess PSCs not assessed by the GI and PSCs with a risk rating of Moderate/Low and higher (where additional information is needed) as part of their construction phase works to understand and comply with contaminated land, health and safety, waste classification and any other relevant guidance.
- Soil leachable, groundwater contaminant concentrations and ground gas exceedances were encountered in the Phase 2 ground investigation locations at one trenchless crossing location. Additional groundwater sampling and ground gas monitoring is recommended to provided further information on dewatering and ground gas mitigation measures during construction works.

Conduct additional geo-environmental monitoring during construction.
Recommendations for ground gas and groundwater monitoring/testing during the construction phase should be provided within the Construction Phase Environmental Management Plan. The ground gas data recorded at the trenchless crossing of the unnamed tributary of the River Itchen should be considered at the pre-construction phase in terms of risks to groundworkers in the planned launch/reception pits.

Watching Briefs
Watching briefs should be in place during construction. Groundworkers should remain vigilant throughout construction and should visual and/or olfactory indicators of contamination (including asbestos) be encountered, works should cease in that area and advice be sought from a suitably qualified geo-environmental professional.

Stockpile Management
Stockpile material must be well managed and kept on an area of hardstanding located down gradient of surface water drainage that may potentially discharge to a watercourse. It is recommended that any stockpiled material

is covered to prevent rainfall infiltration, run off, and leachate and dust generation. Stockpiles should be secured when not in use to prevent third party access.

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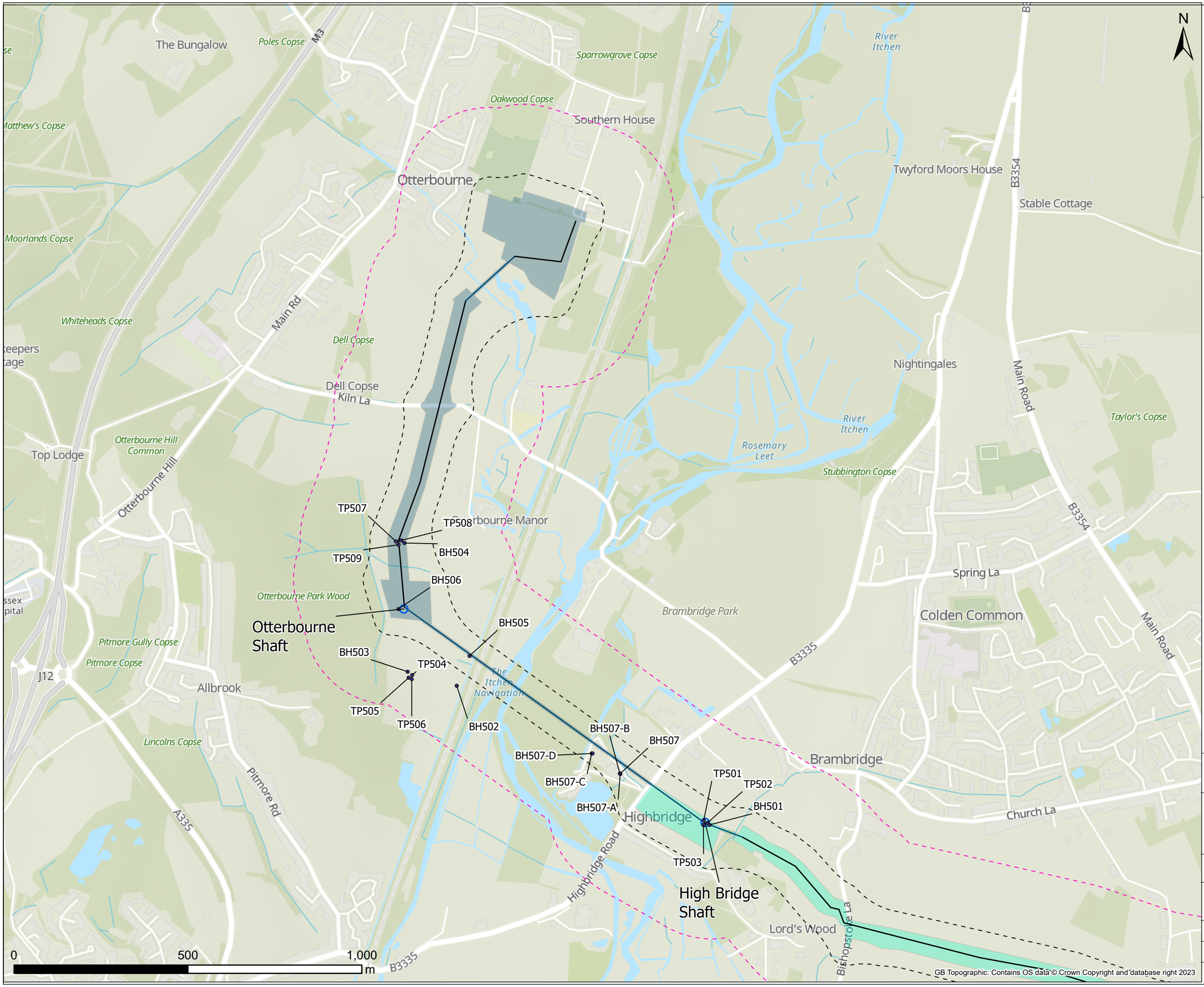
Figures



Contains Southern Water preliminary data - All site locations and routes shown are preliminary only and subject to further site selection assessment and stakeholder consultation.

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Southern Water

Project Title	Water For Life Hampshire
Drawing Title	Section M Phase 1 / 3A Ground Investigation Locations

Scale	Date Drawn	Page	Sheet Size
1:10,000	15/01/2025	1.1	A3
Originator	Checker	Reviewer	Approver
SB	GS	AC	JH
Project No.			Revision
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Document Path: C:\Southern Water\Hampshire Water for Life\Geo_MapSeries\GI_Scoping\GI_Scoping.aprx

PSC No.	Name	Source	Current	Dates	Description	Category	Section
1	Works - Crockerhill Brickworks	Groundsure, National Library of Scotland, ArcGIS Earth, Google Earth	Y	1868 - Present	1868 to 1939 brickfield including infilled ponds. 1939 to 1992 (last available map) Saw mills east of Forest Lane. 1999 to Present - 'Pinks' Industrial park / Welbourne Business Park	PSC & Infilled Land	F
2	Pit - Clay	NLS	N	1937-61 - 1949-70		Infilled Land	F
4	Farm - Albany Farm	National Library of Scotland, Historic Map 1856. Fareham and Gosport Council	Y	1856-1914 - Present	Area now a business centre, houses, a care home and offices. Local authority note timber furniture manufacture.	PSC	F
5	Landfill - Albany Farm Historic Landfill	Environment Agency, National Library of Scotland, Historic Map 1856	N	1856-1913 - 1949-89	Old chalk pit 1888-1913 (NLS),1949-70 (NLS) no longer labelled, markings remain. Landfill licence granted 1977 and shown in lower area until 1989.	Infilled Land	F
6	Landfill - Albany Farm Historic Landfill	Environment Agency, National Library of Scotland, Historic Map 1856	N	1977 - 1982	1892-1914 (NLS) - Old Chalk Pit. Inert backfill.	Infilled Land	F
7	Pit - Unspecified	National Library of Scotland, Historic Map 1856	N	1856 - 1965		Infilled Land	F
8	Pit - Sand	National Library of Scotland, Historic Map 1856	N	1856-1913 - 1937-61		Infilled Land	F
9	Pit - Chalk	National Library of Scotland, Fareham BC EHO, Historic Map 1856	Y	1856-1913 - 1949-70	1892-1913 (NLS) excavation markings still present 1949-92 (NLS). Chalk pit followed by farm use.	PSC & Infilled Land	F
10	Pit - Chalk	National Library of Scotland, Historic Map 1856	N	1856-1913 - 1949-78	Former pit and pond.	Infilled Land	F
11	Landfill - Heytesbury Farm Landfill	Environment Agency, National Library of Scotland / Fareham BC EHO	N	1856-1913 - 1949-70	Former clay pit. Visible on Historical 1956 Map, 1888-1913 (NLS),1949-70 (NLS) no longer labelled. First input 1980. Unknown last input. Local authority note - Waste treatment: landfill construction/demolition/builders waste.	Infilled Land	F
12	Pit - Various	Fareham Council EHO	N	Unknown	Chalk, gravel, clay pit	Infilled Land	F
14	Pit - Various	Fareham BC EHO	N	1856 - 1873	Chalk, gravel, clay pit	Infilled Land	F
15	Infilled Land - Disturbed Ground	Fareham BC EHO	N	Unknown	Unknown landfill/ Stockpiled Soil/ Raised land/ Reclaimed land/ Fly-tipping/Burnt waste - no evidence seen on historical maps.	PSC & Infilled Land	F
16	Embankment	Historic Map 1932	Y	1932 - 1987	Road embankment, road layout has changed in area.	PSC	F
17	Embankment	Historic Map 1958	N	1958 - 1992	Road embankment, layout of road has changed in area, road no longer extends up this far, although area still seems to be raised.	PSC	F
18	Waste Facility - Recycling and waste centre	Historic Map 1856, Google Earth	Y	1856 - Present	Charity Farm shown throughout Historical Maps until 1993. Current map shows area as a waste and recycling centre.	PSC	F
19	Infilled Land - Pond	Historic Map 1856	N	1856 - 1895		Infilled Land	F
20	Infilled Land - Drain	Historic Map 1856	N	1856 - 1910		Infilled Land	F
21	Farm - Whitedell Farm	Historic Maps 1856 - 1992 Google Earth 2024	Y	1856 - Present		PSC	F
22	Pit - Sand	Historic Map 1856	N	1856 - 1898		Infilled Land	F
23	Pit - Chalk	Historic Map 1873	N	1856 - 1985		Infilled Land	F
24	Pit - Chalk	Historic Map 1895	N	1895 - 1898		Infilled Land	F
25	Pit - Chalk	Historic Map 1897	N	1856 - 1985	Infilled Land, western part potentially crosses the pipeline route.	Infilled Land	F
26	Infilled Land - Channel	Historic Map 1868	N	1856 - 1910		Infilled Land	F
27	Infilled Land - Channel	Historic Map 1868	N	1856 - 1957		Infilled Land	F
28	Infilled Land - Channel	Historic Map 1868	N	1856 - 1957		Infilled Land	F
29	Electricity Sub Station (Small)	ArcGIS Earth / Google Earth	Y	1987 - Present		PSC	G
30	Infilled Land - Pond	National Library of Scotland	N	1868 - 1894		Infilled Land	G
31	Infilled Land - Pond	National Library of Scotland	N	1868 - 1938	Infilled by 1940.	Infilled Land	G
32	Farm - Cold Harbour Farm	National Library of Scotland, Google Earth	Y	1888 -1913 - Present		PSC	G
33	Garage - Drokes Farm Motor Company	Google Earth / ArcGIS Earth	Y	2017 - Present	2017 to Present (2023). Servicing, repairs and diagnostic.	PSC	G
34	Nursery	National Library of Scotland	Y	1949-70 - Present		PSC	G
35	Infilled Land - Pond	NLS	N	1888-1913 - 1999		Infilled Land	G
36	Pit - Gravel	National Library of Scotland	N	1892-1914 - 1937-61	Excavation marks visible 1937-61, no longer labelled, pipeline route no longer being passed through PSC.	Infilled Land	G
37	Pit - Gravel	National Library of Scotland	N	1868 - 1913		Infilled Land	G
38	Farm - Little Tapnage Farm	ArcGIS Earth / Google Earth	Y	2021 - Present	2021 Google Earth to Present.	PSC	G
39	Railway	National Library of Scotland	N	1909 - 1968	Appears to be dismantled by 1980. Area now a path.	PSC	G
40	Infilled Land - Pond	National Library of Scotland	N	1868-1897 - 1949-70		Infilled Land	G
41	Infilled Land - Pond	National Library of Scotland	N	1888 - 1994		Infilled Land	G
42	Hospital - Ravenswood	National Library of Scotland, Google Earth, Historic Map 1940	Y	1940-70 - Present		PSC	G
43	Embankment	Historic Map 1939	Y	1939 - Present		PSC	G
44	Embankment	Historic Map 1987	Y	1939 - Present		PSC	E
45	Pit - Gravel	Historic Map 1968	N	Pre-1868	Labelled as 'Gravel Pit Copse'; Shape seen in 1868 map and first labelled in 1888, no actual gravel pit confirmed.	Infilled Land	H
46	Pit - Various	Historic Map 1994, BGS Historical Mineral Planning Areas	N	1973 - 1994	Park Place - Sand and gravel surface mineral working (BGS) Licence granted 1972. Eastern corner pipeline passes through.	Infilled Land	G
49	Pit - Gravel	Historic Map 1895	N	1895 - 1938		Infilled Land	G
50	Infilled Land - Pond	Historic Map 1965	N	1965 - 1994		Infilled Land	G
51	Pit - Gravel	Historic Map 1895	N	1895 - 1938		Infilled Land	G
52	Pit - Gravel	Historic Map 1908	Y	1908 - Present	Pipeline no longer passes near PSC.	Infilled Land	G
53	Infilled Land - Pond	Historic Map 1868	N	1868 - 1994		Infilled Land	F
54	Infilled Land - Drain	Historic Map 1968	N	1868 - 1979	Unclear when the drain was first created, first labelled as a drain in map 1979, however shape can be seen on 1868 map.	Infilled Land	G
55	Infilled Land - Drain	Historic Map 1968	N	1868 - 1987	Unclear when the drain was first created, first labelled as a drain in map 1979, however shape can be seen on 1868 map.	Infilled Land	G
57	Infilled Land - Drain	Historic Map 1968	N	1868 -1980	Unclear when the drain was first created, first labelled as a drain in map 1979, however shape can be seen on 1868 map.	Infilled Land	G
58	Infilled Land - Drain	Historic Map 1968	N	1868 -1980	Unclear when the drain was first created, first labelled as a drain in map 1979, however shape can be seen on 1868 map.	Infilled Land	G
59	Pit - Sand	Historic Map 1868	N	1868 - 1938	Hospital built on top.	Infilled Land	G
60	Pit - Gravel	Historic Map 1895	N	1895 - 1938	Hospital built on top.	Infilled Land	G
62	Infilled Land - Drain	Historic Map 1868	N	1868 - 1994	Shown as a large channel in 1868map, no water shown in that area on ArcGIS Map, however channel outline is still visible on 1994 Map.	Infilled Land	G
64	Infilled Land - Drain	Historic Map 1868	N	1868 - 1895		Infilled Land	G
65	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
66	Infilled Land - Drain	Historic Map 1868	N	1868 - 1938		Infilled Land	G
67	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
68	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
69	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
70	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
71	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
72	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
73	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
74	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
75	Infilled Land - Drain	Historic Map 1868	N	1868	Only visible in 1868 map.	Infilled Land	G
76	Farm	Google Earth, Groundsure Historical Tanks layer	Y	Pre-1999 - Present	Tanks identified by Groundsure 1986-87.	PSC	H
77	Agricultural - Nursery / Farm	Google Earth	Y	1987 - Present	Possible greenhouses adjacent to corridor.	PSC	H
78	Infilled Land - Disturbed Ground	Google Earth	Y	2005 - Present	Ground shown as disturbed with soil and waste heaps. Land also used a farm yard.	PSC & Infilled Land	H
79	Farm	Google Earth	Y	1999 - Present	Small scale activities, no farm name.	PSC	H
80	Tank	Historic Map 1989	N	1986 - 2007		PSC	H

PSC No.	Name	Source	Current	Dates	Description	Category	Section
81	Tank	Historic Map 1989	N	1986 - 1994		PSC	H
82	Pit - Sand	Historic Map 1939	N	1939 - 1957		Infilled Land	H
83	Pit - Sand	Historic Map 1939	N	1939 - 1968		Infilled Land	H
84	Infilled Land - Pond	Historic Map 1868	N	1868 - 1909	No labels on map, however older maps potentially show a pit or an infilled pond.	PSC	H
85	Farm - Westland Farm	Historic Map 1994	Y	1994 - Present		PSC	H
86	Farm	Google Earth	Y	2014 - Present	Farm building.	PSC	H
87	Infilled Land - Swimming pool	Historic Map 1965	N	1965 - 1987		Infilled Land	H
88	Garage	Historic Map 1965, Winchester County Council, Groundsure	Y	1965 - Present		PSC	H
89	Pit - Sand	Historic Map 1965	N	1965 - 1968		Infilled Land	H
90	Landfill - Shirrel Heath Sand Pit	Historic Map 1987, Environment Agency	N	1976 - 1987	Surrounding Old sand pit site. Licence issue11/1976. Labelled as disused workings on 1987 Map. Input - inert, commercial waste.	Infilled Land	H
91	Infilled Land - Pond	Historic Map 1965	N	1965 - 1994	Partially infilled, current site has a river running through the middle. Date of infill unknown, visible on most recent historical map of area (1993) but not on current Google Earth imagery.	Infilled Land	H
92	Garage - Winkworths Garage	Historic Map 1986	Y	1986 - Present	Vehicle repair, maintenance and MOT services.	PSC	H
94	Farm - Woodman's Farm	National Library of Scotland	N	1888 - 1913		PSC	J
95	Pit - Sand	National Library of Scotland	N	1895 - 1896		Infilled Land	J
96	Industrial Estate - Woodmans Farm	Google Earth	Y	1993 - Present	On the former footprint of Woodmans Farm. Units include several vehicle maintenance garages, metal finisher and welding activities and air condition repair. Tank shown in north of site on 1993 historical map.	PSC	J
97	Landfill - Ash House Farm Landfill	National Library of Scotland	N	1868 - 1991		Infilled Land	J
98	Pit - Sand	National Library of Scotland, Historical Map 1968	N	1965 -1968		Infilled Land	J
99	Farm - Unknown	Google Earth	Y	1999 - Present	Farm or possible horse stable.	PSC	J
100	Farm - Five Oaks Farm	National Library of Scotland	Y	Present		PSC	J
101	Farm - Sandy Hill Farm	Historical Map 1868	N	1868 - 1897	From Sandy Hill Farm to Sandy Hill House in next map, 1909.	PSC	J
102	Pit - Sand	Historic Map 1869	N	1869 - 1897		Infilled Land	J
103	Pit - Sand	Historic Map 1895	N	1895 - 1957	LiDAR shows ground level lower than surrounding area. Potentially not infilled.	Infilled Land	H
104	Pit - Sand	Groundsure Historical Maps. BGS mineral planning areas and worked ground layer	N	1965 - 1987	Phillimore Sand pit 1965. 1987 map labels whole area as disused workings.	Infilled Land	J
106	Pit - Gravel	Historic Map 1869	N	1868 - 1869	Only visible on two maps. Not shown on 1895 map.	Infilled Land	K
107	Infilled Land - Marshland	Historical Map 1964	N	1964 - 1993	Not visible on current aerial photography. May still be present.	Infilled Land	K
108	Infilled Land - Marshland	Historical Map 1964	N	1964 - 1993,	Potentially infilled by 1999.	Infilled Land	K
109	Infilled Land - Drain	Historical Map 1964	N	1964 - 1993		Infilled Land	K
114	Wastewater Treatment Works - Pumping Station	Historic Map 1994	Y	1985 - Present		PSC	J
115	Infilled Land - Drain	Historic Map 1965	N	1965	Exact location and size unclear. Label 'drain' present in 1965 map only.	Infilled Land	J
116	Embankment - Park Lug	Historic Map 1964, Hants.gov.uk	Y	1964 - Present	Historical map appear to show a tree lined artificially raised land to form an embankment. Embankment identified as Park Lug on historical maps. Hants.gov.uk describes Park Lug as a boundary for a medieval deer park.	PSC	J
117	Farm - Brooklands Farm	Historic Map 1868	Y	1868 - Present	Lodge Farm/Brooklands farm currently residential housing	PSC	K
118	Infilled Land - Marshland	National Library of Scotland	N	1840-1880		Infilled Land	K
119	Infilled Land - Channel	Historic Map 1869	N	1868 - 1957		Infilled Land	K
121	Infilled Land - Channel	Historic Map 1869	N	1868 - 1985		Infilled Land	K
122	Infilled Land - Channel	Historic Map 1869	N	1868 - 1896		Infilled Land	K
123	Infilled Land - Channel	Historic Map 1869	N	1868 - 1957	Partially infilled at different times, channel is last visible on 1957 map.	Infilled Land	K
125	Railway	National Library of Scotland	N	1868 - 1964	Marked as disused from 1964.	PSC	K
126	Pit - Sand	Historic Map 1957	N	1957	Only visible on 1957 Map. Not visible on 1910 or 1965 maps.	Infilled Land	J
127	Infilled Land - Pond	Historic Map 1868	N	1868 - 1909		Infilled Land	E
128	Infilled Land - Pond	Historic Map 1909	N	1896 - 1957		Infilled Land	J
129	Farm - Dalecote Farm	Historic Map 1965	Y	1965 - Present		PSC	J
130	Farm - Treefield Farm	Historic Map 1868	Y	1957 - Present		PSC	J
131	Agricultural - Orchard	ArcGIS Earth	Y	1868 - Present		PSC	K
132	Infilled Land - Pond	National Library of Scotland	N	1868 - 1957	Infilled by 1964. Land drain still present.	Infilled Land	K
133	Infilled land - Artificial Deposit	British Geological Survey	N	Unknown	BGS Artificial Ground	Infilled Land	K
134	Infilled Land - Pond	National Library of Scotland	N	1888 - 1914		Infilled Land	K
135	Farm - Winterhill Farm	National Library of Scotland, ArcGIS Earth	N	1888 - 1913		PSC	K
136	Garage	Google Earth	Y	Present		PSC	K
137	Works - Brick works	NLS	N	1888-1913 - 1949-70	1937-61 Works.	PSC & Infilled Land	K
138	Farm - Trullingham / Laurel Farm	NLS / Google Earth	Y	1868 - Present	Shown as Trullingham on maps from 1888-1913 to 1949-70. Laurel Farm not shown until 1949-70.	PSC	K
139	Infilled Land - Landscaped bank	National Library of Scotland	N	1896 - 1993		Infilled Land	K
140	Works - Brick works	Groundsure Winchester City Council	N	1868 - 1888	Recorded as a Brick Field with Kilns on the 1885 map. No longer recorded as a Brick Field on the 1896 map and forms the rear garden of a residential property.	Infilled Land	K
143	Farm - Merry Orchard Farm	Historic Map 1964	Y	1964 - Present	Cherry Orchard Farm/Merry, possibly part of Merrytree Farm/Merry Orchard Farm.	PSC	K
146	Infilled Land - Pond	Historic Map 1993	N	1993 - 2000	Only visible on 1993 map.	Infilled Land	K
148	Infilled Land - Pond	Historic Map 1868	N	1868 - 1964		Infilled Land	K
149	Infilled Land - Marshland	Historic Map 1964	Y	1964 - Present		Infilled Land	K
150	Farm - Tangier Farm	Historic Map 1868	Y	1868 - Present	Tangier Farm.	PSC	K
151	Infilled Land - Pond	National Library of Scotland	N	1888-1913 - 1947-1970		Infilled Land	L
152	Works - Brick works	National Library of Scotland, Winchester CC EHO	N	1892-1914	The 1940 plan records the site as disused with the south eastern area of the site divided up into fields. Post 1940 site is recorded as open ground with ponds. Site developed into housing post 1963 into housing.	PSC & Infilled Land	L
153	Landfill - Sand pit	National Library of Scotland, Winchester CC EHO	N	1892-1914 - 1945-1965		Infilled Land	L
154	Embankment	National Library of Scotland	Y	1888 - Present		PSC	L
155	Infilled Land - Made Ground (BGS)	National Library of Scotland, BGS	Y	1868 - Present		PSC	L
156	Garage	Google Maps	Y	Present	Vehicle maintenance.	PSC	L
157	Industrial Estate - Simba Business Park	Google Maps	Y	Present	Business park (fuel, workshops, general trade).	PSC	L
158	Garage	Google Earth	Y	Present	Fuel store / vehicle repair.	PSC	L
159	Waste Facility - Recycling / Scrap Yard	ArcGIS Earth	Y	Present		PSC	L
160	Farm - Rockery Farm	Google Earth	Y	Present		PSC	L
161	Worked Ground	Google Earth	N	2019 - 2020		PSC	L
162	Farm - Lowhill Farm	ArcGIS Earth	Y	1868 - Present		PSC	L
163	Farm - Ashbourne Stables	Google Earth	Y	1993 - Present		PSC	L
164	Fuel Filling Station	Historical Map 1963, Winchester City Council	N	1963 - 2010	Poor map coverage post 1963. The 1983 map shows the garage and a Coach House developed on the site, 1989 only labels the coach house.	PSC	L
165	Pit - Gravel	Historic Map 1868	N	1868 - 1957		Infilled Land	L
166	Pit - Gravel	Historic Map 1996	N	1888 - 1957	Replaced with houses.	Infilled Land	L

PSC No.	Name	Source	Current	Dates	Description	Category	Section
263	Farm - Pigeionhouse Farm	National Library of Scotland	N	1856-1913 - 1949-70	Currently residential property.	PSC	E
264	Pit - Chalk	National Library of Scotland	N	1856-1913 - 1949-70		Infilled Land	E
265	Infilled Land - Pond	National Library of Scotland	N	1856-1931 - 1949-70		Infilled Land	E
266	Worked Ground	National Library of Scotland	N	1937-61 - 1949-70	1937-61 unspecified buildings.1949-70 (NLS) unspecified heaps. Area identified by local authority as a former anti-aircraft battery during 2nd world war.	PSC	E
267	Pit - Chalk	National Library of Scotland	N	1888-1913 - 1949-70		Infilled Land	E
268	Pit - Chalk	National Library of Scotland	N	1856-1913 - 1937-61		Infilled Land	E
269	Pit - Chalk	National Library of Scotland	N	1908 - 1913	Local authority suggest pit present in 1873.	Infilled Land	E
270	Pit - Chalk	National Library of Scotland	N	1888-1913 - 1949-70		Infilled Land	E
271	Pit - Chalk	National Library of Scotland	N	1888-1913 - 1937-61		Infilled Land	E
273	Water Works - Reservoir	National Library of Scotland	N	1938 - 1951	Reservoir(Portsmouth Water Works).	PSC	E
274	Infilled Land - Pond	National Library of Scotland	N	1937-61 - 1949-70		Infilled Land	E
275	Pit - Chalk	Historic Map 1860	N	1856 - 1980		Infilled Land	E
276	Pit - Chalk	Historic Map 1869	N	1856 - 1980		Infilled Land	E
277	Pit - Chalk	Historic Map 1869	N	1856 - 1978		Infilled Land	E
278	Pit - Chalk	Historic Map 1869, Groundsure Historical Industrial Land Uses layer	N	1856 - 1957		Infilled Land	E
279	Works - Kiln	Historic Map 1869	N	1869 - 1957		PSC	E
280	Infilled Land - Pond	Historic Map 1856	N	1856 - 1897		Infilled Land	E
281	Pit - Chalk	Historic Map 1873	N	1873 - 1980		Infilled Land	E
282	Works - Kiln	Historic Map 1856	N	1856 - 1957		PSC	E
283	Pit - Chalk	Historic Map 1856	N	1856 - 1993		Infilled Land	E
284	Pit - Chalk	Historic Map 1856	N	1856 - 1895		Infilled Land	E
285	Pit - Chalk	Historic Map 1856	N	1856 - 1873		Infilled Land	E
286	Infilled Land - Well	Historic Map 1868	N	1868 - 1965		Infilled Land	E
287	Pit - Chalk	Historic Map 1873	N	1873 - 1978		Infilled Land	E
288	Pit - Chalk	Historic Map 1895	N	1895 - 1980		Infilled Land	E
289	Pit - Chalk	Historic Map 1895	N	1895 - 1978		Infilled Land	E
290	Pit - Chalk	Historic Map 1895	N	1895 - 1957		Infilled Land	E
291	Pit - Chalk	Historic Map 1895	N	1895 - 1993		Infilled Land	E
292	Pit - Chalk	Historic Map 1895	N	1895 - 1941		Infilled Land	E
293	Pit - Chalk	Historic Map 1895	N	1895 - 1908		Infilled Land	E
294	Pit - Chalk	Historic Map 1897	N	1897 - 1972		Infilled Land	E
295	Pit - Chalk	Historic Map 1909	N	1909 - 1957		Infilled Land	E
296	Infilled Land - Pond	Historic Map 1909	N	1868 - 1957		Infilled Land	E
297	Military - Fort Widley	Historic Map 1963	Y	1850 - 1972	Various uses. Last military use 1972. See Zeticia Report P14032-24-R10 Site E. Sold to Portsmouth Council 1972.	Military	E
298	Farm - New Barns Farm	Historic Map 1968	Y	1968 - Present		PSC	E
299	Infilled Land - Pond	National Library of Scotland	N	1860 - 1913		Infilled Land	D
300	Pit - Chalk	National Library of Scotland	N	1888 - 1913		Infilled Land	D
301	Infilled Land - Pond	National Library of Scotland	N	1892 - 1914		Infilled Land	D
302	Pit - Chalk	National Library of Scotland, Havant Borough Council	N	1866 - 1980	Known or suspected filled ground.	Infilled Land	D
303	Pit - Chalk	National Library of Scotland	N	1888 - 1913		Infilled Land	D
304	Military - Farlington Redoubt	https://www.heritagegateway.org.uk/Gateway/. Zetica Detailed UXO report.	N	1860s - 1991	1860s - Farlington Redoubt, former barracks. Chalk pit 1931 - 1991. Chalk pit used as firing range during 1944.	Infilled Land	D
305	Waste Facility - Physical Treatment Facility	Google Earth	Y	Present	L&S Waste Management. EA Permit Number - DP3295HN, A16 : Physical Treatment Facility.	PSC	D
306	Pit - Chalk	National Library of Scotland	N	1860 - 1913	Former quarry	Infilled Land	D
307	Water Works - Treatment Works	Groundsure, Google Earth	Y	1931 - Present	Filter beds shown in the northern portion of the map. Filter tanks also shown on maps.	PSC	D
308	Water Works - Reservoir	National Library of Scotland	N	1897 - Present		PSC	D
310	Garage	Google Earth	Y	Present	Tyre repair / replacement garage.	PSC	E
311	Pit - Chalk	Historic Map 1859	N	1859 - 1932	Labelled 'old chalk pit' on 1859 map. Shown as 'Old chalk pit' and 'Collyer's Pit' on 1897 map buildings in the central area. Cottages shown by 1951.	Infilled Land	D
313	Pit - Chalk	National Library of Scotland	N	1859 - 1913	Eastern part extends across pipeline route.	Infilled Land	D
314	Pit - Unspecified	National Library of Scotland	N	1860-1913 - 1949-1970	Labelled 'The Dell'	Infilled Land	D
315	Infilled Land - Pond	National Library of Scotland	N	1869 - 1914		Infilled Land	D
316	Farm - Highbank Farm	National Library of Scotland	N	1970 - 1973		PSC	D
317	Infilled Land - Pond	National Library of Scotland	N	1888 - 1973		Infilled Land	D
318	Infilled Land - Pond	National Library of Scotland	N	1860 - 1913		Infilled Land	D
319	Water Works - Reservoir	National Library of Scotland	N	1897 - 1991	Reservoir(Portsmouth Water Works).	Infilled Land	D
320	Railway - Portsdown & Horndean (Tram)	Historic Map 1910, Wikipedia	N	1903 - 1935	Portsdown & Horndean Light railway (tram).	PSC	D
321	Electricity Sub Station (Small)	ArcGIS Earth	Y	1960 - Present		PSC	D
322	Pit - Chalk	Historic Map 1859	N	1859 - 1995		Infilled Land	D
323	Pit - Chalk	Historic Map 1859	N	1859 - 1971		Infilled Land	D
324	Pit - Chalk	Historic Map 1859	N	1859 - 1963		Infilled Land	E
325	Pit - Clay	Historic Map 1860, Havant Borough Council	N	1860 - 1907	Known or suspected Made Ground (local authority records).	Infilled Land	D
326	Pit - Sand	Historic Map 1860, Environment Agency, Havant Borough Council	N	1860 - 1960	Privett Road Sand Pit. Input data and type unknown.	Infilled Land	D
327	Infilled Land - Pond	Historic Map 1860	N	1860 - 1991		Infilled Land	D
328	Infilled Land - Pond	Historic Map 1860	N	1860 - 1869		Infilled Land	D
329	Pit - Chalk	Historic Map 1866	N	1866 - 1969		Infilled Land	D
330	Pit - Chalk	Historic Map 1866, Havant Borough Council	N	1866 - 1897	Known or suspected filled ground (local authority records).	Infilled Land	D
331	Pit - Unspecified	Historic Map 1868	N	1868 - 1897	Davis's Grave / Beris's Grave	Infilled Land	D
332	Infilled Land - Pond	Historic Map 1895	N	1895 - 1937		Infilled Land	D
333	Infilled Land - Pond	Historic Map 1895	N	1895 - Present		Infilled Land	D
334	Infilled Land - Pond	Historic Map 1895	N	1895 - 1930		Infilled Land	D
335	Infilled Land - Pond	Historic Map 1895	N	1895 - 1937		Infilled Land	D
336	Pit - Gravel	Historic Map 1897, Havant Borough Council, Groundsure Historical Industrial Use layer	N	1897 - 1930	Known or suspected filled ground (local authority records).	Infilled Land	D
337	Infilled Land - Pond	Historic Map 1898	N	1898 - 1907		Infilled Land	D
338	Pit - Sand	Historic Map 1930	N	1930 - 1937		Infilled Land	D
339	Pit - Sand	Historic Map 1930	N	1930 - 1952		Infilled Land	D

PSC No.	Name	Source	Current	Dates	Description	Category	Section
340	Military - Fort Purbrook	Historic Map 1932	Y	1861 - 1968	Various uses. Last military use 1968. See Zeticia Detailed UXO Report P14032-24-R11, D Site.	Military	D
341	Agricultural - Nursery	Historic Map 1937	N	1937 - 1963		PSC	D
344	Water Works	Historic Map 1950	Y	1950 - Present	Drain (covered).	PSC	D
345	Infilled Land - Drain	Historic Map 1950	N	1950 - 1993	Drain (covered).	Infilled Land	D
346	Infilled Land - Drain	Historic Map 1950	N	1950 - 1993		Infilled Land	D
347	Infilled Land - Drain	Historic Map 1950	N	1950 - 1973		Infilled Land	D
348	Infilled Land - Drain	Historic Map 1950	N	1950 - 1973		Infilled Land	D
349	Electricity Sub Station (Small)	Historic Map 1951	Y	1951 - Present		PSC	D
350	Infilled Land - Pond	Historic Map 1952	N	1952 - 1959		Infilled Land	D
351	Infilled Land - Drain	Historic Map 1960	N	1960 - 1979		Infilled Land	D
352	Farm - Highbank Farm	Historic Map 1960	N	1960 - 1973		PSC	D
353	Infilled Land - Pond	Historic Map 1960	N	1960 - 1973		Infilled Land	E
354	Infilled Land - Drain	Historic Map 1960	N	1960 - 1975		Infilled Land	E
355	Infilled Land - Drain	Historic Map 1960	Y	1960 - Present	Looks to be covered but still mapped. Possibly realigned but Groundsure show a watercourse in this location by woodland	Infilled Land	E
356	Infilled Land - Swimming Pool	Historic Map 1969	N	1969 - 1982	Swimming Pool.	Infilled Land	D
357	Electricity Sub Station (Small)	Historic Map 1968	Y	1968 - Present		PSC	D
358	Water Works	Historic Map 1969	Y	1969 - Present	Reservoir (Covered).	Infilled Land	D E
359	Infilled Land - Swimming Pool	Historic Map 1969	N	1969 - 1973	Swimming Pool.	Infilled Land	D
360	Infilled Land - Swimming Pool	Historic Map 1969	N	1969 - 1973	Swimming Pool.	Infilled Land	D
361	Pit - Chalk	Historic Map 1969	N	1859 - 1980	Northern portion crosses pipeline route.	Infilled Land	D
363	Electricity Sub Station (Small)	Historic Map 1971	Y	1971 - Present		PSC	D
364	Water Works	Historic Map 1973	N	1973	Tank.	PSC	D
365	Water Works	Historic Map 1973	N	1973 - 1991		PSC	D
366	Water Works - Reservoir	Historic Map 1991	Y	1991 - Present	Covered Reservoir.	Infilled Land	D
367	Pit - Chalk	Historic Map 1993	N	1991 - Present	Potentially Infilled.	Infilled Land	D E
368	Infilled Land - Marshland	Historic Map 1993	Y	1993 - Present		Infilled Land	E
369	Infilled Land - Marshland	Historic Map 1993	Y	1993 - Present		Infilled Land	E
370	Infilled Land - Made Ground (BGS)	Historic Map 1866, Havant Borough Council	N	1866 - 1974	Potential infill with Earth Spoils, Domestic Refuse, Incinerator Ash (local authority records).	Infilled Land	WRP (C), Budds Farm to WRP (C)
372	Infilled Land - Marshland	Historic Map 1866	N	1866 - 1993	Broad Marsh.	Infilled Land	WRP (C), Budds Farm to WRP (C), D
375	Infilled Land - Watercourse	Historic Map 1867	N	1863 - 1969	Former Hermitage Stream to Storehouse Lake.	Infilled Land	WRP (C), Budds Farm to WRP (C)
378	Wastewater Treatment Works - Budds Farm	Historic Map 1969	Y	1969 - Present	Budd's Farm Sewage Works.	PSC	Budds Farm (C), Budds Farm to WRP (C)
379	Wastewater Treatment Works - Lagoons	Historic Map 1969	N	1969 - 1991	Sewage Sludge.	Infilled Land	Budds Farm (C), Budds Farm to WRP (C)
381	Works - Aggregate	Historic Map 1991	Y	1991 - Present	Aggregate works currently owned by Tarmac. Hanson ready mixed concrete plant located on site.	PSC	Budds Farm to WRP (C)
382	Works	Google Earth, Historic Map 1971, Havant Borough Council	Y	1958 - Present	Garage / Depot / Works / Factory. Area of known or suspected filled ground (local authority records).	PSC	WRP to Havant Thicket Reservoir (B)
383	Railway - Building and siding	National Library of Scotland	N	1892 - 1914	Historical Maps do not detail use. Possibly for storage.	PSC	WRP to Havant Thicket Reservoir (B)
385	Infilled Land - Pond	National Library of Scotland	N	1892 - 1914	In proposed tunnel area.	Infilled Land	WRP to Havant Thicket Reservoir (B)
386	Infilled Land - Watercourse	National Library of Scotland	N	1888 - 1913		Infilled Land	WRP to Havant Thicket Reservoir (B)
387	Works - Corn Mill	National Library of Scotland, Historic Map 1866	N	1866 - 1951	Including Mills Dams and pond areas that have been infilled.	PSC	WRP to Havant Thicket Reservoir (B)
388	Wastewater Treatment Works	National Library of Scotland	N	1931 - 1966	Tanks and filter beds shown on 1939 historical map onwards.	PSC	WRP to Havant Thicket Reservoir (B)
389	Infilled Land - Watercourse	National Library of Scotland, Havant Borough Council	N	1892 - 1978	Area of known or suspected infilled soils (local authority records)	Infilled Land	WRP to Havant Thicket Reservoir (B)
391	Railway - South Western Railway	Historic Map 1866	Y	1866 - Present	South Western Railway branch line.	PSC	WRP to Havant Thicket Reservoir (B), D
392	Infilled Land - Pond	Historic Map 1866	N	1866 - 1951		Infilled Land	WRP to Havant Thicket Reservoir (B)
393	Infilled Land - Pond	Historic Map 1886	N	1868 - 1971		Infilled Land	WRP to Havant Thicket Reservoir (B)
394	Infilled Land - Pond	Historic Map 1886	N	1868 - 1907		Infilled Land	WRP to Havant Thicket Reservoir (B)
395	Water Works - Tank	Historic Map 1939	N	1939 - 1961		PSC	WRP to Havant Thicket Reservoir (B)
396	Water Works - Tank	Historic Map 1939	Y	1939 - Present		PSC	WRP to Havant Thicket Reservoir (B)
397	Water Works - Tank	Historic Map 1939	Y	1939 - Present		PSC	WRP to Havant Thicket Reservoir (B)
398	Water Works - Tank	Historic Map 1939	Y	1939 - Present		PSC	WRP to Havant Thicket Reservoir (B)
399	Water Works - Tank	Historic Map 1939	Y	1939 - Present		PSC	WRP to Havant Thicket Reservoir (B)
400	Water Works - Tank	Historic Map 1939	Y	1939 - Present		PSC	WRP to Havant Thicket Reservoir (B)
401	Water Works - Tank	Historic Map 1939	Y	1939 - Present		PSC	WRP to Havant Thicket Reservoir (B)
403	Wastewater Treatment Works	Historic Map 1952	N	1952 - 1957	1952 map shows sludge beds, filter beds, settling tanks, congestion tanks (east of Dunsbury Way) and humus tanks (west side of Dunsbury Way). Now an industrial estate.	PSC	WRP to Havant Thicket Reservoir (B)
405	Infilled Land - Pond	Historic Map 1953	N	1953 - 1971	Pond likely infilled, now forms part of residential gardens.	Infilled Land	WRP to Havant Thicket Reservoir (B)
406	Infilled Land - Pond	Historic Map 1953	N	1953 - 1973		Infilled Land	WRP to Havant Thicket Reservoir (B)
407	Water Works - Pumping station	Historic Map 1955	N	1955 - 1998		Infilled Land	WRP to Havant Thicket Reservoir (B)
408	Farm - Health Farm	Historic Map 1955	N	1955 - 1973	Farm	PSC	WRP to Havant Thicket Reservoir (B)
409	Infilled Land - Pond	Historic Map 1955	N	1955 - 1978	Pond, potentially infilled land	Infilled Land	WRP to Havant Thicket Reservoir (B)
411	Infilled Land - Drain	Historic Map 1955	N	1955 - 1978		Infilled Land	WRP to Havant Thicket Reservoir (B)
413	Infilled Land - Drain	Historic Map 1963	N	1963 - 1973		Infilled Land	WRP to Havant Thicket Reservoir (B)
414	Infilled Land - Drain	Historic Map 1963	N	1955 - 1973		Infilled Land	WRP to Havant Thicket Reservoir (B)
415	Farm - Hook's Farm	Historic Map 1966	N	1966 - 1971	Farm.	PSC	WRP to Havant Thicket Reservoir (B)
416	Infilled Land - Drain	Historic Map 1966	N	1966 - 1971	Drain - Infilled Land.	Infilled Land	WRP to Havant Thicket Reservoir (B)
417	Infilled Land - Drain	Historic Map 1966	N	1961 - 1973		Infilled Land	WRP to Havant Thicket Reservoir (B)
418	Infilled Land - Drain	Historic Map 1967	N	1967 - 1987		Infilled Land	E
420	Infilled Land - Swimming Pool	Historic Map 1974	Y	1974 - 1993	Swimming Pool - No Longer present, last record 1993.	PSC	WRP to Havant Thicket Reservoir (B)
421	Infilled Land - Pond	National Library of Scotland	N	1892 - 1914		Infilled Land	E
422	Farm - Dunsbury Hill Farm	National Library of Scotland, Google Earth	N	1840-1880- 1999	Last available map shown 1963 NLS map. Not shown on 1999 google photography.	PSC	E
424	Infilled Land - Pond	Historic Map 1952	Y	1866 - 1966	Pond - Potentially still present but obscured by trees.	Infilled Land	Havant Thicket Reservoir (A)
425	Infilled Land - Swimming Pool	Historic Map 1952	N	1952 - 1956	Swimming Pool - Part of Stockheath Naval Camp.	Infilled Land	Havant Thicket Reservoir (A)
426	Embankment	Historic Map 1956	N	1956 - 1964	Embankment - Crosses Pipeline Route.	PSC	WRP to Havant Thicket Reservoir (B)
427	Infilled Land - Drain	Historic Map 1975	Y	1975 - Present	Drain - Likely still present, potentially obscured by trees.	Infilled Land	Havant Thicket Reservoir (A)
428	Infilled Land - Drain	Historic Map 1988	N	1988 - 1991		Infilled Land	Havant Thicket Reservoir (A)
429	Infilled Land - Marshland	Historic Map 1866	N	1866 - 1938		Infilled Land	WRP (C), WRP to Bedhampton Springs (B)
430	Infilled Land - Pond	Historic Map 1951	N	1939 - 1969	Potentially still present.	Infilled Land	D

PSC No.	Name	Source	Current	Dates	Description	Category	Section
431	Works - Portsdown Windmill	Historic Map 1869	N	1856 - 1869		PSC	E
432	Pit - Unspecified	Historic Map 1980, Groundsure Historical Industrial Land use and waste disposal layers	N	1856 - 1991	Disused pit on 1980 map. Widley Dell on previous maps. Groundsure Waste Disposal layer notes 1952 used as landfill or other waste disposal site. Site may extend southwest outside of boundary.	Infilled Land	E
433	Pit - Chalk	Historic Map 1941	N	1908 - 1957		Infilled Land	E
434	Pit - Chalk	Historic Map 1908	N	1908 - 1993		Infilled Land	E
435	Pit - Gravel	Historic Map 1868	N	1868 - 1950		Infilled Land	G
437	Infilled Land - Worked Ground (BGS)	BGS	N	1963 - 1993	Appears to have been infilled by 1993.	Infilled Land	M
438	Infilled Land - Made Ground (BGS)	BGS	N	Unknown		Infilled Land	M
439	Pit - Unspecified	Groundsure Historical Land Use Layer	N	1869 - 1957		Infilled Land	L
440	Infilled Land - Made Ground (BGS)	BGS	N	Unknown		Infilled Land	L
441	Landfill - Crowd Hill Landfill	Environment Agency	N	1962 - 1972	SW Phase 2 ground investigation 2023 found very little to denote landfill. Approx 0 - 0.5m MG overlying natural deposits.	Infilled Land	L
442	Works - Brick works	Groundsure Historical Industrial Land Use layer	N	1895		PSC	L
443	Landfill - Land at Rossgarth Landfill	Hampshire County Council, Environment Agency. Phase 3c GI	N	1988 - 1995	EA input 1988 to 1995 (licence surrendered).Inert waste. Local authority note - 'Gas risk - Gassing, Permeability - high'. Boundary extended west following Phase 3c GI hole 3J5007DS. MG to 3.6m bgl inc brick, concrete, glass, ceramics, cement.	Infilled Land	J
444	Works - Smithy	Groundsure Historical Industrial Land Use layer	N	1910		PSC	H
445	Worked Ground - unspecified	Groundsure Historical Land Use Layer	N	1965 - 1987	LiDAR shows ground level lower than surrounding area. Potentially not infilled.	Infilled Land	H
446	Worked Ground - Unspecified heap	Groundsure Historical Industrial Land Use layer	N	1868 - 1965		PSC	H
447	Pit - Unspecified	Groundsure Historical Industrial Land Use layer	N	1868 - 1869		Infilled Land	H
448	Landfill - Firth Lane Sand Pit	Winchester City Council, Hampshire County Council, Environment Agency, Google Earth	N	1998 - 2007	A01: co-disposal landfill site (EA), Licence application desk study undertaken 1997. Google Earth appears to show site closure by 2007.	Infilled Land	H
449	Landfill - Quob Copse Landfill	Environment Agency	N	1971 - 1972	Droxford Rural District Council, household / commercial landfill.	Infilled Land	G
450	Worked Ground - unspecified	Groundsure Historical Industrial Land Use layer	N	1908 - 1938		Infilled Land	G
451	Fuel Filling Station	Groundsure Historical Garages Layer	N	1961 - 1993	Information from Groundsure layer. Site is currently residential properties and a public house.	PSC	E
452	Infilled Land - Christ Church, London Road	Havant Borough Council	N	1897 - 1998	Waste type - Putrescible.	PSC	D
453	Pit - Unspecified	Groundsure Historical Industrial Land Use layer	N	1895		Infilled Land	D
454	Landfill - Disused Sand Pit B Brick and Tile works	Groundsure Historical Industrial Land use / Havant Borough Council	N	1930 - 1938	Local authority - suspected filled ground along the south of site.	Infilled Land	D
455	Pit - Unspecified	Groundsure Historical Industrial Land Use layer	N	1898 - 1938		Infilled Land	D
456	Landfill	Portsmouth City Council	N	1952	Waste disposal / unknown infill. Considered a landfill by the local authority.	Infilled Land	D
457	Pit - Chalk	Havant Borough Council, Groundsure Historical Industrial Land Use layer	N	1895 - 1963	Unknown material used to fill a small quarry hole.	Infilled Land	D
459	Infilled Land - Made Ground (BGS)	BGS / Havant Borough Council	Y	1969 - Present	Known or suspected infilled soils (local authority records). Historical mapping shows potential highways construction activities.	Infilled Land	WRP to Havant Thicket Reservoir (B), WRP (C), Budds Farm to WRP (C), D
460	Landfill - Land South of Budds Farm	Environment Agency, Havant Borough Council	N	2014	Bund erosion and water egress noted to EA. Former domestic waste landfill.	Infilled Land	Budds Farm (C), Budds Farm to WRP (C)
461	Infilled Land - Made Ground (BGS)	BGS	N	Unknown		Infilled Land	E
462	Landfill - Bedhampton Waterworks	Environment Agency, Havant Borough Council, Groundsure Historical Industrial Land use	N	Unknown	L05 inert landfill registered to Portsmouth Water. Area of known or suspected infilled soils (local authority records).	Infilled Land	WRP to Havant Thicket Reservoir (B)
463	Worked Ground - Heap	Groundsure Historical Industrial Land Use layer	N	1910 - 1963	Unspecified heap apart from 1931 which is recorded as unspecified ground workings. Tank recorded on site between 1897 - 1910.	Infilled Land	Havant Thicket Reservoir (A)
464	Pit - Unspecified	Groundsure Historical Industrial Land Use layer	N	1963 - 1991	Potential embankment on Historical Mapping.	Infilled Land	WRP to Havant Thicket Reservoir (B)
465	Pit - Unspecified	Groundsure Historical Industrial Land Use layer	N	1907 - 1963		Infilled Land	WRP to Havant Thicket Reservoir (B)
466	Landfill - Harts Farm Landfill	Environment Agency	N	1978 - unknown	Household waste landfill, site ref FHA15, 1760/1/13/6.	Infilled Land	WRP (C), Budds Farm to WRP (C), D
467	Worked Ground - unspecified	Groundsure Waste Disposal and Historical Industrial Uses layers	N	1952	Unknown hole. Potentially landfilled.	Infilled Land	E
468	Military - Research Facility	Google Maps, http://www.portsdown-tunnels.org.uk/	Y	1950 - Present	QinetiQ Technology Business park. Potential tanks on site.	Military	E
469	Military - Fort Southwick	Winchester County Council, / http://www.portsdown-tunnels.org.uk/	N	1861 - 2002	Various uses. Last military use 1968. See Zeticia Detailed UXO Report P14032-24-R11, D Site.	Military	E
470	Worked Ground - unspecified	Groundsure Historical Industrial Land Use layer	N	1986 - 1987		Infilled Land	H
471	Worked Ground - unspecified	Groundsure Historical Industrial Land Use layer	N	1987		Infilled Land	J
472	Landfill - Crowd Hill Landfill	BGS Historical Landfill point	N	Unknown	Risk code G2, boundaries unknown, location shown at point.	Infilled Land	L
473	Worked Ground - unspecified	Groundsure Historical Industrial Land Use layer	N	1957 - 1968		Infilled Land	L
474	Military - Wintershill Hall (Former military / civilian base)	https://wintershill.net/about/	N	1941 - 1946	Headquarters of the Hampshire Fire Service. The lower lawn was covered in Nissen huts for offices and additional accommodation. 20m south of BPT-4.	PSC	K
475	Garage	Google Earth, Site visit 04052023	Y	Unknown - Present	Streetview shows Motorhome Service Centre. Above ground tank (metal) and bunded tank (plastic) at approx. 456320, 111685.	PSC	G
476	Works - Parchow Groundworks	Ground investigation site visit 26 March 2023	Y	Unknown - Present	Former telephone exchange.	PSC	E
478	Infilled Land - Artificial Ground	ROL-2-562-575-0135-1979 MAP	N	1937 - 1993	Artificial Land / Worked Ground may be associated with removal of woodlands	Infilled Land	M
479	Water Works - Pump house	A60-21-SU-0089	Y	1988 - Present	Pump House.	PSC	D
480	Pit - Various	HAM-076-10-XX-1909-G-01	N	1909 - 1932	Potentially Infilled Pit (Sand and Gravel) associated with RTD deposits.	PSC	D
481	Waste Facility - Incinerator	Groundsure 2023 Report	N	1987 - 1993		PSC	WRP (C)
482	Infilled Land - Pond	SU51SE-03-G-1957	Y	1939 - 1957	Former Un-named building which at present is an infilled pond (associated with the River Meon).	PSC	G
483	Farm - Crockerhill Farm	SU-51SE-03-G-1957	Y	1957		PSC	F
484	Farm - Building (potential)	SU-51E-03-G-1957	Y	1957		PSC	G
485	Wastewater Treatment Works	SU-51SE-01-G_1987	Y	1987	Sewage Works with 5 tanks, two settlement tanks.	PSC	G
487	Building - Un-named	HAM-075-03-XX-1941-G-01_1941	Y	1941		PSC	E
488	Infilled Land - Pond	ROL-4-1741-1750-0290_1986	Y	1986		Infilled Land	F
490	Infilled Land - Pond	SU810_S1_SEP_1994_1994	Y	1994		Infilled Land	F
492	Infilled Land - Pond	SU6109_1965_1965	Y	1965		Infilled Land	E
493	Railway - Meon	SU-51SE-03-G_1957	Y	1909 - 1957	Meon Railway.	PSC	G
494	Infilled Land - Pond	SU5909_S1_NOV_1992_1992	Y	1992		Infilled Land	F
495	Water Works - Reservoir (covered)	SU-51SE-01-G-1987	Y	1987		PSC	F G
496	Pit - Gravel	HAM-075-02-xx-1932	N	1932		Infilled Land	F
498	Wastewater Treatment Works	Groundsure Google Earth	Y	1965 - Present		PSC	E
499	Landfill	Portsmouth Borough Council Waste Disposal GIS	N	1952 - 1980	Potential landfill recorded by local authority, unknown infill (dated 1952 by local authority).	Infilled Land	E
500	Military - Belmont Camp II	Safelane WfL UXO Report 9714 RA Section 9.1.3	N	1940 - 1950	Camp's facilities included classrooms, training grounds, barracks, and administrative buildings.	PSC	D
501	Military - Stockheath Naval Camp	Safelane WfL UXO Report 9714 RA Section 9.1.3	N	1941 - 1970	Nissen huts in west of Camp, assault course south of PSC 425 swimming pool, practice trench in the north. South of PSC 428 drain. Site demolished in 1950 to 1970 and replaced with housing	Military	WRP to Havant Thicket Reservoir (B)
502	Military - HMS Daedalus III	Safelane WfL UXO Report 9714 RA Section 9.1.3 / Zetica P14032-24-R1-A Zetica UXO Desk Study Havant Thicket Pipeline	N	1940 - 1950	Camp's facilities included classrooms, training grounds, barracks, and administrative buildings. Eastern extent passes pipeline route.	Military	WRP to Havant Thicket Reservoir (B)
503	Military - Fraser Naval Camp	Safelane WfL UXO Report 9714 RA Section 9.1.3	N	1940 - 1950	Camp's facilities included classrooms, training grounds, barracks, and administrative buildings. Northern part of the former barracks potentially passes through the pipeline route.	Military	WRP to Havant Thicket Reservoir (B)
504	Military - Belmont Naval Camp	Safelane WfL UXO Report 9714 RA Section 9.1.3	N	1940 - 1950	Camp's facilities included classrooms, training grounds, barracks, and administrative buildings.	Military	WRP to Havant Thicket Reservoir (B)
505	Farm - Widley Farm	Groundsure 2023 Report Winchester County Council	N	1860 - 1980	Farm buildings. Unknown filled ground (possible pond) noted in east of site by local authority	PSC	E
507	Farm - Offwell Farm	Groundsure 2023 Report	Y	1867 - Present		PSC	E
508	Landfill - Whitedell Farm	Environment, Agency Groundsure	N	1980 - 1982	Licence 10/14, FFA7, 1760/7 - Inert landfill.	PSC	F
509	Farm - Cloverfield Farm	OS Zoomstack maps	Y	2005 - Present		PSC	H
510	Worked Ground	Google Maps	Y	2023		PSC & Infilled Land	F
511	Worked Ground	Google Maps	Y	2023	Potential stockpile of unknown soil.	Infilled Land	F
512	Farm - Pig farm (potential)	Google Earth (2005)	N	2005 - 2007	Potential pig Farm.	PSC	H

PSC No.	Name	Source	Current	Dates	Description	Category	Section
513	Farm - Barn	Google Maps, Groundsure Maps	Y	1986 - Present		PSC	G
514	Infilled Land - Made Ground (asbestos)	WfL Phase 2 Ground Investigation	Y	2023	Made Ground up to 0.7m bgl including brick, tile and macadam. Asbestos cement (0.147%) detected at 0.5m bgl. Source not delineated.	Infilled Land	J
515	Infilled Land - Artificial Ground	Groundsure Historic Maps	N	1937 - 1993		Infilled Land	M
516	Pit - Gravel	Groundsure Historic Maps, Winchester City Council Contaminated Land Data	N	1938 - 2010		Infilled Land	M
517	Farm - Storage area	Google Earth	Y	2015 - Present	Storage area.	PSC	M
519	Infilled Land - Artificial Ground	Winchester City Council Contaminated Land Data (Site Reports)	N	2016		Infilled Land	M
520	Infilled Land - Marshland	Groundsure Historic Maps	N	1868 - 1968		Infilled Land	L
522	Infilled Land - Marshland	Groundsure Historic Maps	N	1939 - 1968		Infilled Land	L
523	Farm - Storage area	Google Earth	Y	2000 - Present	Storage area.	PSC	L
524	Infilled Land - Watercourse	Groundsure Historic Map 1869, LIDAR data	N	1869 - 1888		Infilled Land	L
525	Infilled Land - Pond	Groundsure Historic Maps, LIDAR data, Google Earth	N	1868-1992		Infilled Land	L
526	Farm - Storage area	Google Earth, LIDAR data	Y	2014 - Present	Storage area for farm / stables to the southeast.	PSC	L
527	Embankment	Groundsure Historic Maps, LIDAR data	Y	1964 - Present		Infilled Land	L
528	Agricultural - Orchard	Groundsure Historic Maps	N	1868 - 1957		PSC	K
529	Worked Ground - Stockpile	Google Earth, LIDAR data	N	2012 - Present	Ground workings. Soil heap first visible in 2012, still present but overgrown in 2024 aerial photography.	PSC	K
530	Worked Ground - unspecified	Google Earth, Google Maps, LIDAR data	Y	2019 - Present		PSC	K
531	Infilled Land - Watercourse	Groundsure Historic Maps	N	1868 - 1964		Infilled Land	K
532	Infilled Land - Made Ground (BGS)	BGS, LIDAR data, Google Earth	N	Unknown	BGS Made Ground	Infilled Land	K
533	Embankment - (potential)	Groundsure Historic Maps, LIDAR data	Y	1964 - Present		PSC	J
534	Embankment	Groundsure Historic Maps, LIDAR data	Y	1964 - Present		PSC	J
535	Tank	Groundsure Historic Maps, Google Earth	N	1993 - 2012		PSC	J
536	Infilled Land - Pond	Groundsure Historic Maps, LIDAR data	N	1869 - 1964		Infilled Land	J
538	Farm - Storage area	Google Earth, Google Maps	Y	2019 - Present	Storage area.	PSC	J
539	Worked Ground - Stockpile	Google Earth, LIDAR data	Y	2014 - Present	Unspecified heap.	PSC	J
540	Farm - Storage area	Google Earth, Google Maps	Y	2012 - Present	Storage area.	PSC	J
541	Agricultural - Orchard	Groundsure Historic Maps	N	1868 - 1968		PSC	J
542	Infilled Land - Pond	Groundsure Historic Maps, LIDAR data	N	1868 - 1957		Infilled Land	J
543	Infilled Land - Pond	Groundsure Historic Maps	N	1868 - 1869		Infilled Land	H
544	Infilled Land - Marshland	Groundsure Historic Maps	N	1895 - 1896		Infilled Land	H
545	Farm - Building	Google Earth	Y	2005 - Present	Farm building.	PSC	H
546	Farm - Yard / Storage area	Google Earth	Y	2012 - Present	Yard / Storage area.	PSC	H
547	Farm	Google Earth	Y	pre-1999 - Present		PSC	H
548	Farm	Groundsure Historic Maps, Google Earth	Y	1868 - Present		PSC	K
582	Filter Beds or Potential Tanks	Historical Maps A28-17-SU7006SW 1959, Google Earth	N	1959-2007		PSC & Infilled Land	B
584	Tanks	Historical Maps 1969	Y	1969 - Present		PSC	D
587	Tanks	Historical Maps - 1939 HAM-076-10-XX-1939	N	1939 - 1969		PSC & Infilled Land	WRP to Havant Thicket Reservoir (B)
588	Farm - Mayles Farm	Historical Map - A48-06-SU-0380-1980	Y	1980 - Present		PSC	G
592	Pit - Gravel	Groundsure Historical Maps	N	1859 - 1985		Infilled Land	F
593	Infilled Land - Reservoir	Historical Maps - HAM-075-01-XX-1910	N	1897 - 1910		Infilled Land	F
594	Infilled Land - Pond	Historical Maps - HAM-075-01-XX-1859	N	1856 - 1957		Infilled Land	F
595	Farm - Castle Farm	Historical Maps HAM-067-13-XX-1897-G-01	Y	1897 - Present		PSC	G
596	Wastewater Treatment Works - Filter beds / tanks	Historical Maps - A54-02-SU-0360_1969	N	1939 - 1993		PSC & Infilled Land	WRP to Havant Thicket Reservoir (B)
597	Wastewater Treatment Works - Settlement Tanks	Historical Maps 2500 A33-18-SU-0239_1952	N	1952 - 1958		PSC & Infilled Land	WRP to Havant Thicket Reservoir (B)
598	Wastewater Treatment Works - Filter beds (former)	Historical Maps 2500 - A33-18-SU-0239_1952	N	1952 - 1964		PSC	WRP to Havant Thicket Reservoir (B)
599	Tank - Congestion	Historical Maps 2500 - A33-18-SU-0239_1952	N	1952 - 1958		PSC & Infilled Land	WRP to Havant Thicket Reservoir (B)
600	Infilled Land - Former Sludge Beds	Historical Maps - 2500 A33-18-SU-0239_1952	N	1952 - 1958		PSC & Infilled Land	WRP to Havant Thicket Reservoir (B)
601	Water Works - Pumping station	Historical Map - A49-02SU-0211_1971	N	1955 - 1975		PSC	WRP to Havant Thicket Reservoir (B)
602	Embankment	A28-22-SU7107-1_1955	N	1955 - 1971		PSC	WRP to Havant Thicket Reservoir (B)
603	Tank	Historical Maps - SU7108SE_1971 TO 1993, Google Earth	Y	1971 - Present		PSC	WRP to Havant Thicket Reservoir (B)
604	Electricity Sub Station (Small)	Historical Mapping - SU107SW_1969, Google Street View	Y	1969 - Present		PSC	WRP to Havant Thicket Reservoir (B)
605	Electricity Sub Station (Small)	Historical Maps - A60-01-SU-0576_1973, Groundsure Historical Energy Features	Y	1973 - Present	Potentially 2 substations have existed at this location. 1st substation approximately 1973 later replaced approximately 1993.	PSC	D
606	Infilled Land - Pond	Historical Map - A28-08-SU108NW-1_1957	N	1952 - 1964		Infilled Land	Havant Thicket Reservoir (A)
607	Fuel Petrol Filling Station	Google Earth Imagery	Y	1999 - Present		PSC	G
609	Electricity Sub Station (Small)	A32-04-SU7008-4_1964 - Groundsure	N	1964 - 1971		PSC	WRP to Havant Thicket Reservoir (B)
610	Garage	A32-04-SU7008-4_1964 - Groundsure	N	1964 - 1995		PSC	WRP to Havant Thicket Reservoir (B)
611	Farm - Leigh Park Farm	Groundsure Historical Map 1975	N	1991 - Present		PSC	WRP to Havant Thicket Reservoir (B)
612	Pit - Unspecified	Groundsure 2024 Report	N	1968 - 1980	Unspecified Hole. No additional information on Groundsure maps. Potentially an infilled pit.	Infilled Land	M
613	Water Works - Pumping station	Groundsure 2024 Report	N	1980	Groundsure maps indicate a pumping station.	Ground Investigation	L
614	Wastewater Treatment Works	Aerial imagery and Groundsure 2024 reporting	Y	1993 - Present	Sewage Treatment Works.	PSC	K
621	Works - Industrial Estate	Groundsure	N	1939 - 1992	Saw Mills between 1939 - 1990s, then industrial estate.	PSC	F
622	Military - Anti-aircraft Battery	Winchester City Council	N	1939 - 1946	Dates are approximate. Information from Winchester City Council Potential Contaminative use GIS 1_2500 2km buffer 2022.	PSC	Havant Thicket Reservoir (A)
623	Military - Leigh Park House	Zetica Detailed Desk Study	N	1940 - 1957	Used by Admiralty Mine Design Department for administration and design of mines, depth changes and minesweeping. Explosive stored in the 'ice house'. See Zetica Detrail Risk Assessment for detail.	PSC	Havant Thicket Reservoir (A)
624	Pit - Unspecified	Groundsure Winchester City Council	N	1868	Shown only on 1868 map. Reduced ground level also visible on LiDAR.	Infilled Land	E
626	Infilled Land - Drain	Groundsure	N	1868 - 1980	Partially infilled by 1980 south of Mayles Lodge.	Infilled Land	G
627	Infilled Land - Drain	Groundsure	N	1868 - 1994	Drain south of sewage works no longer shown on maps.	Infilled Land	G
628	Works - Depot	Groundsure Google Maps Winchester City Council	Y	1964 - Present	'Depot' shown on maps until 1989. Buildings remain on 2019 Google Earth photography	PSC	K

Appendices

Appendix A: Section M Desk Study Information specific to the GI Investigation

Table A1 summarises desk study information specific for the Phase 2 and 3B/3C GI areas in Section M. The information was used to develop the preliminary conceptual Site model (CSM) presented in the HWTWRP Geotechnical and Geo-environmental desk study Version 4 (SSP, 2024).

Table A1: Geo-environmental Desk Study Summary Information for Phase 2 and Phase 3B/3B GI Locations at Section M

		2M6507SA	2M6508SA	3M6517HP	3M6601HP
Geology	Superficial Deposits	River Terrace Deposits	Alluvium and River Terrace Deposits	None	None
	Bedrock Geology	Lambeth Group -Clay, silt, sand over Chalk		Lambeth Group – Sand over Chalk	Lambeth Group- Sand over Chalk
	Artificial Ground [1]	None			
Hydrogeology	Bedrock Aquifer Classification	Lambeth Group (Secondary A Aquifer) Chalk (Principal Aquifer)		Lambeth Group (Secondary A Aquifer) Chalk (Principal Aquifer)	Lambeth Group (Secondary A Aquifer) Chalk (Principal Aquifer)
	Superficial Aquifer Classification	Secondary A		N/A	N/A
	Source Protection Zones (SPZs)	Zone 1			
	Groundwater Abstractions [2]	178 m west	190m northwest	225 m west	300 m southwest; 320 m northeast
	Nitrate Vulnerable Zones (NVZs)	Hampshire Chalk (Groundwater) and Hamble Estuary Eutrophic			
Hydrology	Surface Watercourses	Unnamed tributary of the River Itchen		Unnamed tributaries of the Itchen are located approximately 175m east	Unnamed tributary of the Itchen is located approximately 200m east.
	Surface Water Abstractions [2]	River Itchen – 800 m southeast		Transfer between Sources- 670 m northeast	Potable Water Supply- 780m northeast and Transfer between Sources- 730 m east
	Risk for Rivers and the sea	Flood Zone 3		Flood Zone 1	
Site History	On Site and Surrounding Land	The earliest mapping from the late 1800s shows woodland, farmland or other undeveloped land this has largely remained unchanged for the trenchless crossing location. An unnamed tributary of the Itchen runs between the two borehole locations.		The earliest mapping from the late 1800s shows undeveloped land this has largely remained unchanged.	
Landfill Sites		None			
Pollution Incidents		There are no pollution incidents (category 1 or 2) within 50 m of the GI locations.			
Ecological Sensitivity (250m radius)	Sites of Special Scientific Interest (SSSIs), SSSI	None			
	Special Areas of Conservation (SAC),				
	Special Protection Areas (SPAs)				
	RAMSAR Site				
	National Nature Reserve (NNR)	South Downs National Park - 330 to 450 m east			
	Ancient Woodlands	Oakwood Copse		None	None
Preliminary Risk Assessment	Overall Risk Assessment Summary	PSCs greater than 50 m distance from trenchless crossing locations		PSCs greater than 50 m distance	

Notes:
[1] Artificial Made Ground as identified by the BGS
[2] Active groundwater and surface water abstractions within 1 km; surface waters up to 250m; artificial ground up to 250m. All distances are approximate.

Appendix B: Chemical Analysis List of Suites

Soil Suites				**Suite L1.0 Soil Generic Analysis**													**Suite L2.0 - Potential Source of Contamination Soil Suites** *(use add ons from Suite 1.0 if required in addition)*													
Chemical	Method	LOD units		Generic Analysis - For locations not included in Suite 2.0 or where required													Farms (buildings/yards)		Fuel filling stations and garages	Electrical substations	Current and former works/industry		Current and historic railway land		STWs and Water Supply Works		Former military facility		Former hospital	Agricultural nursery building	Landfill sites / potentially infilled areas	
			Suite No.	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12	1.13	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	2.12	2.13	2.14	2.15	2.16
			Suite Name	Made Ground	Made Ground + add. metals + inorganics	Natural	Barrier pipe (PE/Metal)	VOCs with TICs	SVOCs with TICs	Pesticides	Herbicides	PFAS (inc PFOS / PFOA)	WAC (1-stage) inc solid suite	Core Logs (including PAK marker)	Tar anlysis (PAH, phenol) - ADEPT 2019 method	Tar analysis Assessment - ADEPT 2019 method	Farms Standard	Farms Standard + VOCs +pestcides	Fuel filling & Garages	Electrical Substations	Works Standard	Works Standard + S/VOC+PCBs	General Railway land	Depots / Yards	STW Standard	STW/WSW + VOCs +PCBs	Standard	Standard + S/VOC+PCBs	Former Hospital	Agri. Nursery	Potentially infilled Land	BGS Made Ground / Landfill
Metals		**mg/kg** (unless stated)																													
Arsenic	ICP-OES / MS	<0.5		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cadmium	ICP-OES / MS	<0.5		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Chromium (trivalent)	ICP-OES / MS	<0.5		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Chromium, Hexavalent	Skalar CFA / ICP-OES	<1		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Chromium (total)		<1																													
Selenium	ICP-OES / MS	<0.5		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Copper	ICP-OES / MS	<0.5		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Lead	ICP-OES / MS	<3		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mercury	ICP-OES / MS	<0.3		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Nickel	ICP-OES / MS	<0.5		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Zinc	ICP-OES / MS	<2		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Boron, water soluble	ICP-OES / MS	<1.0		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Vanadium	ICP-OES / MS	TBC																													
Antimony	ICP-OES / MS	TBC																													
Barium	ICP-OES / MS	TBC																													
Molybdenum	ICP-OES / MS	TBC			x																				x						
Aluminium	ICP-OES / MS	TBC			x																				x						
Manganese	ICP-OES / MS	TBC			x																				x						x
Iron	ICP-OES / MS	TBC			x																				x						x
Inorganics																															
Sulphate, Total	ICP-OES / MS	<10		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sulphide, Easily liberated	Skalar CFA	<10		x	x												x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Phosphate	TBC by lab	TBC			x																					x		x				x
Chloride	TBC by lab	TBC			x																				x	x						x
Cyanide, Free	Skalar CFA	<1			x																x	x			x	x		x			x	x
Cyanide, Total	Skalar CFA	<1			x																x	x			x	x		x			x	x
Cyanide, Complex	Skalar CFA	<1			x																x	x			x	x		x			x	x
Thiocyanate	TBC by lab	TBC			x																				x	x					x	x
Ammonia	TBC by lab	TBC			x												x								x	x				x		x
Ammonium	TBC by lab	TBC			x												x								x	x				x		x
% Stones Greater than 10mm				x	x	x											x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Asbestos ID	HSG 248	Presence		x	x												x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Asbestos Quantification (if asbestos ID positive)	Gravimetric	<0.001%		x	x												x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
pH	Potentiometric	+/- 0.1		x	x	x	x										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Phenols (total)															x																	
Total Phenols includes following Phenol, Resorcinol, Methylphenols (Cresols), Dimethylphenols (Xylenols), 1-Napthols, Trimentylphenols.	HPLC	<0.1		x													x	x	x		x	*	x	*	x		x	*	x		x	
Total Speciated Phenols includes the following Phenol, Pentachlorophenol, 2,4,5-Trichlorophenol, 2,4,6 -Trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2-chlorophenol, 2-methylphenol, 2-nitrophenol, 4-chloro-3-methylphenol, 4-methylphenol	GCMS	<0.05			x													x				*		*		x		*		x		*

Chemical	Method	LOD units	Suite No.	Generic Analysis - For locations not included in Suite 2.0 or where required													Farms (buildings/yards)		Fuel filling stations and garages	Electrical substations	Current and former works/industry		Current and historic railway land		STWs and Water Supply Works		Former military facility		Former hospital	Agricultural nursery building	Landfill sites / potentially infilled areas	
			Suite No.	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12	1.13	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	2.12	2.13	2.14	2.15	2.16
			Suite Name	Made Ground	Made Ground + add. metals + inorganics	Natural	Barrier pipe (PE/Metal)	VOCs with TICs	SVOCs with TICs	Pesticides	Herbicides	PFAS (inc PFOS / PFOA)	WAC (1-stage) inc solid suite	Core Logs (including PAK marker)	Tar anlysis (PAH, phenol) - ADEPT 2019 method	Tar analysis Assessment - ADEPT 2019 method	Farms Standard	Farms Standard + VOCs +pestcides	Fuel filling & Garages	Electrical Substations	Works Standard	Works Standard + S/VOC+PCBs	General Railway land	Depots / Yards	STW Standard	STW/WSW + VOCs +PCBs	Standard	Standard + S/VOC+PCBs	Former Hospital	Agri. Nursery	Potentially infilled Land	BGS Made Ground / Landfill
BTEX																															
Benzene	GCMS	<0.05		x	x		x										x			x	x		x		x		x		x	x	
Toluene	GCMS	<0.05		x	x		x										x			x	x		x		x		x		x	x	
Ethylbenzene	GCMS	<0.05		x	x		x										x			x	x		x		x		x		x	x	
o-xylene	GCMS	<0.05		x	x		x										x			x	x		x		x		x		x	x	
m-xylene	GCMS	<0.05		x	x		x										x			x	x		x		x		x		x	x	
p-xylene	GCMS	<0.05		x	x		x										x			x	x		x		x		x		x	x	
Total BTEX	GCMS	<1.0		x	x		x										x			x	x		x		x		x		x	x	
MTBE				x	x		x										x			x	x		x		x		x		x	x	
PAH by GCMS																															
PAH 17 (total and speciated incl coronene)	GCMS	<0.1		x	x												x	x	x		x	*	x	*	x	x	x	*	x	x	x	*
PAK Marker (PAH indicator test)														x																		
PCBs																																
PCB 7 Congeners (speciated and total)	GCMS	<0.001			x															x		x		x		x		x	x			x
Petroleum Hydrocarbons																																
TPHCWG	GC-FID / GCMS	<0.1			x		x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
TPH >C6-C44 - with silica clean-up	GC-FID or GCMS	<1		x		x											x															
TPHCWG (if over 1000 mg/kg)				x		o											o															
TPH Identification (if over 1000 mg/kg)				o	o	o											o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
o - complete test if threshold reached.																																
VOCs/Semi-VOCs																																
Volatile Organic Compounds (VOCs) inc TICS	GCMS	<0.01						x										x	x			x		x		x		x	x			x
Semi-volatile Organic Compounds (SVOC) incl TICs	GCMS	<0.01					x		x													x		x				x				x
Pesticides / Herbicides																																
Pesticides (organochlorine, organophosphate)	GC-MS	<0.001								x								x												x		x
Herbicides (Organonitrogen / triazine herbicides (to include Atrazine) and acid herbicides)	LC-MS	<0.1									x							x					x	x						x		x
Other																																
Soil Organic Matter	Titration	<0.1%		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Conductivity	Potentiometric	<10 µS/cm		x	x	x	x										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Redox Potential		v		x	x	x	x										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Moisture Content Ratio (% of as received sample)	Gravimetric	<0.1%		x	x	x											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Waste Acceptance Criteria (1-stage) including solid suite	Various	Various		x	x								x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PFAS (to include PFOS and PFOA)	Lab to confirm	<0.001										x														x		x				x
Pathogens																																
Total coliforms	Lab to confirm	TBC																							x							
E.coli	Lab to confirm	TBC																							x							
Faecal coliforms	Lab to confirm	TBC																							x							
Faecal streptococci	Lab to confirm	TBC																							x							
To be confirmed																																
Radioisotopes - TBC site/PSC specific	TBC	TBC																										x	x			
Explosives TBC following UXO assessment	TBC	TBC																										x				
Road surfacing - Coal Tar																																
Coal tar interpretation															x	x																
Note - Ethylene glycol to be included in VOC TICs analysis.																																
Request lab provides the result with the lowest LOD where chemicals are tested twice using different methods (e.g benzene in BTEX suite and VOC analysis.)																																

Water and Leachate Suites					**Suite 3.0 Generic Groundwater Analysis**									**Suite 4.0 - Potential Source of Contamination Groundwater Suites** *(use add ons from Suite 3.0 if required in addition)*													
	Analysis	LOD units			Generic Analysis - For locations not included in Suite 4 or where required									Farms	Fuel filling stations & garages	Electrical substations	Current and former works/industry		Current and historic railway land		Sewage Treatment Works (STW)	Water Supply Works (WSW)	Former military facility		Former hospital	Agricultural nursery building (storage/buildings)	Landfill sites / potentially infilled areas	
		µg/l unless stated	Suite No.	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.10	4.11	4.12	4.13	4.14	4.15
			Suite Name	Soil leachate preparation	Standard	Standard + add. metals + inorganics	TPH CWG	VOCs with TICs	SVOCs with TICs	Pesticides	Herbicides	PFAS (inc PFOS / PFOA)	Hydrogeo Suite	Farms	Fuel filling & Garages	Electrical Substations	Works Standard	Works Standard + S/VOC+PCBs	General Railway land	Depots / Yards	STW	WSW	Military Standard	Military Standard + inorg + S/VOC	Former Hospital	Agri. Nursery	Potentially infilled Land	BGS Made Ground / Landfill
Metals (dissolved)																											
Arsenic	ICP-OES / MS	<5			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cadmium	ICP-OES / MS	<0.01			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Chromium (trivalent)	ICP-OES / MS	<1			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Chromium, Hexavalent	Skalar CFA	<1			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Chromium (total)		<1																										
Selenium	ICP-OES / MS	<1			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Copper	ICP-OES / MS	<0.1			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Lead	ICP-OES / MS	<1			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mercury	ICP-OES / MS	<0.05			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Nickel	ICP-OES / MS	<1			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Zinc	ICP-OES / MS	<5			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Boron, water soluble	ICP-OES / MS	<10			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Vanadium	ICP-OES / MS	<10																										
Antimony	ICP-OES / MS	1																										
Barium	ICP-OES / MS	500																										
Molybdenum	ICP-OES / MS	10				x															x	x						
Aluminium	ICP-OES / MS	10				x															x	x						
Manganese	ICP-OES / MS	5				x															x	x						x
Iron	ICP-OES / MS	100				x															x	x						x
Inorganics																												
Sulphate	ICP-OES / MS	<10 mg/l			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sulphide	Skalar CFA	<10 mg/l			x	x								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Phosphorous (total and ortho)	TBC by lab	TBC				x															x	x		x				x
Chloride	TBC by lab	<0.15 mg/l			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cyanide, Free	Skalar CFA	<0.1			x	x											x	x			x	x		x			x	x
Cyanide, Total	Skalar CFA	<0.1			x	x											x	x			x	x		x			x	x
Thiocyanate	TBC by lab	TBC				x															x	x					x	x
Ammonia	TBC by lab	<0.01 mg/l			x	x							x	x							x	x				x	x	x
Nitrates, nitrites	TBC by lab	<1 mg/l			x	x							x	x							x	x				x	x	x
Total Nitrogen	TBC by lab	TBC				x								x							x	x				x		x
Ammoniacal Nitrogen	TBC by lab	<0.1				x								x							x	x				x		x
Fluoride	TBC by lab	<1 mg/l			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Dissolved Methane	TBC by lab	TBC																									x	x
pH	Potentiometric	+/- 0.1			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Calcium		<1 mg/l											x															
Magnesium	ICP-OES / MS	<0.5 mg/l											x															
Sodium		<1 mg/l											x															
Potassium		<1 mg/l											x															
Bicarbonate		<10 mg/l											x															
Phenols																												
Total Phenols includes following Phenol, Resorcinol, Methylphenols (Cresols), Dimethylphenols (Xylenols), 1-Napthols, Trimentylphenols.	HPLC	<0.1			x									x	x		x		x		x	x	x		x		x	
Total Speciated Phenols includes the following Phenol, Pentachlorophenol, 2,4,5-Trichlorophenol, 2,4,6 -Trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2-chlorophenol, 2-methylphenol, 2-nitrophenol, 4-chloro-3-methylphenol, 4-methylphenol	GCMS	<0.1				x																				x		

Water and Leachate Suites	Analysis	LOD units			Generic Analysis - For locations not included in Suite 4 or where required									Farms	Fuel filling stations & garages	Electrical substations	Current and former works/industry		Current and historic railway land		Sewage Treatment Works (STW)	Water Supply Works (WSW)	Former military facility		Former hospital	Agricultural nursery building (storage/buildings)	Landfill sites / potentially infilled areas	
		µg/l unless stated	Suite No.	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.10	4.11	4.12	4.13	4.14	4.15
			Suite Name	Soil leachate preparation	Standard	Standard + add. metals + inorganics	TPH CWG	VOCs with TICs	SVOCs with TICs	Pesticides	Herbicides	PFAS (inc PFOS / PFOA)	Hydrogeo Suite	Farms	Fuel filling & Garages	Electrical Substations	Works Standard	Works Standard + S/VOC+PCBs	General Railway land	Depots / Yards	STW	WSW	Military Standard	Military Standard + inorg + S/VOC	Former Hospital	Agri. Nursery	Potentially infilled Land	BGS Made Ground / Landfill
BTEX																												
Benzene	GCMS	<0.1			x	x	x									x	x		x			x	x			x	x	
Toluene	GCMS	<0.1			x	x	x									x	x		x			x	x			x	x	
Ethylbenzene	GCMS	<0.1			x	x	x									x	x		x			x	x			x	x	
o-xylene	GCMS	<0.1			x	x	x									x	x		x			x	x			x	x	
m-xylene	GCMS	<0.1			x	x	x									x	x		x			x	x			x	x	
p-xylene	GCMS	<0.1			x	x	x									x	x		x			x	x			x	x	
Total BTEX	GCMS	<1.0			x	x	x									x	x		x			x	x			x	x	
MTBE	GCMS	<1			x	x	x									x	x		x			x	x			x	x	
PAHs																												
PAH 17 (total and speciated incl coronene)	GCMS	<0.0001			x	x							x	x	x		x	*	x	*	x	x	x	*	x	x	x	*
PCBs																												
PCB 7 Congeners (speciated and total)	GCMS	<0.01				x										x		x		x	x			x	x			x
Petroleum Hydrocarbon																												
TPHCWG	GCMS	<1.0				x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
TPH >C6-C44	GC-FID or GCMS	<10			x								x															
Free product Identification (if found)					o	o								o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
VOCs/Semi-VOCs																												
Volatile Organic Compounds (VOCs) inc TICS	GCMS	<0.001						x						x	x			x		x	x			x	x			x
Semi-volatile Organic Compounds (SVOC) incl TICs	GCMS	<0.001							x									x		x				x				x
Pesticides / Herbicides																												
Pesticides (organochlorine, organophosphate)	GC-MS	<0.001								x				x												x		x
Herbicides (Organonitrogen / triazine herbicides (to include Atrazine) and acid herbicides)	LC-MS	<0.001									x			x					x	x						x		x
Other																												
Conductivity	Potentiometric	<1 µS/cm			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Redox Potential		v																			x							x
Total hardness (as CaCO3)	ICP-OES / MS	1 mg CaCO3/L			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Total dissolved solids (TDS)	Gravimetric	10 mg/l			x	x							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PFAS (to include PFOS and PFOA)	Lab to confirm	<0.001 (total)										x									x			x				x
Pathogens																												
Total coliforms	Lab to confirm	TBC																			x							
E.coli	Lab to confirm	TBC																			x							
Faecal coliforms	Lab to confirm	TBC																			x							
faecal streptococci	Lab to confirm	TBC																			x							
Soil leachate preparation				x																								
Note - Ethylene glycol to be included in VOC TICs analysis.																												

Appendix C: Deviations Reported by the Analytical Laboratory

The Quality Control (QC) associated with the results of the following soil analysis did not wholly meet the QMS requirements, therefore the accreditation has been removed by the analytical lab. However, the laboratory has confidence in the performance of the method as a whole and the integrity of the data has not been significantly compromised:

- 2M6507SA 0.50 m, 3.00 m and 6.50 m: GRO (>C6-C10) Total and pH (2:5:1) exceeded holding times.
- 2M6508SA 1.00 m: 17 PAHs (inc. Coronene) by GCMS, Cyanide (Total and Free), Sulphide, TPH (>C6-C40) Total (Calc), BTEX & MTBE by GCMS exceeded holding time.
- 2M6508SA 1.70 m, 4.97 m water samples: Electrical conductivity, pH, Cyanide (Total and Free), Sulphide, TPH (>C6-C40) Total (Calc), BTEX & MTBE by GCMS exceeded holding time.
- 3M6601HP 1.00 m, pH and GRO (>C6-C10) total deviation present due to exceeded holding time.

A non-standard volume has been used for PAH analysis on the following groundwater samples which has resulted in a raised detection limit.

- 2M6507SA (20 July 2023) and 2M6508SA (20 July 2023)
- 2M6508SA (15 September 2023)

A non-standard volume has been used for PAH and TPH (C_{10}-C_{40}) analysis on the following groundwater samples which has resulted in a raised detection limit.

- 2M6507SA (14 September 2023)

Appendix D: Geo-Environmental Laboratory Analysis Summary Screening Tables

	Screening Criteria	S4UL Reference Page	Sample ID	2M6507SA	2M6507SA	2M6507SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA	3M6517HP	3M6517HP	3M6601HP	3M6601HP
	GAC Land Use	Commercial	Sample Depth	0.5	3.0	6.5	1.0	11.0	3.2	5.0	0.3	1.0	0.2	0.5
	SOM	1.0%	Sample GEOL GEOL	RTD	RTD		ALV	ALV	RTD	WHCK	MGR	Head	TOP	LMBE
Analyte	***Units***		**Lab ID**	#25245059293 30004	#25245059293 30015	#25245059293 30023	G2034-222023040509 2851	G2034-222023040509 3144	G2034-222023040509 3016	G2034-222023040509 3120	G2034-222023050303 1934	G2034-222023050303 2027	#82847355856 80004	#82847355856 80005
Arsenic	mg/kg	640		9.2	8.7	5.8	11.1	1.5	11.8	7	8.6	11.7	5.5	11.8
Cadmium	mg/kg	190		<0.2	<0.2	0.2	0.2	0.8	<0.2	0.9	<0.2	<0.2	0.2	<0.2
Chromium	mg/kg	8600		29.6	20.6	30.5	37	1.4	30.5	7	26.7	38.4	12.3	31.1
Chromium, Hexavalent	mg/kg	33		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg	12000		<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	mg/kg	68000		16.5	16.8	27.5	17.7	2.6	18.5	4.9	12.3	14.5	9.8	19.7
Lead	mg/kg	1100		12.3	7.1	14	13.5	2.2	14.2	4.6	14.9	15.8	15.4	16.1
Elemental Mercury	mg/kg	58 (25.8)												
Mercury	mg/kg	1100		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methylmercury	mg/kg	320												
Nickel	mg/kg	980										20.2		
Zinc	mg/kg	730000		53	36.8	142.8	54.6	17.8	55.9	21.4	46.8	47.4	44.2	58.7
Beryllium	mg/kg	12												
Boron, water soluble	mg/kg	240000		1.5	1.6	2.2	0.7	<0.5	0.9	0.6	1		<0.5	<0.5
Vanadium	mg/kg	9000												
Antimony	mg/kg													
Barium	mg/kg													
Molybdenum	mg/kg													
Manganese	mg/kg													
Inorganics														
Elemental Sulphur	mg/kg													
Sulphate, Total	mg/kg			124	130	142	34	303	125	323	263	80	347	580
Sulphide, Easily liberated	mg/kg											<0.6		
Chloride	mg/kg													
Cyanide, Free	mg/kg													
Cyanide, Total	mg/kg													
Cyanide, Complex	mg/kg													
Thiocyanate	mg/kg													
Ammonia	mg/kg													
% Stones Greater than 10mm	%			<0.1	4.6	<0.1	2.3	<0.1	2	<0.1	3.1	4.3	2.1	4.9
Asbestos	Identifed											NAIIS		
pH	pH			7.4	7.6	8.4	8.8	9.5	8.7	9.1	7.8	7.8	6.8	7.2
Soil Organic Matter	%			0.65	0.35	0.65	0.36	0.58	0.35	0.47	2.07	0.53	1.33	0.99
Phenols														
Phenol	mg/kg	440										<0.11		
Chlorophenols	mg/kg	3500												
Pentachlorophenol	mg/kg	400									<0.10			
Catechol	mg/kg													
Resorcinol	mg/kg													
Cresols	mg/kg											0.16		
Xylenols & Ethylphenols	mg/kg											<0.11		
Naphthols	mg/kg													
Trimethylphenol	mg/kg											<0.11		
2,4-Dimethylphenol	mg/kg													
Total Phenols	mg/kg													
BTEX														
Benzene	mg/kg	27										<0.012		
Toluene	mg/kg	56000 (869)										<0.012		
Ethylbenzene	mg/kg	5700 (518)										<0.012		
o-xylene	mg/kg	6600 (478*)										<0.012		
m-xylene	mg/kg	6200 (625)												
p-xylene	mg/kg	5900 (576*)												
m,p-xylene		#N/A										<0.024		
Total Xylenes (calculated for HWO)	mg/kg	#N/A												
Total BTEX		#N/A										<0.073		
MTBE		#N/A										<0.024		
PAH by GCMS														
Naphthalene	mg/kg	190 (76.4*)										<0.10		
Acenaphthylene	mg/kg	83000 (86.1*)										<0.10		
Acenaphthene	mg/kg	84000 (57*)										<0.10		
Fluorene	mg/kg	63000 (30.9*)										<0.10		
Phenanthrene	mg/kg	22000										<0.10		
Anthracene	mg/kg	520000										<0.10		
Fluoranthene	mg/kg	23000										<0.10		
Pyrene	mg/kg	54000										<0.10		
Benzo(a)anthracene	mg/kg	170										<0.10		
Chrysene	mg/kg	350										<0.10		
Benzo(b)fluoranthene	mg/kg	44										<0.10		
Benzo(k)fluoranthene	mg/kg	1200										0.12		
Benzo(a)pyrene	mg/kg	35										<0.10		
Indeno(1,2,3-cd)pyrene	mg/kg	500										0.12		
Dibenzo(a,h)anthracene	mg/kg	3.5										0.12		
Benzo(g,h,i)perylene	mg/kg	3900										0.21		
Coronene	mg/kg											0.1		
Coal Tar	mg/kg	15												
Polyaromatic hydrocarbons, Total 17	mg/kg											1.83		
Benzo(j)fluoranthene	mg/kg													
Sum of detected PCB 7 Congeners	mg/kg													
Dioxins and similar PCBs (equiv)	mg/kg													
Petroleum Hydrocarbon (1% SOM)														
Aliphatics >C5-C6	mg/kg	3200 (304*)										<0.242		
Aliphatics >C6-C8	mg/kg	7800 (144*)										<0.242		
Aliphatics >C8-C10	mg/kg	2000 (78*)										<0.242		
Aliphatics >C10-C12	mg/kg	9700 (48*)										<4.85		
Aliphatics >C12-C16	mg/kg	59000 (24*)										<4.85		
Aliphatics >C16-C21	mg/kg											<4.85		
Aliphatic EC16 - 35	mg/kg	1600000												
Aliphatics >C21-C35	mg/kg											<12.1		
Aliphatics >C35-C44	mg/kg	1600000										<7.27		
Aromatics >EC5-EC7	mg/kg	26000 (1220*)												
Aromatics >EC7-EC8	mg/kg	56000 (869)										<0.012		
Aromatics >EC8-EC10	mg/kg	3500 (613)										<0.049		
Aromatics >EC10-EC12	mg/kg	16000 (364*)										<4.85		
Aromatics >EC12-EC16	mg/kg	36000 (169*)										<4.85		
Aromatics >EC16-EC21	mg/kg	28000										<4.85		
Aromatics >EC21-EC35	mg/kg	28000										<12.1		
Aromatics >EC35-EC44	mg/kg	28000										<7.27		
Ali&Aro EC44-70	mg/kg	28000												
Petrol Range Organics^	mg/kg													
Diesel Range Organics^	mg/kg													
Sum of C5-C44 Ali/Aro (CWG)	mg/kg	#N/A		0	0	0	0	0	0	0	0	0	0	0
TPH >C10-C40	mg/kg			64.3	<24.8	36.2	47.6	52.4	67.5	60.3	37.2	31.7	49.6	65.8
1,2,4-Trimethylbenzene	mg/kg													
Isopropylbenzene	mg/kg													
Propylbenzene	mg/kg													
Styrene	mg/kg													
TPH MAX Value				64.3	<24.8	36.2	47.6	52.4	67.5	60.3	37.2	31.7	49.6	65.8
Volatile Organic Compounds														

	Screening Criteria	S4UL Reference Page	Sample ID	2M6507SA	2M6507SA	2M6507SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA	3M6517HP	3M6517HP	3M6601HP	3M6601HP
	GAC Land Use	Commercial	Sample Depth	0.5	3.0	6.5	1.0	11.0	3.2	5.0	0.3	1.0	0.2	0.5
	SOM	1.0%	Sample GEOL GEOL	RTD	RTD		ALV	ALV	RTD	WHCK	MGR	Head	TOP	LMBE
Analyte	***Units***		**Lab ID**	#25245059293 30004	#25245059293 30015	#25245059293 30023	G2034-222023040509 2851	G2034-222023040509 3144	G2034-222023040509 3016	G2034-222023040509 3120	G2034-222023050303 1934	G2034-222023050303 2027	#82847355856 80004	#82847355856 80005
Vinyl Chloride	mg/kg	0.059												
1,1-Dichloroethene	mg/kg													
Dichloromethane	mg/kg													
trans-1,2-Dichloroethene	mg/kg													
1,1-Dichloroethane	mg/kg													
2,2-Dichloropropane	mg/kg													
cis-1,2-Dichloroethene	mg/kg													
Bromochloromethane	mg/kg													
Chloroform	mg/kg	99												
1,1,1-Trichloroethane	mg/kg	660												
Carbontetrachloride	mg/kg	2.9												
1,1-Dichloropropene	mg/kg													
1,2-Dichloroethane	mg/kg	0.67												
1,2-Dichloropropane	mg/kg													
Dibromomethane	mg/kg													
Bromodichloromethane	mg/kg													
trans-1,3-Dichloropropene	mg/kg													
cis-1,3-Dichloropropene	mg/kg													
1,1,2-Trichloroethane	mg/kg													
1,3-Dichloropropane	mg/kg													
Dibromochloromethane	mg/kg													
1,2-Dibromoethane	mg/kg													
Chlorobenzene	mg/kg	56												
1,1,2,2-Tetrachloroethane	mg/kg	270												
1,1,1,2-Tetrachloroethane	mg/kg	110												
Trichloroethene	mg/kg	1.2												
Tetrachloroethene	mg/kg	19												
2,4,6 Trinitrotoluene (TNT)	mg/kg	1000												
HMX	mg/kg	110000												
RDX	mg/kg	210000												
1,2,3,4-Tetrachlorobenzene (TeCB)	mg/kg	1700 (122)									<0.0012			
1,2,3,5-Tetrachlorobenzene (TeCB)	mg/kg	49 (39.4)												
1,2,4,5-Tetrachlorobenzene	mg/kg	42 (39.7*)												
Pentachlorobenzene (PeCB)	mg/kg	640 (43*)									<0.0012			
Carbon Disulphide	mg/kg	11												
Hexachlorobutadiene	mg/kg	31												
2,4-Dinitrotoluene	mg/kg													
2,6-Dinitrotoluene	mg/kg													
2-Chloronaphthalene	mg/kg													
Biphenyl	mg/kg													
Bromobenzene	mg/kg													
Bromoform	mg/kg													
Chloroethane	mg/kg													
Chloromethane	mg/kg													
bis(2-Ethylhexyl) phthalate	mg/kg													
Butylbenzyl phthalate	mg/kg													
Diethyl phthalate	mg/kg													
n-Dibutyl phthalate	mg/kg													
n-Dioctyl phthalate	mg/kg													
Herbicides/Insecticides														
Aldrin	mg/kg	170									<0.0024			
Dieldrin	mg/kg	170									<0.006			
Atrazine	mg/kg	9300									<0.0024			
Dichlorvos (DDVP)	mg/kg	140									<0.0024			
Alpha-Endosulfan	mg/kg	5600 (0.003)									<0.0012			
Beta-Endosulfan	mg/kg	6300 (0.00007)									<0.012			
Alpha-Hexachlorocyclohexanes	mg/kg	170									<0.0024			
Beta-Hexachlorocyclohexanes	mg/kg	65									<0.0024			
Gamma-Hexachlorocyclohexanes	mg/kg	67									<0.0012			
1,2-Dichlorobenzene	mg/kg	2000 (571*)												
1,3-Dichlorobenzene	mg/kg	30												
1,4-Dichlorobenzene	mg/kg	4400 (224)												
1,2,3-Trichlorobenzene	mg/kg	102									<0.0012			
1,2,4-Trichlorobenzene	mg/kg	220												
1,3,5-Trichlorobenzene	mg/kg	23									<0.0012			
Hexachlorobenzene	mg/kg	110 (0.2)									<0.0024			
Hexachloroethane	mg/kg													
Total CFC (for Haz)	mg/kg													
Moisture.														
Moisture Content Ratio (% of as received sample)	%			16.2	19.2	27.1	18.5	20.4	18.2	19.2	16.6	17.5	16.7	25.9
PFOA/PFOS														
PFOA	mg/kg	0.6												
PFOS	mg/kg	0.6												
PFHxS	mg/kg	0.6												
PFNA	mg/kg	0.6												
Hazard Quotient	%	1												

				LOC ID	2M6508SA
				DEPTH	1.00
				GEOL	ALV
			Assessment Criteria	LAB ID	G2034-222023040509285 1
Analyte	Units	LOD	Human Consumption	LAB RECEIVED DATE	12/04/2023
Alkalinity as CaCO3	µg/l		-		
Arsenic	µg/l	1	10		<1.0
Boron	µg/l	10	1000		<10.0
Cadmium	µg/l	0.02	5		0.1
Chromium (Total)	µg/l	1	50		<1.0
Chromium Trivalent	µg/l	3	-		<3.0
Chromium Hexavalant	µg/l	3	-		<3.0
Copper	µg/l	1	2000		3
Iron	µg/l		200		
Lead	µg/l	1	10		<1.0
Mercury	µg/l	0.03	1		<0.03
Manganese	µg/l		50		
Fluoride	µg/l	1	1500		500
Nickel	µg/l	1	20		<1.0
Selenium	µg/l	1	10		<1.0
Zinc	µg/l	2	5000		2
Total Ammonia (N)	µg/l	20	-		41.2
Ammoniacal Nitrogen as N	µg/l	20	-		
Ammoniacal Nitrogen as NH3	µg/l	20	-		50
Ammonium (NH4)	µg/l	20	500		52.9
Chloride	µg/l	1000	250000		<1000.0
Chlorine	µg/l		-		
Cyanide	µg/l	20	50		<20.0
Nitrate as NO3	µg/l	900	50000		2600
Nitrite as NO2	µg/l	40	500		<40.0
Phenol	µg/l		0.5		
Pentachlorophenol	µg/l	0.04	-		
PCBs	µg/l		-		
Sodium	µg/l		200000		
Sulphate	µg/l	3000	250000		<3000.0
pH	pH Units	1	-		7.9
Dichloromethane	µg/l		-		
1,2 Dichloroethane	µg/l		3		
Trichloroethene (PCE)	µg/l		10		
1,1,1 Trichloroethane	µg/l		-		
1,1,2 Trichloroethane	µg/l		-		
Trichloromethane (Chloroform)	µg/l		100		
1,2,3 Trichlorobenzene	µg/l	0.01	-		
1,2,4 Trichlorobenzene	µg/l		-		
Trichlorobenzene (1,2,3 & 1,2,4)	µg/l		-		
Tetrachloroethene	µg/l		10		
Tetrachloromethane	µg/l		3		
1,1,1,2 Tetrachloroethane	µg/l		-		
Vinyl Chloride (Chloroethene)	µg/l		0.5		
>C5 to C6 Aliphatic	µg/l	100	10		
>C6 to C8 Aliphatic	µg/l	100	10		
>C8 to C10 Aliphatic	µg/l	100	10		
>C10 to C12 Aliphatic	µg/l	10	10		
>C12 to C16 Aliphatic	µg/l	10	10		
>C16 to C21 Aliphatic	µg/l	10	10		
>C21 to C35 Aliphatic	µg/l	10	10		
>C35 to C44 Aliphatic	µg/l	10	10		
Total Aliphatic C5-35	µg/l	340	-		
>C5 to C7 Aromatic	µg/l	5	10		
>C7 to C8 Aromatic	µg/l	5	10		
>C8 to C10 Aromatic	µg/l	20	10		
>C10 to C12 Aromatic	µg/l	10	10		
>C12 to C16 Aromatic	µg/l	10	10		
>C16 to C21 Aromatic	µg/l	10	10		
>C21 to C35 Aromatic	µg/l	10	10		
>C35 to C44 Aromatic	µg/l	10	10		
Total Aromatic C5-C35	µg/l	70	-		

				LOC ID	2M6508SA
				DEPTH	1.00
				GEOL	ALV
			Assessment Criteria	LAB ID	G2034-222023040509285 1
Analyte	Units	LOD	Human Consumption	LAB RECEIVED DATE	12/04/2023
TPH Ali/Aro	µg/l	410	10		<176.0 (TPH >C6-40)
Benzene	µg/l	1	1		<1
Ethylbenzene	µg/l	0.5	300		<0.5
Toluene	µg/l	1	700		<1
Xylene	µg/l		500		
M- & P-Xylene	µg/l	1	-		<1
O-Xylene	µg/l	1	-		<1
Total Xylene (M, P & O)	µg/l	2	-		
MTBE	µg/l	1	15		<1
naphthalene	µg/l	0.01	-		0.11
acenaphthylene	µg/l	0.01	-		<0.02
acenaphthene	µg/l	0.01	-		0.03
fluorene	µg/l	0.01	-		<0.02
phenanthrene	µg/l	0.01	-		<0.02
anthracene	µg/l	0.01	-		<0.02
fluoranthene	µg/l	0.01	-		<0.02
pyrene	µg/l	0.01	-		<0.02
benzo(a)anthracene	µg/l	0.01	-		<0.02
chrysene	µg/l	0.01	-		<0.02
benzo(b)fluoranthene	µg/l	0.01	0.1		<0.02
benzo(k)fluoranthene	µg/l	0.01	0.1		<0.02
benzo(a)pyrene	µg/l	0.01	0.01		<0.02
benzo(g,h,i)perylene	µg/l	0.01	0.1		<0.02
dibenzo(ah)anthracene	µg/l	0.01	-		<0.02
indeno(1,2,3-c,d)pyrene	µg/l	0.01	0.1		<0.02
Sum (benzo b, k, ghi & indeno123cd)	µg/l	0.04	0.1		
Total PAH	µg/l	0.16	-		0.36

				LOC ID	2M6508SA
				DEPTH	1.00
				GEOL	ALV
			Assessment Criteria	LAB ID	G2034-222023040509285 1
Analyte	Units	LOD	Fresh Water	LAB RECEIVED DATE	12/04/2023
Alkalinity as CaCO3	µg/l		-		
Arsenic	µg/l	1	50		<1.0
Boron	µg/l	10	-		<10.0
Cadmium	µg/l	0.02	0.08		0.1
Chromium (Total)	µg/l	1	-		<1.0
Chromium Trivalent	µg/l	3	4.7		<3.0
Chromium Hexavalant	µg/l	3	3.4		<3.0
Copper	µg/l	1	1		3
Iron	µg/l		1000		
Lead	µg/l	1	1.2		<1.0
Mercury	µg/l	0.03	0.07		<0.03
Manganese	µg/l		123		
Fluoride	µg/l	1	-		500
Nickel	µg/l	1	4		<1.0
Selenium	µg/l	1	-		<1.0
Zinc	µg/l	2	10.9		2
Total Ammonia (N)	µg/l	20	200		41.2
Ammoniacal Nitrogen as N	µg/l	20	-		
Ammoniacal Nitrogen as NH3	µg/l	20	-		50
Ammonium (NH4)	µg/l	20	-		52.9
Chloride	µg/l	1000	-		<1000.0
Chlorine	µg/l		2		
Cyanide	µg/l	20	1		<20.0
Nitrate as NO3	µg/l	900	-		2600
Nitrite as NO2	µg/l	40	-		<40.0
Phenol	µg/l		7.7		
Pentachlorophenol	µg/l	0.04	0.4		
PCBs	µg/l		-		
Sodium	µg/l		-		
Sulphate	µg/l	3000	-		<3000.0
pH	pH Units	1	-		7.9
Dichloromethane	µg/l		-		
1,2 Dichloroethane	µg/l		10		
Trichloroethene (PCE)	µg/l		10		
1,1,1 Trichloroethane	µg/l		-		
1,1,2 Trichloroethane	µg/l		-		
Trichloromethane (Chloroform)	µg/l		2.5		
1,2,3 Trichlorobenzene	µg/l	0.01	-		
1,2,4 Trichlorobenzene	µg/l		-		
Trichlorobenzene (1,2,3 & 1,2,4)	µg/l		0.4		
Tetrachloroethene	µg/l		10		
Tetrachloromethane	µg/l		12		
1,1,1,2 Tetrachloroethane	µg/l		140		
Vinyl Chloride (Chloroethene)	µg/l		-		
>C5 to C6 Aliphatic	µg/l	100	-		
>C6 to C8 Aliphatic	µg/l	100	-		
>C8 to C10 Aliphatic	µg/l	100	-		
>C10 to C12 Aliphatic	µg/l	10	-		
>C12 to C16 Aliphatic	µg/l	10	-		
>C16 to C21 Aliphatic	µg/l	10	-		
>C21 to C35 Aliphatic	µg/l	10	-		
>C35 to C44 Aliphatic	µg/l	10	-		
Total Aliphatic C5-35	µg/l	340	-		
>C5 to C7 Aromatic	µg/l	5	-		
>C7 to C8 Aromatic	µg/l	5	-		
>C8 to C10 Aromatic	µg/l	20	-		
>C10 to C12 Aromatic	µg/l	10	-		
>C12 to C16 Aromatic	µg/l	10	-		
>C16 to C21 Aromatic	µg/l	10	-		
>C21 to C35 Aromatic	µg/l	10	-		
>C35 to C44 Aromatic	µg/l	10	-		
Total Aromatic C5-C35	µg/l	70	-		

				LOC ID	2M6508SA
				DEPTH	1.00
				GEOL	ALV
			Assessment Criteria	LAB ID	G2034-222023040509285 1
Analyte	Units	LOD	Fresh Water	LAB RECEIVED DATE	12/04/2023
TPH Ali/Aro	µg/l	410	-		<176.0 (TPH >C6-40)
Benzene	µg/l	1	10		<1
Ethylbenzene	µg/l	0.5	-		<0.5
Toluene	µg/l	1	74		<1
Xylene	µg/l		30		
M- & P-Xylene	µg/l	1	-		<1
O-Xylene	µg/l	1	-		<1
Total Xylene (M, P & O)	µg/l	2	-		
MTBE	µg/l	1	-		<1
naphthalene	µg/l	0.01	2		0.11
acenaphthylene	µg/l	0.01	-		<0.02
acenaphthene	µg/l	0.01	-		0.03
fluorene	µg/l	0.01	-		<0.02
phenanthrene	µg/l	0.01	-		<0.02
anthracene	µg/l	0.01	0.1		<0.02
fluoranthene	µg/l	0.01	0.0063		<0.02
pyrene	µg/l	0.01	-		<0.02
benzo(a)anthracene	µg/l	0.01	-		<0.02
chrysene	µg/l	0.01	-		<0.02
benzo(b)fluoranthene	µg/l	0.01	0.017		<0.02
benzo(k)fluoranthene	µg/l	0.01	0.017		<0.02
benzo(a)pyrene	µg/l	0.01	0.00017		<0.02
benzo(g,h,i)perylene	µg/l	0.01	0.0082		<0.02
dibenzo(ah)anthracene	µg/l	0.01	-		<0.02
indeno(1,2,3-c,d)pyrene	µg/l	0.01	-		<0.02
Sum (benzo b, k, ghi & indeno123cd)	µg/l	0.04	-		
Total PAH	µg/l	0.16	-		0.36

				LOC ID	2M6507SA	2M6507SA	2M6507SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA
				DEPTH	3.70	5.93	8.22	1.70	1.73	10.00	3.42	4.97
				GEOL	RTD			ALV	ALV	ALV	RTD	WHCK
			Assessment Criteria	LAB ID			2M6507SAW200723103903	G2034-222023040509 2925			2M6508SAW200723103946	G2034-222023040509 3046
Analyte	Units	LOD	Human Consumption	LAB RECEIVED DATE	19/09/2023	12/01/2024	22/07/2023	07/04/2023	12/01/2024	19/09/2023	22/07/2023	07/04/2023
Alkalinity as CaCO3	µg/l		-									
Arsenic	µg/l	1	10		3	2	1	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/l	10	1000		360	240	260	10	<10.0	30	20	20
Cadmium	µg/l	0.02	5		0.07	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02
Chromium (Total)	µg/l	1	50		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium Trivalent	µg/l	3	-		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Chromium Hexavalant	µg/l	3	-		<3.0	5	6	<3.0	<3.0	<3.0	<3.0	<3.0
Copper	µg/l	1	2000		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Iron	µg/l		200									
Lead	µg/l	1	10		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Mercury	µg/l	0.03	1		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.04	<0.03
Manganese	µg/l		50									
Fluoride	µg/l	1	1500		400	800	700	200	100	100	100	100
Nickel	µg/l	1	20		3	3	4	<1.0	<1.0	2	2	3
Selenium	µg/l	1	10		<1.0	<1.0	<1.0	2	<1.0	<1.0	<1.0	<1.0
Zinc	µg/l	2	5000		6	20	7	7	9	12	17	24
Total Ammonia (N)	µg/l	20	-		41.2	49.4	16.5	<16.5	32.9	41.2	<16.5	16.5
Ammoniacal Nitrogen as N	µg/l	20	-									
Ammoniacal Nitrogen as NH3	µg/l	20	-		50	60	20	<20.0	40	50	<20.0	20
Ammonium (NH4)	µg/l	20	500		52.9	63.5	21.2	<21.2	42.4	52.9	<21.2	21.2
Chloride	µg/l	1000	250000		59000	28000	33000	<1000.0	21000	24000	22000	9000
Chlorine	µg/l		-									
Cyanide	µg/l	20	50		<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Nitrate as NO3	µg/l	900	50000		1000	<900.0	<900.0	<900.0	27300	29700	28700	2200
Nitrite as NO2	µg/l	40	500		<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	380
Phenol	µg/l		0.5									
Pentachlorophenol	µg/l	0.04	-									
PCBs	µg/l		-									
Sodium	µg/l		200000		109000	97000	69000		11000	12000	13000	
Sulphate	µg/l	3000	250000		57000	161000	164000	<3000.0	19000	17000	20000	24000
pH	pH Units	1	-		7.3	7.5	7.5	7.3	7.3	7.2	7.3	7.3
Dichloromethane	µg/l		-									
1,2 Dichloroethane	µg/l		3									
Trichloroethene (PCE)	µg/l		10									
1,1,1 Trichloroethane	µg/l		-									
1,1,2 Trichloroethane	µg/l		-									
Trichloromethane (Chloroform)	µg/l		100									
1,2,3 Trichlorobenzene	µg/l	0.01	-									
1,2,4 Trichlorobenzene	µg/l		-									
Trichlorobenzene (1,2,3 & 1,2,4)	µg/l		-									
Tetrachloroethene	µg/l		10									
Tetrachloromethane	µg/l		3									
1,1,1,2 Tetrachloroethane	µg/l		-									
Vinyl Chloride (Chloroethene)	µg/l		0.5									
>C5 to C6 Aliphatic	µg/l	100	10									
>C6 to C8 Aliphatic	µg/l	100	10									
>C8 to C10 Aliphatic	µg/l	100	10									
>C10 to C12 Aliphatic	µg/l	10	10									
>C12 to C16 Aliphatic	µg/l	10	10									
>C16 to C21 Aliphatic	µg/l	10	10									
>C21 to C35 Aliphatic	µg/l	10	10									
>C35 to C44 Aliphatic	µg/l	10	10									
Total Aliphatic C5-35	µg/l	340	-									
>C5 to C7 Aromatic	µg/l	5	10									
>C7 to C8 Aromatic	µg/l	5	10									
>C8 to C10 Aromatic	µg/l	20	10									
>C10 to C12 Aromatic	µg/l	10	10									
>C12 to C16 Aromatic	µg/l	10	10									
>C16 to C21 Aromatic	µg/l	10	10									
>C21 to C35 Aromatic	µg/l	10	10									
>C35 to C44 Aromatic	µg/l	10	10									
Total Aromatic C5-C35	µg/l	70	-									
TPH Ali/Aro	µg/l	410	10		<100.0 (GRO >C6-10) , <400.0 (EPH >C10-40) , <4400.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , 30.0 (EPH >C10-40) , 130.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , 140.0 (EPH >C10-40) , <1100.0 (TPH >C6-40)	<110.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , <10.0 (EPH >C10-40) , <110.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , 70.0 (EPH >C10-40) , <440.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , <10.0 (EPH >C10-40) , <110.0 (TPH >C6-40)	130.0 (TPH >C6-40)
Benzene	µg/l	1	1		<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/l	0.5	300		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/l	1	700		<1	<1	<1	<1	<1	<1	<1	<1
Xylene	µg/l		500									
M- & P-Xylene	µg/l	1	-		<1	<1	<1	<1	<1	<1	<1	<1
O-Xylene	µg/l	1	-		<1	<1	<1	<1	<1	<1	<1	<1
Total Xylene (M, P & O)	µg/l	2	-									
MTBE	µg/l	1	15		<1	<1	<1	<1	<1	<1	<1	<1
naphthalene	µg/l	0.01	-		<0.40	0.04	<0.10	0.08	0.13	<0.04	<0.20	<0.01
acenaphthylene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
acenaphthene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
fluorene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
phenanthrene	µg/l	0.01	-		<0.40	<0.01	<0.10	0.06	<0.01	<0.04	<0.20	<0.01
anthracene	µg/l	0.01	-		0.8	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
fluoranthene	µg/l	0.01	-		<0.40	<0.01	<0.10	0.02	<0.01	<0.04	<0.20	<0.01
pyrene	µg/l	0.01	-		<0.40	<0.01	<0.10	0.11	<0.01	<0.04	<0.20	<0.01
benzo(a)anthracene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
chrysene	µg/l	0.01	-		<0.40	<0.01	<0.10	0.04	<0.01	<0.04	<0.20	<0.01
benzo(b)fluoranthene	µg/l	0.01	0.1		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
benzo(k)fluoranthene	µg/l	0.01	0.1		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
benzo(a)pyrene	µg/l	0.01	0.01		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
benzo(g,h,i)perylene	µg/l	0.01	0.1		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
dibenzo(ah)anthracene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
indeno(1,2,3-c,d)pyrene	µg/l	0.01	0.1		<0.40	<0.01	<0.10	0.02	<0.01	<0.04	<0.20	<0.01

				LOC ID	2M6507SA	2M6507SA	2M6507SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA
				DEPTH	3.70	5.93	8.22	1.70	1.73	10.00	3.42	4.97
				GEOL	RTD			ALV	ALV	ALV	RTD	WHCK
			Assessment Criteria	LAB ID			2M6507SAW200723103903	G2034-222023040509 2925			2M6508SAW200723103946	G2034-222023040509 3046
Analyte	Units	LOD	Human Consumption	LAB RECEIVED DATE	19/09/2023	12/01/2024	22/07/2023	07/04/2023	12/01/2024	19/09/2023	22/07/2023	07/04/2023
Sum (benzo b, k, ghi & indeno123cd)	µg/l	0.04	0.1									
Total PAH	µg/l	0.16	-		6.8	0.19	<1.60	0.44	0.28	<0.64	<3.20	<0.16
PFOS	µg/l	0.01	0.1									
PFOA	µg/l	0.01	0.1									

				LOC ID	2M6507SA	2M6507SA	2M6507SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA
				DEPTH	3.70	5.93	8.22	1.70	1.73	10.00	3.42	4.97
				GEOL	RTD			ALV	ALV	ALV	RTD	WHCK
			Assessment Criteria	LAB ID			2M6507SAW200723103903	G2034-222023040509 2925			2M6508SAW200723103946	G2034-222023040509 3046
Analyte	Units	LOD	Fresh Water	LAB RECEIVED DATE	19/09/2023	12/01/2024	22/07/2023	07/04/2023	12/01/2024	19/09/2023	22/07/2023	07/04/2023
Alkalinity as CaCO3	µg/l		-									
Arsenic	µg/l	1	50		3	2	1	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/l	10	-		360	240	260	10	<10.0	30	20	20
Cadmium	µg/l	0.02	0.08		0.07	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02
Chromium (Total)	µg/l	1	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium Trivalent	µg/l	3	4.7		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Chromium Hexavalant	µg/l	3	3.4		<3.0	5	6	<3.0	<3.0	<3.0	<3.0	<3.0
Copper	µg/l	1	1		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Iron	µg/l		1000									
Lead	µg/l	1	1.2		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Mercury	µg/l	0.03	0.07		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.04	<0.03
Manganese	µg/l		123									
Fluoride	µg/l	1	-		400	800	700	200	100	100	100	100
Nickel	µg/l	1	4		3	3	4	<1.0	<1.0	2	2	3
Selenium	µg/l	1	-		<1.0	<1.0	<1.0	2	<1.0	<1.0	<1.0	<1.0
Zinc	µg/l	2	10.9		6	20	7	7	9	12	17	24
Total Ammonia (N)	µg/l	20	200		41.2	49.4	16.5	<16.5	32.9	41.2	<16.5	16.5
Ammoniacal Nitrogen as N	µg/l	20	-									
Ammoniacal Nitrogen as NH3	µg/l	20	-		50	60	20	<20.0	40	50	<20.0	20
Ammonium (NH4)	µg/l	20	-		52.9	63.5	21.2	<21.2	42.4	52.9	<21.2	21.2
Chloride	µg/l	1000	-		59000	28000	33000	<1000.0	21000	24000	22000	9000
Chlorine	µg/l		2									
Cyanide	µg/l	20	1		<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Nitrate as NO3	µg/l	900	-		1000	<900.0	<900.0	<900.0	27300	29700	28700	2200
Nitrite as NO2	µg/l	40	-		<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	380
Phenol	µg/l		7.7									
Pentachlorophenol	µg/l	0.04	0.4									
PCBs	µg/l		-									
Sodium	µg/l		-		109000	97000	69000		11000	12000	13000	
Sulphate	µg/l	3000	-		57000	161000	164000	<3000.0	19000	17000	20000	24000
pH	pH Units	1	-		7.3	7.5	7.5	7.3	7.3	7.2	7.3	7.3
Dichloromethane	µg/l		-									
1,2 Dichloroethane	µg/l		10									
Trichloroethene (PCE)	µg/l		10									
1,1,1 Trichloroethane	µg/l		-									
1,1,2 Trichloroethane	µg/l		-									
Trichloromethane (Chloroform)	µg/l		2.5									
1,2,3 Trichlorobenzene	µg/l	0.01	-									
1,2,4 Trichlorobenzene	µg/l		-									
Trichlorobenzene (1,2,3 & 1,2,4)	µg/l		0.4									
Tetrachloroethene	µg/l		10									
Tetrachloromethane	µg/l		12									
1,1,1,2 Tetrachloroethane	µg/l		140									
Vinyl Chloride (Chloroethene)	µg/l		-									
>C5 to C6 Aliphatic	µg/l	100	-									
>C6 to C8 Aliphatic	µg/l	100	-									
>C8 to C10 Aliphatic	µg/l	100	-									
>C10 to C12 Aliphatic	µg/l	10	-									
>C12 to C16 Aliphatic	µg/l	10	-									
>C16 to C21 Aliphatic	µg/l	10	-									
>C21 to C35 Aliphatic	µg/l	10	-									
>C35 to C44 Aliphatic	µg/l	10	-									
Total Aliphatic C5-35	µg/l	340	-									
>C5 to C7 Aromatic	µg/l	5	-									
>C7 to C8 Aromatic	µg/l	5	-									
>C8 to C10 Aromatic	µg/l	20	-									
>C10 to C12 Aromatic	µg/l	10	-									
>C12 to C16 Aromatic	µg/l	10	-									
>C16 to C21 Aromatic	µg/l	10	-									
>C21 to C35 Aromatic	µg/l	10	-									
>C35 to C44 Aromatic	µg/l	10	-									
Total Aromatic C5-C35	µg/l	70	-									
TPH Ali/Aro	µg/l	410	-		<100.0 (GRO >C6-10) , <400.0 (EPH >C10-40) , <4400.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , 30.0 (EPH >C10-40) , 130.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , 140.0 (EPH >C10-40) , <1100.0 (TPH >C6-40)	<110.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , <10.0 (EPH >C10-40) , <110.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , 70.0 (EPH >C10-40) , <440.0 (TPH >C6-40)	<100.0 (GRO >C6-10) , <10.0 (EPH >C10-40) , <110.0 (TPH >C6-40)	130.0 (TPH >C6-40)
Benzene	µg/l	1	10		<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/l	0.5	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/l	1	74		<1	<1	<1	<1	<1	<1	<1	<1
Xylene	µg/l		30									
M- & P-Xylene	µg/l	1	-		<1	<1	<1	<1	<1	<1	<1	<1
O-Xylene	µg/l	1	-		<1	<1	<1	<1	<1	<1	<1	<1
Total Xylene (M, P & O)	µg/l	2	-									
MTBE	µg/l	1	-		<1	<1	<1	<1	<1	<1	<1	<1
naphthalene	µg/l	0.01	2		<0.40	0.04	<0.10	0.08	0.13	<0.04	<0.20	<0.01
acenaphthylene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
acenaphthene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
fluorene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
phenanthrene	µg/l	0.01	-		<0.40	<0.01	<0.10	0.06	<0.01	<0.04	<0.20	<0.01
anthracene	µg/l	0.01	0.1		0.8	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
fluoranthene	µg/l	0.01	0.0063		<0.40	<0.01	<0.10	0.02	<0.01	<0.04	<0.20	<0.01
pyrene	µg/l	0.01	-		<0.40	<0.01	<0.10	0.11	<0.01	<0.04	<0.20	<0.01
benzo(a)anthracene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
chrysene	µg/l	0.01	-		<0.40	<0.01	<0.10	0.04	<0.01	<0.04	<0.20	<0.01
benzo(b)fluoranthene	µg/l	0.01	0.017		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
benzo(k)fluoranthene	µg/l	0.01	0.017		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
benzo(a)pyrene	µg/l	0.01	0.00017		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
benzo(g,h,i)perylene	µg/l	0.01	0.0082		<0.40	<0.01	<0.10	0.02	<0.01	<0.04	<0.20	<0.01
dibenzo(ah)anthracene	µg/l	0.01	-		<0.40	<0.01	<0.10	<0.01	<0.01	<0.04	<0.20	<0.01
indeno(1,2,3-c,d)pyrene	µg/l	0.01	-		<0.40	<0.01	<0.10	0.02	<0.01	<0.04	<0.20	<0.01

Groundwater Results highlighting Exceedances above Generic Assessment Criteria

				LOC ID	2M6507SA	2M6507SA	2M6507SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA	2M6508SA
				DEPTH	3.70	5.93	8.22	1.70	1.73	10.00	3.42	4.97
				GEOL	RTD			ALV	ALV	ALV	RTD	WHCK
			Assessment Criteria	LAB ID			2M6507SAW200723103903	G2034-222023040509 2925			2M6508SAW200723103946	G2034-222023040509 3046
Analyte	Units	LOD	Fresh Water	LAB RECEIVED DATE	19/09/2023	12/01/2024	22/07/2023	07/04/2023	12/01/2024	19/09/2023	22/07/2023	07/04/2023
Sum (benzo b, k, ghi & indeno123cd)	µg/l	0.04	-									
Total PAH	µg/l	0.16	-		6.8	0.19	<1.60	0.44	0.28	<0.64	<3.20	<0.16
PFOS	µg/l	0.01	-									
PFOA	µg/l	0.01	-									

Appendix E: HazWasteOnline™ Reports

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

5TIWE-DPJCW-634HJ

Job name

Hampshire Water Transfer and Water Recycling Project (HWTWRP)[6]

Description/Comments

Waste classification of soils to be excavated for proposed pipeline. Borehole 2M6507SA and 2M6508SA located in agricultural land.

Project

Phase 2 GIR

Site

Section M

Classified by

Name:
Akansha Patel
Date:
14 Feb 2024 10:27 GMT
Telephone:
07722598325

Company:
Stantec UK Ltd
The Stills, 1st Floor
80 Turnmill Street
LONDON
EC1M5QU

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	09 Feb 2023

Next 3 year Refresher due by Feb 2026

Purpose of classification

2 - Material Characterisation

Address of the waste

Greenacres Drive, Otterbourne, Winchester, Hampshire, England, SO21 **Post Code** N/A

SIC for the process giving rise to the waste

80300 Investigation activities

Description of industry/producer giving rise to the waste

Water Industry

Description of the specific process, sub-process and/or activity that created the waste

Waste arising from ground investigation

Description of the waste

2M6507SA (0.50m and 3.00m)- River Terrace Deposits
2M6507SA (6.5M)- Lambeth Group- Clay
2M6508SA (1.00m)- Alluvium
2M6508SA (3.2m)- River Terrace Deposits
2M6508SA (5.00m and 11.00m)- White Chalk Gravel

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	2M6507SA	0.50	Non Hazardous		3
2	2M6507SA[2]	3.00	Non Hazardous		5
3	2M6507SA[3]	6.50	Non Hazardous		7
4	2M6508SA	1.00	Non Hazardous		9
5	2M6508SA[2]	3.20	Non Hazardous		11
6	2M6508SA[3]	5.00	Non Hazardous		13
7	2M6508SA[4]	11.00	Non Hazardous		15

Related documents

#	Name	Description
1	GAC Tool Template v4	waste stream template used to create this Job

Report

Created by: Akansha Patel

Created date: 14 Feb 2024 10:27 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	17
Appendix B: Rationale for selection of metal species	17
Appendix C: Version	18

Classification of sample: 2M6507SA

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:	
2M6507SA	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.50 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.2 mg/kg	1.32	12.147 mg/kg	0.00121 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2 mg/kg	1.142	<0.228 mg/kg	<0.0000228 %		<**LOD**
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		29.6 mg/kg	1.462	43.262 mg/kg	0.00433 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1 mg/kg	1.923	<0.192 mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		16.5 mg/kg	1.126	18.577 mg/kg	0.00186 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	12.3 mg/kg	1.56	19.186 mg/kg	0.00123 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5 mg/kg	1.353	<0.677 mg/kg	<0.0000677 %		<**LOD**
9	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		53 mg/kg	2.774	147.03 mg/kg	0.0147 %		
10	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		1.5 mg/kg	3.22	4.83 mg/kg	0.000483 %		
11	pH			PH		7.4 pH		7.4 pH	7.4 pH		
12	TPH (C6 to C40) petroleum group			TPH		64.3 mg/kg		64.3 mg/kg	0.00643 %		
								Total:	0.0304 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present. Hazardous limit used represents less than 1% of the waste.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00643%)

Classification of sample: 2M6507SA[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:	
2M6507SA[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
3.00 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		8.7	mg/kg	1.32	11.487	mg/kg	0.00115 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<**LOD**
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		20.6	mg/kg	1.462	30.108	mg/kg	0.00301 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1	mg/kg	1.923	<0.192	mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5	mg/kg	1.405	<0.703	mg/kg	<0.0000703 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		16.8	mg/kg	1.126	18.915	mg/kg	0.00189 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	7.1	mg/kg	1.56	11.075	mg/kg	0.00071 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<**LOD**
9	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		36.8	mg/kg	2.774	102.089	mg/kg	0.0102 %		
10	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		1.6	mg/kg	3.22	5.152	mg/kg	0.000515 %		
11	pH			PH		7.6	pH		7.6	pH	7.6 pH		
12	TPH (C6 to C40) petroleum group			TPH		<24.8	mg/kg		<24.8	mg/kg	<0.00248 %		<**LOD**
										Total:	0.0201 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: 2M6507SA[3]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
2M6507SA[3]
Sample Depth:
6.50 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.8	mg/kg	1.32	7.658	mg/kg	0.000766 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.2	mg/kg	1.142	0.228	mg/kg	0.0000228 %		
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		30.5	mg/kg	1.462	44.577	mg/kg	0.00446 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1	mg/kg	1.923	<0.192	mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.9	mg/kg	1.405	1.265	mg/kg	0.000126 %		
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		27.5	mg/kg	1.126	30.962	mg/kg	0.0031 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	14	mg/kg	1.56	21.837	mg/kg	0.0014 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<**LOD**
9	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		142.8	mg/kg	2.774	396.148	mg/kg	0.0396 %		
10	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		2.2	mg/kg	3.22	7.084	mg/kg	0.000708 %		
11	pH			PH		8.4	pH		8.4	pH	8.4 pH		
12	TPH (C6 to C40) petroleum group			TPH		36.2	mg/kg		36.2	mg/kg	0.00362 %		
										Total:	0.0539 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present. Hazardous limit used represents less than 1% of the waste.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00362%)

Classification of sample: 2M6508SA

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:	
2M6508SA	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
1.00 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11.1 mg/kg	1.32	14.656 mg/kg	0.00147 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.2 mg/kg	1.142	0.228 mg/kg	0.0000228 %		
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		37 mg/kg	1.462	54.078 mg/kg	0.00541 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1 mg/kg	1.923	<0.192 mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		17.7 mg/kg	1.126	19.928 mg/kg	0.00199 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	13.5 mg/kg	1.56	21.058 mg/kg	0.00135 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5 mg/kg	1.353	<0.677 mg/kg	<0.0000677 %		<**LOD**
9	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		54.6 mg/kg	2.774	151.468 mg/kg	0.0151 %		
10	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		0.7 mg/kg	3.22	2.254 mg/kg	0.000225 %		
11	pH			PH		8.8 pH		8.8 pH	8.8 pH		
12	TPH (C6 to C40) petroleum group			TPH		47.6 mg/kg		47.6 mg/kg	0.00476 %		
								Total:	0.0305 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present. Hazardous limit used represents less than 1% of the waste.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00476%)

Classification of sample: 2M6508SA[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:	
2M6508SA[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
3.20 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11.8	mg/kg	1.32	15.58	mg/kg	0.00156 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<**LOD**
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		30.5	mg/kg	1.462	44.577	mg/kg	0.00446 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1	mg/kg	1.923	<0.192	mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5	mg/kg	1.405	<0.703	mg/kg	<0.0000703 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		18.5	mg/kg	1.126	20.829	mg/kg	0.00208 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	14.2	mg/kg	1.56	22.149	mg/kg	0.00142 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<**LOD**
9	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		55.9	mg/kg	2.774	155.075	mg/kg	0.0155 %		
10	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		0.9	mg/kg	3.22	2.898	mg/kg	0.00029 %		
11	pH			PH		8.7	pH		8.7	pH	8.7 pH		
12	TPH (C6 to C40) petroleum group			TPH		67.5	mg/kg		67.5	mg/kg	0.00675 %		
										Total:	0.0322 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present. Hazardous limit used represents less than 1% of the waste.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00675%)

Classification of sample: 2M6508SA[3]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:	
2M6508SA[3]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
5.00 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7	mg/kg	1.32	9.242	mg/kg	0.000924 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.9	mg/kg	1.142	1.028	mg/kg	0.000103 %		
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		7	mg/kg	1.462	10.231	mg/kg	0.00102 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1	mg/kg	1.923	<0.192	mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5	mg/kg	1.405	<0.703	mg/kg	<0.0000703 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		4.9	mg/kg	1.126	5.517	mg/kg	0.000552 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	4.6	mg/kg	1.56	7.175	mg/kg	0.00046 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<**LOD**
9	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		21.4	mg/kg	2.774	59.367	mg/kg	0.00594 %		
10	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		0.6	mg/kg	3.22	1.932	mg/kg	0.000193 %		
11	pH			PH		9.1	pH		9.1	pH	9.1 pH		
12	TPH (C6 to C40) petroleum group			TPH		60.3	mg/kg		60.3	mg/kg	0.00603 %		
										Total:	0.0154 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present. Hazardous limit used represents less than 1% of the waste.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00603%)

Classification of sample: 2M6508SA[4]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:	
2M6508SA[4]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
11.00 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		1.5 mg/kg	1.32	1.98 mg/kg	0.000198 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.8 mg/kg	1.142	0.914 mg/kg	0.0000914 %		
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		1.4 mg/kg	1.462	2.046 mg/kg	0.000205 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1 mg/kg	1.923	<0.192 mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		2.6 mg/kg	1.126	2.927 mg/kg	0.000293 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	2.2 mg/kg	1.56	3.432 mg/kg	0.00022 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5 mg/kg	1.353	<0.677 mg/kg	<0.0000677 %		<**LOD**
9	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		17.8 mg/kg	2.774	49.38 mg/kg	0.00494 %		
10	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		<0.5 mg/kg	3.22	<1.61 mg/kg	<0.000161 %		<**LOD**
11	pH			PH		9.5 pH		9.5 pH	9.5 pH		
12	TPH (C6 to C40) petroleum group			TPH		52.4 mg/kg		52.4 mg/kg	0.00524 %		
								Total:	0.0115 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present. Hazardous limit used represents less than 1% of the waste.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00524%)

Appendix A: Classifier defined and non GB MCL determinands

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds.

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history.

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass.

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments.

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight.

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight.

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight.

boron {diboron trioxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2024.30.5942.10989 (30 Jan 2024)
HazWasteOnline Database: 2024.26.5938.10982 (26 Jan 2024)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021
GB MCL List v2.0 - version 2.0 of 20th October 2023

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

TX7M4-BIOUY-0FPNO

Job name

WFLH Section M GIR

Description/Comments

Project

WFLH Section M GIR

Site

Section M

Classified by

Name:
Akansha Patel
Date:
02 Oct 2024 14:49 GMT
Telephone:
07722598325

Company:
Stantec UK Ltd
The Stills, 1st Floor
80 Turnmill Street
LONDON
EC1M5QU

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	09 Feb 2023

Next 3 year Refresher due by Feb 2026

Purpose of classification

2 - Material Characterisation

Address of the waste

N/A **Post Code** N/A

SIC for the process giving rise to the waste

42910 Construction of water projects

Description of industry/producer giving rise to the waste

Water

Description of the specific process, sub-process and/or activity that created the waste

Construction of the pipeline and excavation of the soil

Description of the waste

Topsoil on top of Lambeth group

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	3M6517HP	0.3	Non Hazardous		3
2	3M6517HP[2]	1	Non Hazardous		5
3	3M6601HP[3]	0.2	Non Hazardous		8
4	3M6601HP[4]	0.5	Non Hazardous		10

Related documents

#	Name	Description
1	GAC Tool Template v4	waste stream template used to create this Job

Report

Created by: Akansha Patel

Created date: 02 Oct 2024 14:49 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	12
Appendix B: Rationale for selection of metal species	13
Appendix C: Version	14

Classification of sample: 3M6517HP

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
3M6517HP
Sample Depth:
0.3 m
Moisture content:
16.6%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16.6% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		8.6 mg/kg	1.32	11.355 mg/kg	0.00114 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2 mg/kg	1.142	<0.228 mg/kg	<0.0000228 %		<**LOD**
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		26.7 mg/kg	1.462	39.024 mg/kg	0.0039 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1 mg/kg	1.923	<0.192 mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		12.3 mg/kg	1.126	13.848 mg/kg	0.00138 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	14.9 mg/kg	1.56	23.241 mg/kg	0.00149 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5 mg/kg	1.353	<0.677 mg/kg	<0.0000677 %		<**LOD**
9	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		46.8 mg/kg	2.774	129.83 mg/kg	0.013 %		
10	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		1 mg/kg	3.22	3.22 mg/kg	0.000322 %		
11	pH			PH		7.8 pH		7.8 pH	7.8 pH		
12	pentachlorophenol	604-002-00-8	201-778-6	87-86-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**
13	TPH (C6 to C40) petroleum group			TPH		37.2 mg/kg		37.2 mg/kg	0.00372 %		
14	pentachlorobenzene	602-074-00-5	210-172-0	608-93-5		<0.0012 mg/kg		<0.0012 mg/kg	<0.00000012 %		<**LOD**
15	aldrin (ISO)	602-048-00-3	206-215-8	309-00-2		<0.0024 mg/kg		<0.0024 mg/kg	<0.00000024 %		<**LOD**

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
16		dieldrin (ISO)				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
		602-049-00-9	200-484-5	60-57-1							
17		atrazine (ISO); 2-chloro-4-ethylamine-6-isopropylamine-1,3,5-triazine				<0.0024 mg/kg		<0.0024 mg/kg	<0.00000024 %		<LOD
		613-068-00-7	217-617-8	1912-24-9							
18		dichlorvos (ISO); 2,2-dichlorovinyl dimethyl phosphate				<0.0024 mg/kg		<0.0024 mg/kg	<0.00000024 %		<LOD
		015-019-00-X	200-547-7	62-73-7							
19		endosulfan (ISO); 1,2,3,4,7,7-hexachloro-8,9,10-trinorborn-2-en-5,6-ylenedimethylene sulfite; 1,4,5,6,7,7-hexachloro-8,9,10-trinorborn-5-en-2,3-ylenedimethylene sulfite				0.0132 mg/kg		0.0132 mg/kg	0.00000132 %		
		602-052-00-5	204-079-4	115-29-7							
20		hexachlorocyclohexanes, including lindane				0.006 mg/kg		0.006 mg/kg	0.0000006 %		
		602-043-00-6	210-168-9, 200-401-2, 206-270-8, 206-271-3	58-89-9, 319-84-6, 319-85-7, 608-73-1							
21		lindane (ISO); g-HCH or g-BHC; g-1,2,3,4,5,6-hexachlorocyclohexane				<0.0012 mg/kg		<0.0012 mg/kg	<0.00000012 %		<LOD
		602-043-00-6	200-401-2	58-89-9							
22		1,2,3-trichlorobenzene				<0.0012 mg/kg		<0.0012 mg/kg	<0.00000012 %		<LOD
			201-757-1	87-61-6							
23		hexachlorobenzene				<0.0024 mg/kg		<0.0024 mg/kg	<0.00000024 %		<LOD
		602-065-00-6	204-273-9	118-74-1							
								Total:	0.0251 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: There is no free phase hydrocarbons present.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00372%)

Classification of sample: 3M6517HP[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
3M6517HP[2]
Sample Depth:
1 m
Moisture content:
17.5%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 17.5% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11.7 mg/kg	1.32	15.448 mg/kg	0.00154 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2 mg/kg	1.142	<0.228 mg/kg	<0.0000228 %		<**LOD**
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		38.4 mg/kg	1.462	56.124 mg/kg	0.00561 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1 mg/kg	1.923	<0.192 mg/kg	<0.0000192 %		<**LOD**
5	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		14.5 mg/kg	1.126	16.325 mg/kg	0.00163 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	15.8 mg/kg	1.56	24.645 mg/kg	0.00158 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5 mg/kg	1.353	<0.677 mg/kg	<0.0000677 %		<**LOD**
9	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		20.2 mg/kg	2.976	60.121 mg/kg	0.00601 %		
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		47.4 mg/kg	2.774	131.495 mg/kg	0.0131 %		
11	asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<100 mg/kg		<100 mg/kg	<0.01 %		<**LOD**
12	pH			PH		7.8 pH		7.8 pH	7.8 pH		
13	phenol	604-001-00-2	203-632-7	108-95-2		<0.11 mg/kg		<0.11 mg/kg	<0.000011 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
14		m-cresol; [1] o-cresol; [2] p-cresol; [3] mix-cresol [4]											
		604-004-00-9	203-577-9 [1] 202-423-8 [2] 203-398-6 [3] 215-293-2 [4]	108-39-4 [1] 95-48-7 [2] 106-44-5 [3] 1319-77-3 [4]		0.16	mg/kg		0.16	mg/kg	0.000016 %		
15		3,4-xylenol; [1] 2,5-xylenol; [2] 2,4-xylenol; [3] 2,3-xylenol; [4] 2,6-xylenol; [5] xylenol; [6] 2,4(or 2,5)-xylenol [7]											
		604-006-00-X	202-439-5 [1] 202-461-5 [2] 203-321-6 [3] 208-395-3 [4] 209-400-1 [5] 215-089-3 [6] 276-245-4 [7]	95-65-8 [1] 95-87-4 [2] 105-67-9 [3] 526-75-0 [4] 576-26-1 [5] 1300-71-6 [6] 71975-58-1 [7]		<0.11	mg/kg		<0.11	mg/kg	<0.000011 %		<**LOD**
16		benzene											
		601-020-00-8	200-753-7	71-43-2		<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<**LOD**
17		toluene											
		601-021-00-3	203-625-9	108-88-3		<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<**LOD**
18		ethylbenzene											
		601-023-00-4	202-849-4	100-41-4		<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<**LOD**
19		naphthalene											
		601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20		acenaphthylene											
			205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21		acenaphthene											
			201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22		fluorene											
			201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23		phenanthrene											
			201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24		anthracene											
			204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25		fluoranthene											
			205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		pyrene											
			204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		benzo[a]anthracene											
		601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		chrysene											
		601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		benzo[b]fluoranthene											
		601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		benzo[k]fluoranthene											
		601-036-00-5	205-916-6	207-08-9		0.12	mg/kg		0.12	mg/kg	0.000012 %		
31		benzo[a]pyrene; benzo[def]chrysene											
		601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
32		indeno[123-cd]pyrene											
			205-893-2	193-39-5		0.12	mg/kg		0.12	mg/kg	0.000012 %		
33		dibenz[a,h]anthracene											
		601-041-00-2	200-181-8	53-70-3		0.12	mg/kg		0.12	mg/kg	0.000012 %		
34		benzo[ghi]perylene											
			205-883-8	191-24-2		0.21	mg/kg		0.21	mg/kg	0.000021 %		
35		polychlorobiphenyls; PCB											
		602-039-00-4	215-648-1	1336-36-3		<0.042	mg/kg		<0.042	mg/kg	<0.0000042 %		<**LOD**
36		TPH (C6 to C40) petroleum group											
				TPH		31.7	mg/kg		31.7	mg/kg	0.00317 %		
37		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane											
		603-181-00-X	216-653-1	1634-04-4		<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<**LOD**
										Total:	0.0431 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: There is no free phase hydrocarbons present.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00317%)

Classification of sample: 3M6601HP[3]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
3M6601HP[3]
Sample Depth:
0.2 m
Moisture content:
16.7%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16.7% No Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.5	mg/kg	1.32	7.262	mg/kg	0.000726 %		
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.2	mg/kg	1.142	0.228	mg/kg	0.0000228 %		
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		12.3	mg/kg	1.462	17.977	mg/kg	0.0018 %		
4		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1	mg/kg	1.923	<0.192	mg/kg	<0.0000192 %		<**LOD**
5		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5	mg/kg	1.405	<0.703	mg/kg	<0.0000703 %		<**LOD**
6		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		9.8	mg/kg	1.126	11.034	mg/kg	0.0011 %		
7		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	15.4	mg/kg	1.56	24.021	mg/kg	0.00154 %		
8		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<**LOD**
9		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		44.2	mg/kg	2.774	122.617	mg/kg	0.0123 %		
10		boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		<0.5	mg/kg	3.22	<1.61	mg/kg	<0.000161 %		<**LOD**
11		pH			PH		6.8	pH		6.8	pH	6.8 pH		
12		TPH (C6 to C40) petroleum group			TPH		49.6	mg/kg		49.6	mg/kg	0.00496 %		
											Total:	0.0227 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: There is no free phase hydrocarbons present.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00496%)

Classification of sample: 3M6601HP[4]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
3M6601HP[4]
Sample Depth:
0.5 m
Moisture content:
25.9%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 25.9% No Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11.8	mg/kg	1.32	15.58	mg/kg	0.00156 %		
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<**LOD**
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		31.1	mg/kg	1.462	45.454	mg/kg	0.00455 %		
4		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.1	mg/kg	1.923	<0.192	mg/kg	<0.0000192 %		<**LOD**
5		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5	mg/kg	1.405	<0.703	mg/kg	<0.0000703 %		<**LOD**
6		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		19.7	mg/kg	1.126	22.18	mg/kg	0.00222 %		
7		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	16.1	mg/kg	1.56	25.113	mg/kg	0.00161 %		
8		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<**LOD**
9		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		58.7	mg/kg	2.774	162.842	mg/kg	0.0163 %		
10		boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		<0.5	mg/kg	3.22	<1.61	mg/kg	<0.000161 %		<**LOD**
11		pH			PH		7.2	pH		7.2	pH	7.2 pH		
12		TPH (C6 to C40) petroleum group			TPH		65.8	mg/kg		65.8	mg/kg	0.00658 %		
											Total:	0.0331 %		

Key	
	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: There is no free phase hydrocarbons present.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00658%)

Appendix A: Classifier defined and non GB MCL determinands

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

- **1,2,3-trichlorobenzene** (EC Number: 201-757-1, CAS Number: 87-61-6)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , STOT SE 3; H336 , Aquatic Acute 1; H400 , Aquatic Chronic 3; H410

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

fluoranthene (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

pyrene (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

indeno[123-cd]pyrene (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

benzo[ghi]perylene (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

polychlorobiphenyls; PCB (EC Number: 215-648-1, CAS Number: 1336-36-3)

GB MCL index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans;

POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds.

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history.

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass.

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments.

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight.

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight.

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight.

boron {diboron trioxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight.

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2024.271.6257.11459 (29 Sep 2024)
HazWasteOnline Database: 2024.271.6257.11459 (29 Sep 2024)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021
GB MCL List v2.0 - version 2.0 of 20th October 2023
GB MCL List v3.0 - version 3.0 of 11th January 2024
GB MCL List v4.0 - version 4.0 of 2nd March 2024
GB MCL List v5.0 - version 5.0 of 26th June 2024

Appendix F: Ground Gas Monitoring

Table F1: Ground Gas Monitoring Results Summary for within each monitoring within 2M6507SA (2)

Monitoring Round Date	Peak Gas Concentrations (minimum for Oxygen)						Max Gas Flow Rate (pk) l/hr	Atmospheric Pressure (mbar)
	CH_4 %vol	CO_2 %vol	O_2 %vol	CO ppm	H_2S ppm	VOC ppmv		
18 April 2023 *	<0.1	1	20.2	12	<1	0	-5.5	1023
11 May 2023*	<0.1	0	6.7	3	1	0	-0.4	1014
25 May 2023	<0.1	5.7	4.2	4	1	0.9	<0.1	1027
20 June 2023	<0.1	<0.1	15.2	2	1	0	-0.6	1024
20 July 2023	<0.1	6.7	13.6	1	<1	<0.1	<0.1	1013
16 August 2023	<0.1	3.8	14.9	1	1	0.2	<0.1	1018
14 September 2023	<0.1	6.7	9.3	<1	<1	0	<0.1	1017
11 October 2023	<0.1	7.5	9.0	<1	<1	0	<0.1	1010
14 November 2023	0.1	1.8	11.6	<1	<1	<0.1	-2.8	1001
12 December 2023	0.1	1.0	16.2	<1	<1	30.2	-5.7	993
9 January 2024	0.1	0.8	21.2	<1	<1	0.1	-0.1	1026
7 February 2024	0.2	1.9	20.4	<1	<1	0.6	<0.1	1009
4 April 2024	<0.1	<0.1	19.7	0	<10	<0.1	-4.0	1000

Notes:
CH_4 – Methane, CO_2 – Carbon Dioxide, O_2 – Oxygen, CO – Carbon Monoxide, H_2S – Hydrogen Sulphide, VOC – Volatile Organic Compounds.
ppmv – Part per Million Volume
* Pump flow fail due to high water level. Unable to fully complete gas monitoring

Table F2: Ground Gas Monitoring Results Summary for 2M6508SA (1)

Monitoring Round Date	Peak Gas Concentrations (minimum for Oxygen)						Max Gas Flow Rate (pk) l/hr	Atmospheric Pressure (mbar)
	CH_4 %vol	CO_2 %vol	O_2 %vol	CO ppm	H_2S ppm	VOC ppmv		
18 April 2023	<0.1	0.1	15.8	10	<1	0.7	<0.1	1024
11 May 2023	<0.1	0.1	15.8	4	1	0.3	2	1014
25 May 2023	<0.1	0.1	20	2	1	<0.1	<0.1	1027
20 June 2023	<0.1	0.4	20.3	2	<1	<0.1	-0.9	1002
20 July 2023	<0.1	0.4	20.4	1	1	0.4	<0.1	1013
16 August 2023	<0.1	0.4	20.3	1	1	0.5	<0.1	1018
14 September 2023	<0.1	0.8	20.5	<1	<1	<0.1	-0.1	1024
11 October 2023	<0.1	0.8	20.9	<1	<1	<0.1	<0.1	1010
9 January 2024	0.1	0.7	16.4	<1	<1	0.2	-0.1	1026
7 February 2024	0.1	0.5	21.2	<1	<1	<0.1	<0.1	1008
4 April 2024	<0.1	<0.1	19.72	0	<10	<0.1	0	1004

Notes:
CH_4 - Methane, CO_2 – Carbon Dioxide, O_2 – Oxygen, CO – Carbon Monoxide, H_2S – Hydrogen Sulphide, VOC – Volatile Organic Compounds.
ppmv - Part per Million Volume

Appendix G: Guidance for the assessment of Land Contamination

Selection of Soil Assessment Criteria Protective of Human Health

Generic Assessment Criteria (GAC)

To evaluate potential risks to human health receptors, including future Site users, the soil analytical results have been assessed against the following Generic Assessment Criteria (GAC):

- Suitable for Use Values (S4ULs) for commercial land use (Nathanail et al, 2015) adopting a 1% soil organic matter (SOM) value.
- Lead was compared against the Defra Category 4 Screening Level (C4SL) for a commercial end use, (Defra, 2014) because a S4UL for lead has not been published, also adopting a 1% SOM value.
- Cyanide (free) was compared to the Society of Brownfield Risk Assessment (SoBRA) Acute Generic Risk Assessment criteria for assessing risks to human health from contaminants in soil (Society of Brownfield Risk Assessment (SoBRA), 2020) since there are currently no C4SLs or S4ULs for cyanide. The assessment criteria used evaluates potential for acute harm to a child by inhalation of free cyanide. This is a conservative assessment criterion used as generic assessment criteria as allows the criteria to be adjusted if the Site-specific conditions are suitable.

The GAC for a Commercial/industrial end-use have been selected as these are considered to be the most appropriate for the protection of construction workers undertaking the development and the maintenance workers who may undertake maintenance/operational work at these locations. The GAC have been generated assuming short exposure periods over a long timescale.

The GAC have been generated using assumptions regarding soil characteristics. Where the published GAC are dependent upon Soil Organic Matter (SOM), a value of 1% has been used to provide a conservative assessment. Consideration of the default soil properties used to generate the soil GAC for protection of human health is important as these influence the fate, transport and behaviour of contaminants.

- Soil type – the model default is set as Sandy Loam and assumes a dry and relatively porous soil. The default is considered sufficiently similar to the soils which are variably clayey/ sandy.
- pH – pH influences the cation exchange capacity and the portioning behaviour of a chemical between soil and water. The default is pH 7. The ground encountered have been found to have a pH of typically between 7.4 and 8.7.

Selection of Water Assessment Criteria Protective of Heman Health and Aquatic Eco-systems (Controlled Waters)

The Site is located over a Principal aquifer (Culver Chalk Formation) and within a groundwater source protection zone 1. Active groundwater abstractions for potable water supply are within 250m from the proposed trenchless crossing excavations. Superficial deposits comprising Alluvium and River Terrace deposits are present (Secondary A aquifers). An unnamed tributary of the River Itchen is present within 100m of the proposed trenchless crossing. The tributary flows towards the River Itchen (a designated SSSI and SAC) which is located approximately 500 m east.

To evaluate potential risks to human health and controlled waters receptors, the leachate analysis results (2:1) and groundwater analysis results were assessed against the following:

- UK Drinking Water Standards (DWS) [1]
- Freshwater Environmental Quality Standards (EQS) annual average (AA) concentrations and maximum allowable concentrations (MAC) used where there is no AA.
- In the absence of a TPH threshold within the Water Supply [2](Water Quality) Regs 2021, the value of 10 µg/l as presented within the withdrawn Water Supply (Water Quality) Regs 1989 has been used for reference purposes. These thresholds are considered protective of human health.
- In the absence of a EQS for total ammonia the total ammonia as N (i.e., ammoniacal nitrogen as N) standard for rivers in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 has been used; assuming a good status.

When assessing ground condition data and the potential to harm Controlled Waters, SSP uses the approach presented in Groundwater Protection Policy and Practice (GP3) (EA, 2017).

Bioavailable Environmental Quality Standards (EQS)

Bioavailable Environmental Quality Standards (EQS) have been developed for UK Specific Pollutants copper, zinc and manganese and the EU priority substances lead and nickel. An EQS is the concentration of a chemical in the environment below which there is not expected to be an adverse effect on the specific endpoint being considered, e.g., the protection of aquatic life.

The bioavailability of a metal depends on a number of physico-chemical factors which govern both metal behaviour and the interactions of the toxic forms of the metals with a biological receptor.

The EQS bioavailable corresponds to the bioavailable fraction (BioF) of dissolved metal in a sample, as determined by the physico-chemical characteristics of the water and can be calculated using a biotic ligand model (BLM) or other calculation method. To assess compliance, the bioavailable fraction of dissolved metal can be compared to the EQS bioavailable. However, bioavailable metal is not the same metric as dissolved metal as only a fraction of the dissolved metal will usually be bioavailable.

It is very difficult to measure the bioavailable concentration of a metal directly. Biotic Ligand Models (BLMs) are a predictive tool that can take account of water quality parameters such as pH, and calcium to determine

[1] DWI (2021) Guidance on The Water Supply (Water Quality) Regulations 2016 (as amended) specific to PFOS and PFOA concentrations in drinking water DWI, January 2021.

the amount of bioavailable metal present. However, the complexity of the models, the runtime per sample, input data requirements and level of operator skill needed to interpret the model outputs mean that few regulatory organisations have adopted the full BLMs. The UK has developed simplified Metal Bioavailability Assessment Tool (M-BAT) for copper, zinc, nickel, and manganese.

Geo-environmental laboratory analyses required to generate Site-specific Predicted No Effect Concentrations (PNEC) suitable for the protection of the identified receptors has not been undertaken. On this basis, to provide a conservative assessment the results have been compared against the EQS for copper, zinc, manganese, lead and nickel without a correction for bioavailability.

Limit of Detection vs. Generic Assessment Criteria

Where the concentration of a determinand is below the limits of detection and the limits of detection are below the relevant threshold criterion, the concentrations recorded are not considered to present a hazard to human health or controlled waters.

Where the concentration of a determinand is below the limit of detection and the limit of detection is greater than the relevant threshold criterion, ultra-low analysis or further Detailed Quantitative Risk Assessment would be required to robustly conclude that these can be eliminated as hazards.

Appendix H: Risk Assessment Tables

Table H1: Contaminated Land Risk Assessment for Section M

Location		Trenchless Crossing of an unnamed tributary to the River Itchen				
Potential Source of Contamination	**Potential Contaminants of Concern**	**Potential Receptors**	**Potential Pathways**	**Potential Consequence of Pollutant Linkage**	**Probability of Pollutant Linkage**	**Risk (Without mitigation measures)**
Open field (agricultural). GI locations 2M6507SA and 2M6508SA. GI not targeting PSCs.	Made Ground nor any visual or olfactory evidence of contamination was encountered during the GI. No exceedances of the GAC protective of human health in soil samples collected were detected. Soil leachable concentrations of cadmium and copper exceeded EQS and TPH exceeded Withdrawn Water Supply (Water Quality) Regulations 1989 GAC for the one leachate sample tested. Groundwater samples exceeded the TPH GAC, PAHs (anthracene, fluoranthene, benzo(g,h,i)perylene) and metals (chromium VI, zinc) exceeded the EQS. Carbon dioxide concentrations during monitoring exceeded STL and LTL workplace thresholds. Low oxygen levels were also encountered.	**Construction, maintenance workers and future Site users:** Construction workers during open cut excavations/construction, maintenance workers during operation.	Direct dermal contact, ingestion and inhalation of dusts	Medium	Low Likelihood	Moderate/Low
			Inhalation of gases and vapours.	Medium	Low Likelihood	Moderate/Low
		Adjacent land users: Otterbourne WSW (current operation); Solar Panel Farm users > 50 m distance.	Direct dermal contact, ingestion and inhalation of dusts, gases and vapours during excavation works	Medium	Unlikely Disturbance of ground during excavation activities.	Low
		On Site existing and future infrastructure property (buildings and buried services): No current structures, possible below ground valves at trenchless crossing points.	Direct contact and gas migration / accumulation.	Medium	Low Likelihood Temporary reception pits, possible below ground valve chambers, potential for accumulation of ground gas that could migrate to these features.	Moderate/Low
		Surface water bodies/watercourses: A surface watercourse tributary of the River Itchen adjacent to trenchless crossing Site. River Itchen (approximately 500m southeast).	Surface water runoff from stockpiles and migration through groundwater.	Medium	Likely Excavations beneath this watercourse, groundwater is likely to be hydraulic continuity with the surface watercourse.	Moderate
		Groundwater 2M6507SA and 2M6508SA encountered Superficial deposits of River Terrace Deposits and Alluvium (Secondary A Aquifers). White Chalk (Principal Aquifer), encountered at 14.1m bgl within 2M6507SA and 4.5m bgl within 2M6508SA. Section M is within a Source Protection Zone I.	Leaching through unsaturated and saturated soil.	Medium	Likely Potentially high-water table (groundwater between 0.98 and 4.5m bgl).	Moderate
		Ecological receptors (flora and fauna): The River Itchen (SSSI and SAC) approximately 500 m east.	Plant uptake, direct contact, ingestion and inhalation of dusts, gases and vapours by animals.	Mild	Low Likelihood	Low

Appendix I: Risk Assessment Methodology

Risk Assessment Methodology

Risk Classification Methodology

The method of risk evaluation adopted in this document is consistent with CIRIA C552 (2001). Hence, risk is considered to be a function of both the probability (likelihood) of contamination occurring at the study site and also the potential severity (consequence) of the environmental impacts associated with this contamination.

The classification system used to define contaminant probability, consequence and risk is described in the following tables.

Table A: Classification of probability

Classification	Definition
High Likelihood	There is a contaminant linkage and an event that appears either very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a contaminant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term, and likely over the long term.
Low Likelihood	There is a contaminant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place and is less likely in the shorter term.
Unlikely	There is contaminant linkage but circumstances are such that it is improbable that an event would occur even in the long term.

Table B: Classification of consequence

Classification	Receptor	Definition	Examples
Severe	Humans	Short-term (acute) risk to human health likely to result in "significant harm" as defined in the Environmental Protection Act 1990, Part 2a.	High concentrations of cyanide on the surface of an informal recreation area
	Controlled waters	Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource	Major spillage of contaminants from site into controlled water
	Property	Catastrophic damage to buildings/property	Explosion, causing building collapse (can also equate to an acute human health risk if buildings are occupied)
	Ecology	A short-term risk to a particular ecosystem, or organism forming part of such eco-system	Potentially long term derogation of a designated site or protected species
Medium	Humans	Chronic damage to human health ("significant harm" as defined in the Environmental Protection Act 1990, Part 2a.)	Concentrations of a contaminant from a residential site exceed the site-specific assessment criteria
	Controlled waters	Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution)	Leaching of contaminants from a site to a principal or secondary aquifer
	Property	Significant damage to crops, buildings, structures and services	Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
	Ecology	A significant change in a particular ecosystem	Death of a species within a designated nature reserve
Mild	Humans	Contamination present although unlikely to constitute a significant chronic health risk	Concentrations of a contaminant from a public access site moderately exceed the generic assessment criteria
	Controlled waters	Pollution of non-water resources	Pollution of non-classified groundwater
	Property	Damage to sensitive. buildings/structures/services	Aggressive ground conditions leading to potential for long term degradation of buried concrete
	Ecology	Damage to the environment	Localised damage to aquatic habitat causing temporary relocation of certain species
Minor	Humans	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.)	The presence of contaminants at such concentrations that protective equipment is required during site works.
	Controlled waters	Potential minor release of contamination to local water features	Short term or low volume release of potentially polluting material to a secondary surface water course of low existing quality
	Property	Easily reparable effects of damage to buildings, structures and services. Harm which may result in a financial loss, or expenditure to resolve.	The loss of plants in a landscaping scheme. Discolouration of concrete
	Ecology	Short term, localised damage may occur; consequences are spatially and temporally limited	Short term or localised disruption to in situ flora or fauna; no lasting effects

Table C: Risk classification (comparison of consequence and probability)

Probability (likelihood)		Consequence (severity)			
		Severe	***Medium***	***Mild***	***Minor***
	High likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk