Contaminated Land
Air Quality
Environmental Audit

Partnership No: OC 300776

FORMER TETROSYL WORKS, BEVIS GREEN, MILL LANE, BURY

DETAILED CONTROLLED WATERS RISK ASSESSMENT FOR PHASES 2A, 2B & FORMER MILL LODGE RESERVOIR

For: Barratt Homes Manchester

March 2025

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1. Introduction

1.1 The Bevis Green Works on Mill Road, Walmersley, Bury, previously operated by Tetrosyl Ltd., has been granted planning consent (Ref: 63533) by Bury Metropolitan Borough Council (BMBC) for residential redevelopment with associated infrastructure and open space. The Planning consent is subject to planning conditions including matters related to contamination.

1.2 The Bevis Green Works hereafter referred to as 'the Site' has been subject to a long history of industrial development which includes nineteenth century cotton mill and textile print works buildings together with more recent plant, warehouses and office buildings. By the mid-1960s, The works was used by Tetrosyl Ltd. for the manufacturing, packaging, storage and distribution of car-care products. This included a wide range of items such as antifreeze, cleaning-materials, waxes and paints. Tetrosyl also operated a solvent recovery process under an Industrial Pollution Control (IPC) authorisation. Tetrosyl ceased operating on Site in late 2019.

1.3 Under the CDM Regulations (2015), the Principal Contractor for the groundworks and remedial phases is Urban Regen Ltd. (URL) who is undertaking works on behalf of their Client, developer Barratt Homes Manchester (BHM).

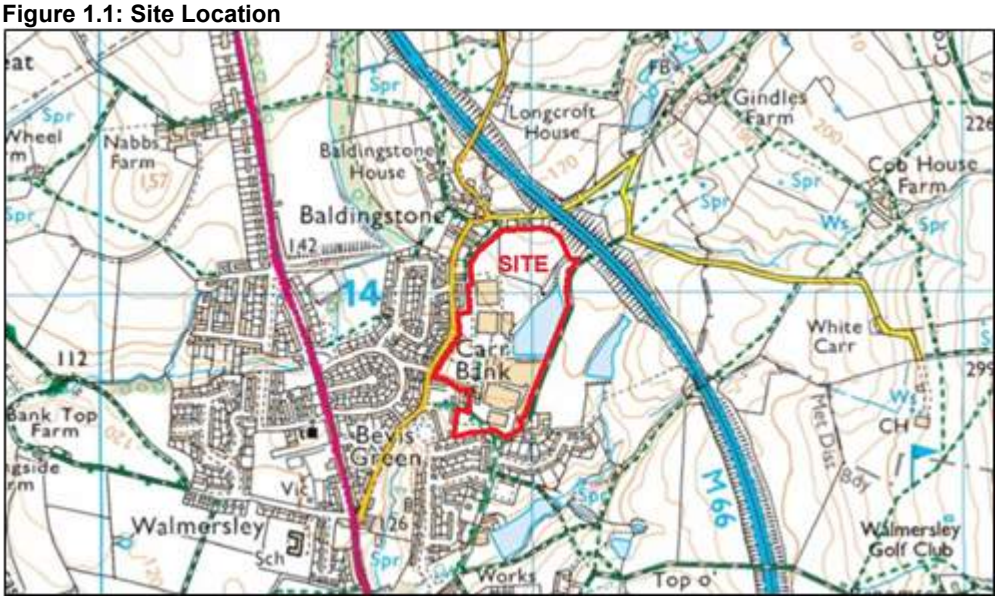
1.4 Smith Grant LLP (SGP) has been appointed by BHM to undertake further investigations, monitoring with concern to the contamination within groundwater of the bedrock aquifer and to derive Remedial Target Values (RTVs) for contaminants of concern (CoC) for groundwater associated with hotspots (HS) 9 - 14 and Quarry (see section 2.2 for further information). This area, which covers Phases 2A, 2B and former Mill Lodge Reservoir is hereafter referred to as the 'Groundwater Plume Source Zone' or 'GPSZ'.

1.5 This report presents the findings of a detailed contamination risk assessment (DQRA) for the GPSZ.

Table 1.1: Site Details

Address	Bevis Green Works, Mill Road, Bury BL9 6RE
NGR	380950, 413950
Full Site Area	~10.4 ha
Previous Use of Site	Office, warehouse, solvent recovery farm and packaging operations for chemical products used in vehicle maintenance. Remediation and preparatory earthworks currently ongoing.
Proposed Use of Site	Residential development with associated private gardens, car parking, infrastructure and open spaces. The watercourse flowing through the Site – a tributary of the Pigs Lee Brook is to be diverted to eastern Site boundary.
Site Situation and Surroundings	The Site is located in the northern part of Bury, Greater Manchester. The surrounding land use comprises a mixture of residential development to the west and south, industrial / commercial units to the southeast, and agricultural land to the east and north (the M66 motorway is located in proximity to the northern Site boundary).

Figure 1.1: Site Location



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1.6 There has been extensive investigation previously undertaken on the Site by Smith Grant LLP (SGP) and Third Parties. This has included intrusive investigation and assessment, detailed (controlled waters) risk assessment, remedial strategies and validation works.

1.7 The whole Site is split into two main areas (Phase 1 and Phase 2). Most homes built within Phase 1 are now occupied or are being validated to enable occupation. Each phase is split into sub-phases. Phase 2 is split into phases 2A-2H as shown on Drawing: 456/ED/05 Rev G.

1.8 Housebuilding is on-going in Phase 1 whilst Remediation Strategies to enable preparatory works to commence have been agreed for Phase 2C-2G. This report solely relates to Phase 2A, 2B and the former Mill Lodge Reservoir.

1.9 The area being considered as part of this Site comprises Phase 2A, 2B and 2H area of site development which includes the central part of the former Tetrosyl works, reservoir, mill lodge and adjacent, previously undeveloped open land.

1.10 The Environment Agency (EA) provided a written review of version 2 of this report (dated 14/08/2024 and as provided within Appendix H, and a meeting with the EA took place on 21st February 2025 where the EA review of version 2 of this report (dated 14/08/2024) was discussed. Amendments to the assessment have since been made which have, in the main reflected amending the distance to the compliance point for a Level 3 soil and groundwater assessment. The compliance point adopted has reflected 50m for confirmed hazardous pollutants and 200m for confirmed non-hazardous pollutants. Further details are provided in Section 7.5.

2. Site Characterisation

2.1. Setting, History, Geology, Hydrogeology and Hydrology

2.1.1. During the site's historical development prior to 1844, a tributary of Pigs Lee Brook which previously flowed through the site was dammed to form a reservoir in the east known as the 'Mill Lodge'. By 1928, with a rock quarry also indicated in the centre-north of the Site to the west of the main reservoir.

2.1.2. The Site occupies the valley of a tributary of the Pigs Lee Brook with a topography sloping from approximately 153m Above Ordnance Datum (AOD) in the north to 136m AOD at the southern Site boundary in the southwest. The substantial drops in levels are present across the dam for the Mill Lodge Reservoir in the east and over a series of large retaining structures to the west.

2.1.3. BGS mapping indicates superficial deposits of Glacial Till (Boulder Clay) across the Site which have been confirmed at various locations, although site investigation information has shown this exists as a thin layer, typically less than 2m thick, whilst being completely absent across large parts of the Site, likely a result of the previous development. At these locations the underlying Rough Rock sandstone bedrock unit outcrops. The Rough Rock thins to the south and southwest and is absent from the most south-easterly parts of the Site, where the mudstones of the underlying Rossendale Formation outcrop.

2.1.4. Made ground has been confirmed across the developed parts of the site during the various phases of site investigation, with only a thin veneer of hardcore noted in the northwest in the northern, undeveloped part of the site. The depths of made ground have been shown to be variable generally extending down to 2-3m below ground level (bgl) in the central and southern sectors, with a maximum proven depth of 11m in the southwest, representing infill to the original Pigs Lee Brook Valley landform.

2.1.5. A band of coal which in general, is directly followed by a band of seatearth has been recorded within the Rough Rock Sandstone, to a combined thickness of between 0.38 and 1.55m.

2.1.6. The culvert which carries a tributary of the Pigs Lee Brook appears to be in hydrological continuity with the local groundwater and to serve as a groundwater drain. During progression of the development, this is to be infilled via means of grouting. The Rough Rock is classified by the Environment Agency as a Secondary A Aquifer, potentially important for local water supply or providing baseflow to surface streams.

2.2. Previous Site Investigation and Assessment

2.2.1. Previous Investigation has identified a series of 'Hotspots' across the Phase 2 area of the Site, as detailed in SGP report ref R2174-R01-v2, dated May 2019.

2.2.2. The source of the contamination is pinpointed to the former processing area where the bulk storage of chemicals and fuels with associated filling points was located together with a solvent recovery and drum crushing plant (area zoned as Phase 2B and partially affecting Phase 2A). This area includes identified Hotspots (HS)09 to HS14 plus Quarry (QT), further details of which, are included within Section 2.2 of the aforementioned report. All infrastructure from this area has since been removed.

2.2.3. This DQRA considers the area of Phase 2B as the predominant source zone (and earlier referenced GPSZ) which includes the following six hotspot areas: as detailed in Table 2.1 below and the locations of which, are shown in Figure 2.1:

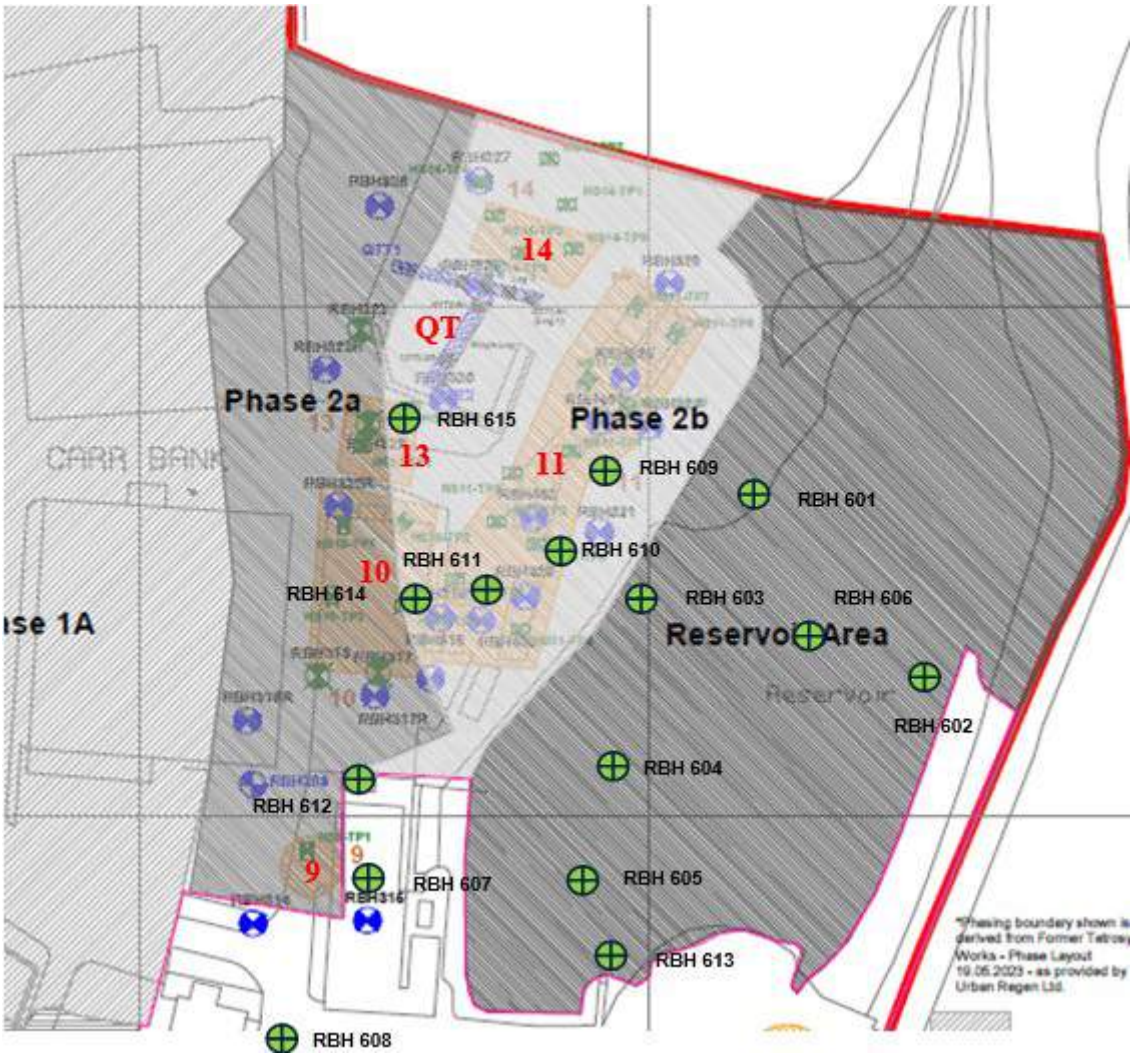
Table 2.1 Summary of findings Potential or Known Contamination "Hot spots"

Hotspot ref:	**Feature**	**Exceedances of Soil RTVs *(taken from R01 hence RTVs used for comparison here have now been superseded)***	**Exceedances for Groundwater RTVs *(taken from R01 hence RTVs used for comparison here have now been superseded)***	**Notes & Requirements for remediation and/or further assessment**
QT	Former rock quarry, latterly used as a refuse tip	Moderate Exceedances Tier 3 Soil Criteria for C8-C16 Aromatic compounds & BTEX	No Exceedances Tier 3 Groundwater Criteria	Full turnover to Quarry fills not possible due to groundwater ingress, further soil removal not required
#9	USTs infilled with concrete near boiler house	No exceedances Tier 3 RTVs	Central areas – no local groundwater data	Soil sampling for comparison to RTVs during removal of secondary soil sources -compare residual soil concentrations to RTVs. Groundwater monitoring and sampling required to confirm local impacts
#10	Solvent filling room and ASTs	Limited soil sampling but significant Tier 3 RTV exceedances recorded	Fewer exceedances to RTVs than adjacent HS11, however impacts and groundwater plume extend into HS10 and local soil sources are confirmed downgradient wells >50m not impacted	Soil sampling for comparison to RTVs during removal of secondary soil sources, maintenance monitoring wells for further monitoring and possible groundwater treatment
#11	Solvent recovery plant and tank farm (various ASTs and pipework)	Majority of samples exceed RTVs for xylene and fewer but significant exceedances RTVs for other BTEX and Aromatic C8-C16	All groundwater RTV exceedances within HS11 (RBH319, RBH320, RBH321, RBH324 & RBH325), downgradient wells >50m not impacted	Soil sampling for comparison to RTVs during removal of secondary soil sources, maintenance monitoring wells for further monitoring and possible groundwater treatment

Hotspot ref:	Feature	Exceedances of Soil RTVs *(taken from R01 hence RTVs used for comparison here have now been superseded)*	Exceedances for Groundwater RTVs *(taken from R01 hence RTVs used for comparison here have now been superseded)*	Notes & Requirements for remediation and/or further assessment
#13	Waste sludge reclamation plant	Limited soil sampling but significant Tier 3 RTV exceedances recorded	No Tier 3 RTV exceedances recorded	Wider range of organic substances detected in this area but limited groundwater impacts Soil sampling for comparison to RTVs removal of secondary soil sources
#14	Drum crushing plant	No exceedances Tier 3 RTVs	No Tier 3 RTV exceedances recorded	Watching brief during works

HS12 & 15 are not located within this area of the site and concerns Phase 1 Area.

Figure 2.1: Hotspots Identified through previous investigation (not to scale)



Location of hotspots shown in shaded orange. . QT: location of infilled quarry.

Baseplan taken from D02 in R2174_R11_V6 (dated October 2023). Locations of exploratory holes are approximated. See appended drawing for surveyed in locations.

2.2.4. An intrusive investigation was undertaken by SGP spanning December 2023 and completed in early January 2024. This has involved the drilling of 15 no. bores (RBH601-615) into the sandstone using rotary coring techniques. Several bores have been drilled within the former Mill Lodge Reservoir which has since been drained, subject to removal of silts and is currently in the process of being built up with validated soils. This intrusive ground investigation has included drilling additional boreholes in Phase 2B and within Phase 2C located directly south of Phase 2B.

2.2.5. The investigation has included the installation of all bores drilled with monitoring standpipes to facilitate groundwater monitoring and sampling. Eight of these standpipes were installed with dual standpipes to allow sampling of groundwater from different depths within the sandstone aquifer to assist with depth profiling of contamination. The response zones for most of the dual standpipes have been placed within the Rough Rock Sandstone either side of the coal and seatearth bands, if identified within drilling. This was for the purposes of assessing whether the coal/seatearth is acting as a band of contaminant absorption and filtration.

2.2.6. The intrusive investigation was followed by two rounds of monitoring and sampling of groundwater; one undertaken in January 2024 and the second completed in early April 2024. The findings of this report is contained within SGP report ref: R2174-15-V1-Draft, included as Appendix G.

2.3. Specialist Geochemical Assessment

2.3.1. A research laboratory specialising in geochemistry, CE Geochem Ltd, was commissioned by BHM to undertake detailed geochemical analysis and modelling of the bedrock aquifer and residing groundwater. Site sampling was undertaken in tandem with the SGP intrusive investigation as detailed above.

2.3.2. The work entailed sampling of select aquifer materials strata, snap-freezing of select rock cores with dry ice on Site to ensure their preservation plus sampling of groundwater during the SGP groundwater sampling event in April 2024. This site sampling was followed by specialist laboratory analysis and in-house three-dimensional modelling.

2.3.3. The focus of their work was to ascertain detailed information with respect to plume mass, delineation in extent, affected area and depth, physicochemical conditions within the Sandstone bedrock aquifer, plume core and plume fringe to establish the natural biodegradation and attenuation potential of the aquifer for contaminants of concern.

2.3.4. The model outputs generated are presented in Appendix C alongside a microbial profiling assessment. The findings of this specialist work are discussed later within Sections 5 and 6 of this report.

2.4. Contaminant Sources and their Likely Origin

2.4.1. Previous investigation and assessment have identified contamination within the smear zone and upper reaches of the bedrock (Rough Rock Sandstone) aquifer. This has included lighter fraction aliphatic and aromatic hydrocarbons, with concentrations of benzene, toluene, ethylbenzene and xylene being the highest of specific indicator compounds (benzene is present as a minor constituent). This is consistent with the anecdotal evidence and records of historical inspections that, by volume, white spirit and other light petroleum distillates were the dominant classes of substances used and stored on the site.

2.4.2. Many of the other substances detected are likely to be either impurities in the original source chemicals, breakdown products formed since discharge or releases or smaller volumes of additives (fragrances, colourants, etc.) used in formulating the products manufactured on the site. These have been assessed as secondary constituents to the major hydrocarbon contaminant plumes or dispersed or localised impacts.

2.4.3. The source of the contamination appears to be pinpointed to the former processing area where the bulk storage of chemicals such as white spirit and other volatile organic compounds (VOCs) plus halogenated compounds and phenol together with fuels with associated filling points were located. In addition, a solvent recovery and drum crushing plant were present. This area which is predominantly zoned as Phase 2B includes identified Hotspots (HS)09 to HS14 plus a former infilled quarry (as detailed previously). All tanks, buildings and other plant infrastructure from this area have since been removed.

2.4.4. Specific details with respect to contaminants of concern that have been modelled within this DQRA for Controlled Waters are specified later within the Conceptual Site Model detailed in Section 5.

2.4.5. Select chlorinated (halogenated) solvents including dichloromethane (DCM), vinyl chloride (VC), chloroform (trichloromethane), trichloroethylene (TCE), and tetrachloroethylene (PCE) have also been detected but at significantly lower concentrations.

2.4.6. With respect to semi-volatile organic compounds (SVOCs), select polyaromatic hydrocarbons (PAHs), including naphthalene, fluoranthene, BAP[1], BBF[2], BKF[3] and benzo(ghi)perylene have exceeded corresponding threshold limits, alongside phenol.

2.4.7. Chlorofluorocarbons (CFCs) have been detected in several groundwater locations but no soil source has been identified, and they appear to represent a dispersed plume in the central part of the site whose maximum concentration does not exceed the adopted Tier 1 threshold value.

[1] Benzo(a)pyrene;
[2] Benzo(b)fluoranthene
[3] Benzo(k)fluoranthene

2.4.8. Glycols are also present in the groundwater but at relatively low concentrations and significantly below the adopted Tier 2 criteria. They have therefore not been modelled within this controlled waters DQRA.

3. Remedial Strategies, Site Works Completed and Ongoing

3.1. A series of Outline, groundworks Stage and Developer Stage Remedial Strategies have been produced for the Site and approved by regulatory authorities. These include:

- Preliminary Risk Assessment and Outline Remediation Strategy (Ref: R2174-R01-v2), (SGP, dated 02.05.2019);
- Detailed Remedial Strategy for Phase 2 Area (Excluding Phase 2A, 2b & Fromer Mill Lodge Reservoir), Ref: R2174-R11-V6 (SGP, dated: October 2023)

3.2. Outline Remedial Strategy for Full Site

3.2.1. In the Outline Remediation Strategy, SGP proposed that remediation was required to address the source of the groundwater impacts by the following methods:

1. removal of site buildings, tanks and other site infrastructure including the removal of any residual primary sources of pollution in tanks and drums;
2. physical excavation of secondary sources of free product and other contaminants within soils for disposal or treatment; and,
3. in situ treatment of groundwater and bedrock if necessary to reduce residual concentrations to acceptable levels.

3.2.2. The above assessment and proposals were accepted by the Environment Agency (EA) and BMBC who required further works take place to delineate the extent of the impacted materials and that further risk assessment should be carried out before a more detailed Remediation Strategy, including site-specific Remediation Criteria for the protection of Controlled Waters, can be developed.

3.3. Detailed Remedial Strategy for Phase 2 Area (Excluding Phase 2A, 2b & Former Mill Lodge Reservoir)

3.3.1. A Detailed Remedial Strategy for Phase 2 (excluding Phase 2A, 2B and the former Mill Lodge Reservoir was submitted to both the EA and BC (ref: SGP R2174-R11-V6, dated October 2023).

3.3.2. This Detailed Remedial Strategy is supported with an updated Controlled Waters DQRA which has been prepared by Groundtech[4]. The updated RTVs are provided within letter report, reference: GRO-21459-4595 dated 14th July 2023.

3.3.3. Regulatory approval of the Remedial Strategy with the derived RTVs has since been obtained as detailed within the EA letter ref: SO/2020/120065/06-L01, dated 19th February 2024. This

approval included a series of actions, and a response was provided to the EA to clarify these actions on 26th February 2024 by SGP (ref: 2174-L20240226).

3.4. Works to be Completed

3.4.1. A remedial options appraisal followed by detailed remedial strategy to address contamination within controlled waters concerning the GPSZ has yet to be developed. This DQRA has been produced as preparatory work in advance of and to inform remedial targets to achieve during remediation of controlled waters within the GPSZ on Site.

3.5. Works Currently Ongoing

3.5.1. The PC has removed infrastructure associated with the Tetrosyl Works. Remediation followed by verification of identified contamination hotspots is ongoing by an independent Consultant contracted by the PC. Surface water sampling is ongoing by the contracted consultant of the PC at intervals as required by the EA.

3.5.2. Validation of ground gas and vapour are currently being undertaken within the wider Phase 2 Area (which is located outside of Phases 2A, 2B and the Former Mill; Lodge Reservoir.

3.5.3. The former Mill Lodge Reservoir has recently been drained and associated silts have been removed. This area is currently being built back up to level with both Site won and imported materials that are being chemically tested and validated under a Materials Management Plan (MMP) in accordance with DoWCoP and declared to CL:AIRE[5].

3.6. Remedial Site Trials Completed to Date

3.6.1. A remedial pilot trial was operated by the PC under RPS215 from 29th September 2022 to 6th December 2022. This involved abstraction of groundwater from Phase 2B from installed wells followed by treatment via means of filtration through granular activated carbon before discharge to foul sewer. The discharge to sewer was subject to achieving favourable contamination test results of sampling at outlet. The results have been reported by URL in February 2023 (report ref: 357-VR2-V1, Draft).

3.6.2. The trial found that intermittent pumping for abstraction targeted the ‘smear zone’ was optimal as this prevented the boreholes drying out. A strong relationship between the volume of groundwater pumped out and removal of dissolved phase GRO was noted. Source removal achieved versus costs, however, showed the remedial method not to be cost effective.

[4] Reference: Groundtech, November 2022 ‘Hydrogeological Detailed Quantitative Risk Assessment, reference GRO-21459-3710-1.2’

4. Supporting Studies for this DQRA Model

4.1. C.E Geochem is a specialist geochemical research laboratory based in Derby who specialises in the investigation of geochemical conditions and studies to support remedial treatability trials.

4.2. Geochem has undertaken two in-depth studies to determine and support input parameters used within this Controlled Waters DQRA model. These two reports, contained in Appendix C are as follows:

- Tetrosyl Advanced Characterisation and Sorption Studies (A231001/PMII, dated 26/02/2024); and,
- Tetrosyl Plume Visualisation & Microbial Profiling Study. Investigation of Potential Source Term Mass Depletion by Processes of Natural Attenuation (A231001C, rev 03, dated 08/2024).

4.3. The purposes of these two studies have been to:

1. Establish properties and geochemical conditions of the Rough Rock Sandstone aquifer;
2. Determine whether biodegradation of the primary CoC is occurring within the saturated sandstone aquifer and at what attributed rate;
3. Understand whether there is any natural absorption potential of the coal band encountered within the Rough Rock sandstone and whether it is having a role in stemming downward migration of the plume.

4.4. Tetrosyl Advanced Characterisation and Sorption Studies

4.4.1. The first document reports the findings of a depth profiling study to gain an understanding of the source term mass distribution of VOCs and identification of the presence of NAPL within the Rough Rock Sandstone aquifer. A sorption isotherm study was additionally performed to understand the sorption capacity of coal and seatearth clay residing within a band in the sandstone.

4.4.2. The full report is contained in Appendix C.1.

4.4.3. Sections of rock of the plume core (RBH610), plume fringe (RBH614, 615, 602 and 606), reservoir west and east (RBH606 and 602, respectively) and within the aquifer located south of the inground ‘barrier’ (RBH612) were retrieved by Geochem during the intrusive ground investigation conducted in December 2023 to January 2024 and which were snap frozen on Site for preservation. These resultant cores were then split, logged (see Appendix B of this

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report) and inspected by UV fluorescence for specific contaminant distribution and subsampled to establish total VOC concentrations.

4.4.4. The studies found that the solid phase concentrations of VOCs[6] in the analysed core sections were generally below 50 µg/kg except for the coal layers which were much higher concentrations were recorded (610 µg/kg recorded for toluene, for example). The study recorded the coal had sorbed between 65% and 98% removal of VOCs from solution within the sandstone. Some absorption of VC by the coal was additionally observed although elevated VC was recorded in sampled groundwater from installed wells located both above and below the coal layer sited within the plume core. The lowest sorption capacity was for MTBE with sorption was recorded between 10% and 40%. This has proven that the coal could be playing an important role in limiting the vertical component of contaminant mobility in groundwater. In addition, there was no evidence of free phase NAPL observed. Full details of the methodology alongside findings of the study are provided within Appendix C.1.

4.5. Tetrosyl Plume Visualisation & Microbial Profiling Study

4.5.1. The second study Geochem has undertaken has involved a 3D plume visualisation to assess plume geometry, volume and contaminant mass. The model has used all available contaminant data recorded within sampled groundwater, a dataset which spans 2021 to 2024.

4.5.2. The validity of natural attenuation processes within the Rough Rock saturated aquifer have been established through presentation of the findings of a microbial profiling study. This study was supported via collection of groundwater from select wells at the plume fringe and during the second groundwater sampling event on the ‘6 series wells’ across the plume and fringes which took place in April 2024.

4.5.3. The results of the studies have shown that natural degradation of BTEX and chlorinated solvents is occurring within the dissolved phase of the Rough Rock Aquifer, albeit fairly slowly. Half-lives for each primary CoC have been calculated.

4.5.4. C.E. Geochem has confirmed that the plume is shrinking with half-lives of most primary contaminants spanning 1 -2 years. The half-lives derived within this study have been input into the DQRA model (see Table 6.6).

4.5.5. Delineation and mass calculations of the coalesced plume have been determined. The RTVs derived from the DQRA model (as detailed later in section 9) have been used within the plume visualisation modelling to establish plume extents.

[6] Includes BTEX (all), PCE, TCE & cis-1,2-DCE

4.5.6. The plume has been delineated to predominantly reside within Phase 2B and is shown for each contaminant of concern as modelled by Geochem within their Suite of contaminant plume drawings which span 2021 to 2024 (see drawings ref: A231001/C/01 – C16 V3).

4.5.7. Plume fringes are recorded at the boundary of Phase 2B with 2A and Phase 2B with Phase 2H. The plume has been delineated from available data over four years (2021-2024).

4.5.8. The report supporting this study is contained within Appendix C.2.

4.5.9. This report concludes that enhanced monitored natural attenuation (EMNA) may be explored as a viable option for in-situ aquifer remediation.

5. Quantitative Risk Assessment Approach

5.1. DQRA Methodology and Remedial Target Development

5.1.1. The Detailed Quantitative Risk Assessment (DQRA) undertaken and reported herein has been used to develop Remedial Target Values (RTVs) that the remedial treatment of groundwater and bedrock will need to achieve to reduce residual contaminant concentrations to acceptable levels. Preparation of an updated DQRA is also a requirement of the EA.

5.1.2. In general, Environmental Quality Standards (EQS) have been utilised within the model to determine whether contaminant concentrations on Site are elevated at the receptor. The Annual Average (AA) value for the EQS of a particular contaminant of concern (CoC) has been used in preference although for some contaminants where there is no AA, the maximum admissible concentration (MAC) is adopted. Drinking Water Standards (DWS) have been adopted as a conservative approach for comparison of certain CoCs where EQS are unavailable. It is however acknowledged that this aquifer although important to supply baseflows to rivers, does not provide potable supply. This applies to select carbon bandings of total petroleum hydrocarbons. Select fractions of lighter total petroleum hydrocarbons have utilised a benzene, toluene, ethylbenzene and xylenes (BTEX) indicator compound as a target concentration within the model.

5.1.3. The DQRA needs to be protective of all Controlled Waters Receptors and hence will require certain conservative assumptions to be made regarding the existence of preferential migration pathways.

5.2. Methodology

5.2.1. The method for generating the RTVs is the Environment Agency (EA) Hydrogeological Risk Assessment for Land Contamination: Remedial Targets Methodology Worksheet V3.2 2013 (RTM).

5.2.2. The model assesses contaminant concentrations at three tiers;

Tier 1: the initial partitioning of contaminants from the soil matrix in the unsaturated zone into soil porewater.

Tier 2: dilution of contamination by means of infiltration on entering the aquifer; and,

Tier 3: attenuation by dispersion and diffusion between the release point from entering the aquifer receptor to a compliance point at a specified distance away from the source.

This Tier can include the potential for adsorption to organic matter and degradation between the release point at the source and a receptor. Although this depends upon the presence of organic matter and whether

biodegradation within the groundwater and bedrock matrix On-Site can be proven. This tier can be modelled for both soil and groundwater.

5.2.3. The results can be compared to groundwater concentrations to determine the likelihood of impacts at receptors at a distance from the contaminant source zones.

5.2.4. The results of the DQRA assessment may also be applied to contaminants adsorbed within soil. This can therefore be applied to residual made ground replaced during the works, treated soils under consideration for replacement and the residual groundwater within source zones following implementation of the source reduction exercises, specified under the Outline Remediation Strategy.

5.2.5. The model cannot assess impacts from free product. The requirement for removal of all substantial free phase hydrocarbon from primary sources remains a core part of the principles of remediation provided within Outline Remediation Strategy. It is noted, however that no free phase product has been encountered within the bedrock aquifer to date.

5.2.6. Where available, Site-specific Information from the site investigations has been used to derive remediation criteria in preference to published reference values. Where necessary, authoritative published criteria may be used providing consideration is given to the range of available values and the selection of specific values is justified, particularly where these have a proportionately large influence on the outcome of the assessment.

5.2.7. The derived Remediation Criteria can be used to define areas where remediation to protect controlled waters is required (by comparison with site investigation data). The derived criteria can also be used to assess the adequacy of future works undertaken to reduce non-polluting source concentrations (by comparison to verification data).

6. Conceptual Site Model

6.1. Contaminant Sources

Contaminant Sources Modelled within the DQRA

6.1.1. Hydrocarbons and associated organic compounds have been recorded on the Site within soils and as dissolved phase in groundwater of the Rough Rock Sandstone aquifer in the former solvent storage and use areas in the northern area of the Site (Phase 2B and to a much lower extent, Phase 2A).

6.1.2. Light petroleum distillate (aliphatic and aromatic hydrocarbons) dominates with relatively few impacts from hydrocarbons heavier than carbon bands C16 and during most recent groundwater monitoring and sampling events, not exceeding C12.

6.1.3. Concentrations of BTEX are recorded and it is noted that benzene is present at much lower concentrations than that recorded for toluene, ethylbenzene and xylenes. These hydrocarbon fractions are typically the most soluble and mobile substances. Concentrations reduce with distance from the former sources down-hydraulic gradient. While EQS are only available for total hydrocarbons under the Drinking Water Standard, the BTEX indicator substances should also be considered individually. Concentrations of MTBE (an additive within unleaded petrol) have been recorded in select locations, which is considered within the DQRA modelling.

6.1.4. Select chlorinated (halogenated) solvents including dichloromethane (DCM), vinyl chloride, chloroform (trichloromethane), trichloroethylene (TCE), and tetrachloroethylene (PCE) have also been detected but at significantly lower concentrations than that of the hydrocarbons as detailed above.

6.1.5. While it is known that certain chlorinated solvents were used and stored on the Site, reported concentrations are several orders of magnitude less than the hydrocarbons present. The well documented chain showing the progression of the degradation of chlorinated solvents has been observed. Further details of degradation are discussed later, within Section 6 of this report. It should be noted that where recorded, all chlorinated hydrocarbons have been identified as dissolved phase and the presence of free chlorinated solvent product (as DNAPL[7]) has not been recorded either on Site or within analysis carried out at the specialist laboratory.

6.1.6. Phenol and Cresols have been identified within select locations within groundwater sampled from the GPSZ. Where water quality standards exist, the corresponding concentrations are only slightly elevated.

[7] Dense, Non-Aqueous Phase Liquid

Contaminant Sources Modelled within the DQRA

6.1.7. SGP has assessed that hydrocarbon impacts to the Secondary A Aquifer underlying the site were present, and that this was in turn acting as a migration pathway, although concentrations of pollutants in the downstream watercourse were undetectable with the exception of traces of glycols.

6.1.8. The projected extent of the hydrocarbon and solvent contaminated coalesced plumes within the northern and central parts of the development area have been modelled by C.E Geochem Ltd using specialist three-dimensional plume modelling, the results of which, are provided within the drawings which accompany the report of Appendix C.

6.1.9. Given the length of time since the primary sources were removed, it is considered likely that the detected plume is either stable or receding.

Contaminants Excluded from DQRA Modelling

6.1.10. Glycols are present in the groundwater but at relatively low concentrations and significantly below the adopted Tier 2 criteria. There have therefore not been modelled within this controlled waters DQRA.

6.1.11. The CFC dichlorodifluoromethane (Freon 12). This is present at a maximum concentration of 2,000 µg/l but appears to be confined to the northern and central parts of the site. The CFC would be expected to strongly partition to vapour phase on discharge to the surface, so does not pose a risk of pollution to surface waters. This CFC has low environmental toxicity, and a UK environmental standard is not available; the Danish Drinking Water Standard adopted was not exceeded. This is therefore not considered as a CoC for the Site and has not been modelled within this DQRA.

6.1.12. A number of PAHs appear to be elevated above corresponding water quality standards. This includes naphthalene, fluoranthene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(ghi)perylene. The presence of these are generally within Phase 2B but there are select locations within the former reservoir.

6.1.13. The presence of such PAHs within the secondary A Aquifer are ubiquitous and not considered to be specifically sourced to the Site. The most probable cause of this is from the bands of coal and seatearth which are commonplace in the Rough Rock Sandstone and have been recorded within exploratory holes cored within the bedrock on the Site. The corresponding EQS for many of the PAHs are very low, for example, the EQS for fluoranthene is 0.0063 µg/l which is below the reporting limits of detection for most laboratories.

6.1.14. In comparison with more recent groundwater sampling, the presence of TPH fractions exceeding C12 (aromatic) and C10 (aliphatic) are negligible and hence these have been removed from assessment within this DQRA model.

6.2. Receptors

6.2.1. The Secondary A Aquifer within the Rough Rock sandstone is considered a receptor of residual contamination from historical operations on Site. The shallow groundwater in the Rough Rock is considered likely to be in hydraulic continuity with the deeper strata of the Rossendale Formation which is represented locally by shales and mudstones. Given the almost exclusive presence of light non-aqueous phase liquids as the primary pollution sources on the Site, however, impacts to groundwater bodies other than the Rough Rock aquifer are considered unlikely and have not been considered further within the DQRA model.

6.2.2. The tributary of the Pigs Lee Brook which flows through the Site and discharges 200m off site to the southwest is not considered a receptor of contaminated groundwater. This is because within the area of the contaminant plume, the watercourse is located above rockhead and above a band of overlying glacial clay.

6.2.3. Once this watercourse is diverted to along the eastern Site boundary as per detailed design, it is to be lined with 300mm of clean and validated clay. The southern section of this watercourse (Area 2F) of Phase 2, (close to HS1), will flow within a newly constructed culvert. Although the previous culvert is thought to have been damaged and consequently, has been allowing the surrounding groundwater to flow into it, this culvert is to be grouted as part of the groundworks. The tributary is therefore not considered to be in hydraulic continuity with the Secondary A Aquifer until it flows to around 200m downstream of the Site boundary where it enters an open watercourse.

6.2.4. The Proposed attenuation pond located within the northeastern part of Phase 2 (within the northern area of the former Mill Lodge Reservoir) will also be lined with 300mm clay and will sit above rockhead. It is not therefore considered that this will exist as a receptor for contaminated groundwater within the sandstone bedrock aquifer.

6.3. Pathways

6.3.1. Most contaminants of concern identified on Site are Light Non-Aqueous Phase Liquids (LNAPL) hydrocarbons up to C12 carbon bandings, which, if present as free product, would tend to float on top of the groundwater presenting a reservoir of pollutant at shallow depth. As per the Outline Remediation Strategy, a key remediation objective is to remove LNAPL where it is encountered. It is intended that heavily impacted soils are also removed for treatment to allow their re-use within the site. This essentially will leave only hydrocarbons adsorbed to soils or in dissolved phase in pore water and groundwater. Both the residual soils and the

retained treated soils could, however, continue to leach hydrocarbons to the dissolved phase in soil pore water which may migrate into the Secondary 'A' Aquifer.

6.3.2. A relict drain comprising a clay pipe set within the weathered bedrock located along the eastern boundary of Phase 2B (close to HS11) has been identified with an outfall that is likely to be to the culvert. This drain has been previously considered as a potential pathway to allow migration of contaminants from Phase 2B possibly connecting to the tributary of the Pigs Lee Brook located further to the south. It is understood this pipe has since been removed and hence is no longer considered as a preferential pathway.

6.3.3. Similarly, the weir located south of the former Mill Lodge Reservoir is also considered to have potentially affected groundwater flow. The top part of this structure is to be dismantled and removed whereas the reminder is to remain in-situ and be grouted up.

6.3.4. A wall which is potentially keyed into the bedrock and located along the southern boundary of Phase 2B has previously been considered to act as a cut off for contaminant flow. This wall has been investigated and has been found to not be keyed into the bedrock and is considered unlikely to be acting as a barrier to plume migration. A band of coal with seatearth is located within the sandstone which appears to subcrop very close to this feature located close to the boundary of Phase 2B and C (see Appendix F for a photo of the outcrop alongside its location). The findings made by C.E. Geochem through undertaking their assessment would suggest that this coal outcrop is restricting plume migration down-gradient rather that the initially considered sub-surface 'barrier' wall.

6.4. Conceptual Site Model for Controlled Waters DQRA

6.4.1. The potential source-pathway-target target relationships which either exist already (and will remain following completion of remediation works), or may be introduced, by the remediation / construction works are summarised in the following table, together with commentary on the likelihood of significant pollution based on site/method specific factors and identification of the level of RTM assessment appropriate for generation of RTVs for residual / treated soils on the Site.

Table 6.1: Conceptual Site Model for Controlled Waters

Source / Contaminant	Receptor	Pathway
Adsorbed hydrocarbons in residual made ground following excavations to remove free product and grossly contaminated soils, or in treated soils following treatment to reduce total concentrations & dissolved phase hydrocarbons in groundwater	Secondary 'A' Aquifer in Rough Rock Sandstone	Leaching and infiltration of dissolved phase contamination to groundwater and migration to south down hydraulic gradient to nominal compliance point in accordance with standard practice for resource protection
	Surface Water in downstream watercourse	Leaching and infiltration of dissolved phase contamination to groundwater and migration to south down hydraulic gradient to surface watercourse.

7. DQRA for Controlled Waters: Input Values, Justification and Sensitivity Analysis

7.1. All three tiers of soils assessment, and the tier 3 groundwater assessment have been completed using site-specific data. Where data are unavailable, certain conservative assumptions have been made and library data is referenced with associated justification.

7.2. It is intended that the criteria be used to assess both residual materials left in-situ following the planned excavation of unacceptably contaminated soils (and any free product if identified), and for any treated materials to assess their potential for retention within the site/confirm recovery under the site MMP.

7.3. Contaminants of Concern Alongside Adopted Threshold Criteria

7.3.1. The contaminants of concern, as detailed within Section 6.1 earlier are as follows:

Table 7.1: Contaminants of Concern with Adopted Threshold Criteria to be used within DQRA Mode

Contaminant of Concern	Adopted Threshold Value (µg/l) unless otherwise stated	Source	Justification
Total Petroleum Hydrocarbons			
Aliphatic >C6-C8	15,000	DWS	WHO 2008
Aliphatic >C8-C10	300	DWS	WHO 2008
Aliphatic >C10-C12	300	DWS	WHO 2008
Aromatic >EC5-EC7	10	EQS (AA) for benzene	Benzene is used as an indicator compound
Aromatic >EC7-EC8	74	EQS (AA) for toluene	Toluene is used as an indicator compound
Aromatic >EC8-EC10	30	EQS (AA) for xylene	Xylene is used as an indicator compound
Aromatic >EC10-EC12	90	DWS	WHO 2008
BTEX & MTBE			
Benzene	10	EQS (AA)	Freshwater Priority Hazardous EQS[8]
	50	EQS (MAC)	
Toluene	74	EQS (AA)	Freshwater Specific Pollutant EQS
Ethylbenzene	30	DWS	WHO 2008
m- p- Xylenes	30	EQS (AA)	Freshwater Specific Pollutant EQS
o-Xylenes	30	EQS (AA)	Freshwater Specific Pollutant EQS
MTBE	15	DWS	WHO 2008
Chlorinated Solvents			
(Cis) 1-2-Dichloroethene	50	DWS	WHO 2008
1,2-Dichloroethane	10	EQS (AA)	Freshwater Priority Hazardous EQS
DCM	20	EQS (AA)	Freshwater Priority Hazardous EQS
Chloroform	2.5	EQS (AA)	Freshwater Priority Hazardous EQS
TCE	10	EQS (AA)	Freshwater Priority Hazardous EQS
PCE	10	EQS (AA)	Freshwater Priority Hazardous EQS
Vinyl Chloride	0.5	DWS	WHO
Phenols			
Phenol	7.7	EQS (AA)	Freshwater Priority Hazardous EQS

[8] *EQS Updated February 2022*

7.4. Physio-Chemical Characteristics of Contaminants of Concern

7.4.1. The adopted physiochemical characteristics of the contaminants of concern are those published in authoritative guidance on the derivation of various generic assessment criteria for human health.

7.4.2. A discussion of the selection process for the parameters of contaminant, soil, groundwater and receptor are provided below whilst values and their justification / source are referenced within Appendix A.

7.5. Compliance Point for Controlled Waters

7.5.1. Compliance points down hydraulic gradient of the source boundary (southern edge of Phase 2B) have been selected to be suitably protective of the Secondary A aquifer and the closest point to the surface watercourse. The CoCs have been categorised in accordance with the JAGDAG list of EA confirmed hazardous and non-hazardous pollutants[9]. These have been applied at the Tier 3 level of the RTM to derive associated remedial target values (RTVs). For EA confirmed hazardous pollutants, a 50m compliance point has been adopted (in line with EA guidance for the RTM model) whereas for confirmed non-hazardous pollutants, a compliance point of 200m has been adopted. Whilst a 50m compliance point for hazardous substances is adopted, it is noted that the downgradient site boundary is 200m from the area covered by this report and hence is considered as a conservative parameter within the model.

7.5.2. The compliance points as detailed above have been selected due to the following:

- In accordance with the Water Framework Directive, the introduction of hazardous pollutants is prohibited and spread of those already within an aquifer is undesirable.

- There are no surface water receptors in hydraulic continuity with the Rough Rock sandstone within the Site; the new tributary of the Pigs Lee Brook flowing through the Site (and its associated attenuation pond) is located above the water table and the base and sides will be lined with 300mm clay. The existing culvert on Site which is known to have been breached and thus has been allowing groundwater to ingress, is to be grouted up imminently.

- The closest point at which a surface watercourse could feasibly receive baseflows from groundwater is where the tributary of the Pigs Lee Brook daylights from its culvert. This is located at 200m south of the southern Site boundary and has been routinely monitored during remedial works, as required by the EA.

[9] EA published on Joint Agencies Groundwater Directive Advisory Group (JAGDAG) January, 2017. Available at: 2018 01 31 Confirmed hazardous substances list_0.pdf

- The Rough Rock Sandstone (a Secondary A Aquifer) is not considered to have strategic resource potential, the groundwater is unlikely to form a potential future resource and the hazardous substance is already in the groundwater.

- The boundary of the Rough Rock Sandstone with the Rossendale Formation Mudstone has been recorded within the Site during drilling. This is located within Phase 2D, at around 100m north of the southern boundary of the full Site. Although this geological boundary is sited at 145m down hydraulic gradient of the source boundary, to ensure an element of conservatism, the compliance point has been pulled forward to ensure that the contaminant concentrations within the aquifer are acceptable before this aquifer boundary is reached.

7.6. Infiltration through Soils

7.6.1. Soil infiltration rate has been derived from annual average rainfall for Rochdale (closest climatic station to the Site) as provided by the Meteorological Office10). This details an average of 1,197.22mm/yr, which equates to 3.2mm daily average. Taking account of rainfall being seasonal, the average highest rainfall of 4.48mm is recorded for the month of December. An average of 4mm has been adopted where 50% infiltration occurs (which allows for buildings and areas of hardstanding of the completed residential development). This equates to an infiltration rate of 0.002m/day.

7.7. Hydraulic Gradient (and Direction of Groundwater Flow)

7.7.1. Interpolated groundwater contours and gradients from the most recent monitoring recorded in both January and April 2024 are provided in Appendix E. The gradient and direction of three possible groundwater flows were calculated during each monitoring round, all from around the approximate source zone (southern/southeastern boundary of Phase 2B) and are summarised in Table 7.2 below.

Table 7.2: Hydraulic gradients recorded on Site during recent Monitoring

Flow Alignment	Direction of Flow	Calculated Hydraulic Gradient (January 24)	Calculated Hydraulic Gradient (April 24)	Average
HG1	SSW	0.052305	0.047451	0.049878
HG2	SE	0.073003	0.05548	0.0642415
HG3	SSE	0.089285	0.068297	0.078791
			Average	**0.06430**

7.8. Hydraulic Conductivity within Aquifer

7.8.1. Falling head tests were undertaken within the vicinity of the GPSZ on Phase 2B, 2C and the former Mill Lodge Reservoir within several monitoring wells in March 2024. The results and

[10] Rochdale - Climate Station (Greater Manchester) UK climate averages - Met Office

associated calculations are reported in R15). A summary of the findings are detailed within the table below.

Table 7.3: Summary of Falling Head Testing on Site

Monitoring Well	Response Zone		Stratum	Result		Comments
	Mbgl	mAOD		m/s	m/d	
RBH601 (D)	9.0-11.0	139.924 – 137.924	Sandstone	1.09E-05	0.942	Located below coal/seatearth band
RBH602	7.5-10.5	140.531 – 137.531	Sandstone	8.06E-06	0.696	Located above coal/seatearth band
RBH603 (S)	3.0-5.0	144.304 – 142.304	Sandstone	6.65E-06	0.575	Located above coal/seatearth band
RBH605	5.5-7.5	142.259 – 140.259	Sandstone	7.12E-06	0.615	Located above coal/seatearth band
RBH607	4.0-6.0	144.007 – 142.007	Sandstone	4.65E-06	0.402	Located above coal/seatearth band
RBH614 (S)	9.0-12.0	146.108 – 144.108	Sandstone	6.45E-06	0.557	Located below coal/seatearth band
RBH615(S)	3.0-5.0	148.078 – 146.078	Sandstone	8.51E-06	0.735	Located below and through suspected coal/seatearth band
				Average	**0.646**	

7.8.2. Artesian flow of groundwater was encountered within several bores, during drilling of the '6 series' wells in December 2023 and January 2024. All such bores were located within or close to the southeastern boundary of Phase 2B (located at the western edge of the former reservoir). These have been excluded from the piezometric survey of the Site.

7.8.3. It is, acknowledged that artesian conditions within the sandstone aquifer may be having an influence on the groundwater flow potential and therefore may be assisting to confine or partially confine the GPSZ to the area further north (i.e. to Phase 2B).

7.9. Organic Carbon residing within Fill Materials

7.9.1. Data collected through previous extensive investigation has recorded an average of 1.172% TOC (i.e. 0.01172 FOC) within the site-won fill materials. These predominantly comprise cohesive material of sandy clay although clayey sands are also present but very much in the minority.

7.10. Carbon within the Rough Rock Sandstone

Bands of Coal with/without Underlying Seatearth

7.10.1. During the intrusive investigation which spanned November 2023 to January 2024, a band of coal followed by seatearth clay was identified within thirteen of the fifteen bores. It is possible that coal / seatearth may also be present within RBH615 at between 3.0 and 3.38m although core loss is recorded. Coal was absent in RBH612 located further to the south of Phase 2B.

7.10.2. The top of the coal with seatearth was encountered between 147.408m AOD in RBH614 in the northwestern area of Phase 2B11 and 137.532m AOD in RBH602 in the eastern part of the Former Mill Lodge Reservoir.

7.10.3. The coal band is observed as outcropping just to the south of RBH607. A band of coal is recorded at the base of the sandstone within RBH608 recorded between 6.0 and 6.5mbgl and which is located south of the coal outcrop. This is considered as a separate (deeper) band of coal within the Rough Rock Sandstone and it sits directly above the Rossendale Mudstone Formation.

7.10.4. The coal was sampled and analysed within the laboratory for its carbon (TOC%) content which returned a result of 22% (i.e. an FOC of 0.22).

Bands of Coal with/without Underlying Seatearth

Four samples of sandstone bedrock (considered not to specifically be contaminated with hydrocarbons) were collected during the ground investigation of December 2023 to January 2024 and analysed for TOC. These four results together with existing TOC results from 45no. samples of Rough Rock Sandstone analysed during previous ground investigation on Site have been averaged giving a result of 0.20347% TOC (FOC: 0.00203407). This mean average has then been used within the DQRA model.

7.11. Physical Features of Soils and Bedrock Aquifer Matrices

7.11.1. Site data have been used to determine the physical features of the Rough Rock Sandstone Bedrock and the soil fill that is predominantly site won to bring the Site up to level. Tier 1 of the model uses parameters based on the site won backfill material whereas Tiers 2 and 3 utilise measured parameters of the Rough Rock Sandstone. These are detailed in Table 7.4.

Table 7.4: Physical Features of Soils and Bedrock Aquifer Matrices

Parameter	Soil Fill (Predominantly Site Won and cohesive)	Rough Rock Sandstone
Bulk Density	**1.79** Average measured from 217 tests on Site won fill (testing completed by URL)	**2.41** Average measured from laboratory testing (2 tests) completed by C.E Geochem (report ref: A231001
Total Porosity (fraction)	**0.325** Average measured from 217 tests on Site won fill (testing completed by URL) Calculated from: (1 - (Bulk Density ÷ Particle Density)) x 100.	0.12-0.14 Average used: **0.13** Measured from laboratory testing (2 tests) completed by C.E Geochem (report ref: A231001)
Air Filled Porosity	**0.27026** Average calculated from 217 tests on Site won fill (testing completed by URL) Calculated from: Calculated from: 1 - (MC /100) * total porosity derived from bulk density))	0.001 – 0.002 Average used: **0.0015** Recorded from laboratory testing (2 tests as percentage of air voids) completed by C.E Geochem (report ref: A231001)

[11] *If the core loss in RBH615 is coal, as suspected, then the top of the coal is at 148.078m AOD within the NW area of Phase 2B*

Parameter	Soil Fill (Predominantly Site Won and cohesive)	Rough Rock Sandstone
Water Filled Porosity	**0.05287** Average calculated from 217 tests on Site won fill (testing completed by URL) Calculated from: (MC /100) * total porosity (derived from bulk density)	**0.1485** Calculated using average from laboratory testing (2 tests as voids ratio x Degree of saturation) completed by C.E Geochem (report ref: A231001)
Effective Porosity	Use water filled porosity as above.	Use water filled porosity as above.
Particle Density	**2.65** (average of 10. No tests on Site won fill from URL dataset: ref: Brown very sandy very gravelly clay Testing date: 15/09/23	**2.62** Average measured from laboratory testing (2 tests) completed by C.E Geochem (report ref: A231001

7.12. Plume Dimensions

7.12.1. The thickness of the contaminant plume and its width perpendicular to the direction of hydraulic flow is dependent upon the CoC. Table 7.5 below details the contaminant-specific plume dimensions adopted for the model together with justification of the values utilised. These values have been derived through groundwater monitoring and sampling.

Table 7.5: Plume Dimensions

CoC	Plume Width (m)	Plume Thickness (m)	Justification
Petroleum Hydrocarbons			
BTEX & Lighter TPH Aromatic Carbon Bandings (>EC5-EC7 and >EC7->EC8)	67.5	2.6	Spans from RBH320 to RBH326. The associated plume thickness for these contaminants appears to be confined within the upper reaches of the sandstone bedrock and above a band of coal with a basal layer of seatearth. The thickest identified plume of BTEX appears to be in RBH610 where PID readings and olfactory evidence of contamination is observed between 3.4 and 6.0m which is predominantly located above the coal band.
MTBE	36.8	3.0	Spans RBH330 and RBH609(S). Response zone in RBH330 is 3.0m.
TPH Aromatic Carbon bandings >EC8->EC10 and >EC10->EC12	31.2	2.6	Spans between RBH609(S) and RBH320. Contaminant thickness observed through visual and olfactory assessment (plus using PID) within the associated bores (RBH609(S), 321, 610, 611 and 320) is recorded between 0.2m (RBH609) and 2.6m (RBH610). Largest thickness used as a conservative assessment.
TPH Aliphatic Carbon bandings C6-C8	55.3	0.2 (2.6)	Spans RBH609(s) to RBH326. Contaminant thickness observed through visual and olfactory assessment (plus using PID) within (RBH609(S), is recorded at 0.2m. There is no visual and or olfactory evidence of hydrocarbons recorded within the log of RBH330.
TPH Aliphatic Carbon bandings C8-C10 and C10-C12	78.0	2.6	Spans RBH319 to RBH326. Contaminant thickness observed through visual and olfactory assessment (plus using PID) within (RBH609(S), is recorded at between 0.2m (RBH609) and 2.6m (RBH610). Largest thickness used as a conservative assessment.

CoC	Plume Width (m)	Plume Thickness (m)	Justification
Chlorinated Solvents			
Tetrachloroethylene (PCE)	44.26	4.76	Identified in RBH319, 320, 321, 325, 326, 609(S)
Trichloroethylene (TCE)	33.8	4.76	Identified in RBH319, 320, 321, 610(D) & 603(S)
Cis 1,2 Dichloroethene	5.5	4.76	Identified with a plume core in RBH610 and the adjacent RBH321. RBH321 has RZ between 147.174m AOD and 144.174m AOD whereas RZ for RBH610 (D) is between 143.915 and 142.415m AOD. Coal does not appear to be confining the VC concentration. Giving a plume thickness of 4.76m
Vinyl Chloride	78.0	4.76	Appears to span from RBH319 to RBH326. Incorporating: RBH609(S), 610(D), 320, 321, 324, 325, 329 & 615) RBH321 has RZ between 147.174m AOD and 144.174m AOD whereas RZ for RBH610 (D) is between 143.915 and 142.415m AOD. Coal does not appear to be fully confining the VC concentration. Giving a plume thickness of 4.76m
Chloroform (trichloromethane)	16.2	3	Appears to span RBH319 & 320. PID readings are predominantly within made ground above bedrock. Response zone spans 3m.
Dichloromethane	16.2	3	No elevated concentrations but could potentially become a breakdown product of chloroform
Phenol			
Phenol	5	2	RBH609(S) & previously RBH321

7.12.2. Progression of the chloroethene (chlorinated solvent) degradation chain is observed whereby PCE is dechlorinated to TCE then DCE and eventually to VC. This is then degraded into ethene and finally to ethane.

7.12.3. Impact of vinyl chloride within bedrock is observed within RBH321 and the adjacent RBH610(D) located above and below the coal band recorded respectively. C.E. Geochem has considered that although VC has been found to sorb to the coal, the influence of the sorption is limited (refer to Section 4 and Appendix C).

7.13. Contaminant Concentrations at Plume Core

7.13.1. The initial contaminant concentrations used within the model are an important factor in establishing their concentration at the designated receptor. These concentrations, do not, however, impact the derived RTV derived from the model output but instead are used to establish whether remediation of a particular contamination may be necessary at the 100m compliance point as used.

7.13.2. Contaminants within groundwater have been recorded at least biannually since 2021. During this time, contaminant concentrations have shown a general decline, some by two orders of magnitude. C.E Geochem have noted that shrinkage in the coalesced plume has occurred during the monitoring period.

7.13.3. URL undertook twelve weeks of pump and treat trials spanning September to December 2022 and it is noticed that this has had an influence on the reduction in concentration of a number of CoCs.

7.14. Application of Degradation Rates Within DQRA model

7.14.1. As mentioned previously within Section 4, C.E Geochem has undertaken two in-depth studies on the aquifer properties and geochemical conditions of the Rough Rock Sandstone and biodegradation potential of the CoC (as BTEX and specific chlorinated solvents).

7.14.2. The studies provide primary, secondary and tertiary evidence to support that biodegradation is occurring within the Rough Rock Aquifer within the dissolved phase. This, together with the half-lives as specified within the table above have been applied within the DQRA modelling at Tier 3 (for both soils and groundwater).

7.14.3. Published half-lives for carbon range bands are not widely available therefore the approach of using indicator compounds has been pursued12. In general, based on the VOC and TIC analysis, the bulk of the hydrocarbon contaminant mass is made of C6-C10 Aliphatic and C5-C12 Aromatics, the latter which could generally be expected to degrade in a similar manner to BTEX compounds.

7.14.4. For longer chain substances (C10-C12 Aromatic bandings), the lightest PAHs of equivalent carbon range are used, although this is considered a conservative approach as most of the substances detected are single ring compounds with increasingly longer chain aliphatic substitutions at various positions on a single ring.

Table 7.6: Half Lives Derived for CoC from C.E. Geochem Specialist Studies

Contaminant	Derived Half Life (Days)
Benzene (& indicator for: TPH Aromatic >EC5-EC7)	297
Toluene (& indicator for: TPH Aromatic >EC7-EC8)	448
Ethylbenzene	642
Xylenes (total) (& indicator for: TPH Aromatic >EC8-EC10)	804
PCE	1,797
TCE	511
Cis-1,2-DCE	577
VC	730

[12] *CLAIRE Petroleum Hydrocarbon Guidance - final version1.1.pdf*

7.14.5. There are a small number of contaminants that have been identified within the plume, but which make up only a minor constituent. Such CoC alongside published half-lives (as averages where a range is provided) have been used within the model.

Table 7.7: Half Lives used for Minor Constituents of Plume

Contaminant	Derived Half Life (Days)	Justification
MTBE	730	EPA
Chloroform	365,000	Doesn't readily degrade in groundwater
TPH Aliphatic C6-C8	9.9E+100	Recalcitrant unless oxidised
TPH Aliphatic C8-C10	9.9E+100	Recalcitrant unless oxidised
TPH Aliphatic C10-C12	9.9E+100	Recalcitrant unless oxidised
TPH Aromatic >EC10-EC12	1,830	Howard et al, 1991
Dichloromethane	28	Howard et al, 1991
Phenol	6	Howard et al, 1991

7.15. Parameter Sensitivity analysis

7.15.1. Influence various parameters have on the resultant RTV has been investigated. It is noted that the following parameters have an influence on the resultant RTVs derived within the RTM model:

- Mixing zone thickness
- Infiltration rate
- Half-life degradation in water
- FOC in soil
- FOC in aquifer
- Effective porosity
- Octanol-carbon partition coefficient (Koc)
- Application of Degradation: Degradation in dissolved phase only vs degradation in all phases
- Bulk density of aquifer materials
- Hydraulic gradient of aquifer
- Hydraulic conductivity of aquifer
- Plume width perpendicular to hydraulic flow

7.15.2. It is noted that by altering the above input parameters can produce a significant effect on the resultant RTV. This is illustrated using one of the primary CoCs, total xylenes.

Table 7.8: Parameter Sensitivity within DQRA Model Using Total Xylenes

DQRA Input Parameter	Input 1	Input 2	Resultant change	Sensitivity of parameter
half-life for degradation of contaminant in water (Days)	804	10	Changing half-life from 804 days to 10 days alters the groundwater RTV from: 177 µg/l to 58,000 µg/l	**Very large** (increased half-life significantly reduces RTV)
Application of Degradation: Degradation in dissolved phase only vs degradation in all phases	Degradation in dissolved phase only	Degradation in all phases	Changing the degradation from dissolved phase only to all phases alters the groundwater RTV from: 177 µg/l to 626µg/l	**Very large** (applying degradation in all phases to degradation in dissolved phase only significantly reduces RTV)
Effective porosity of aquifer	0.1485	0.096	Changing effective porosity alters RTV the groundwater RTV from: 177 µg/l to 162µg/l	**Moderate** (increasing effective porosity of aquifer significantly increases RTV)
Bulk density of aquifer materials	2.41	2.32	Changing bulk density of aquifer materials alters RTV the groundwater RTV from: 177 µg/l to 160µg/l	**Moderate to Large** (increasing bulk density of aquifer increases RTV)
Hydraulic gradient of aquifer	0.0643	0.044	Changing hydraulic gradient of aquifer materials alters RTV the groundwater RTV from: 177 µg/l to 797µg/l	**Very Large** (increasing hydraulic gradient of aquifer significantly reduces RTV)
Hydraulic conductivity of saturated aquifer (m/day)	0.641	1.48	Changing hydraulic gradient of aquifer materials alters the groundwater RTV from: 177 µg/l to 47.3µg/l	**Very large** (reducing hydraulic gradient of aquifer significantly increases RTV)
FOC in aquifer	0.0020347	0.001	Changing FOC of aquifer materials alters the groundwater RTV from: 177 µg/l to 57.2µg/l	**Very large** (reducing FOC of aquifer significantly reduces RTV
Plume width perpendicular to hydraulic flow	67.5m	10m	Changing plume width alters the groundwater RTV from: 177 µg/l to 341µg/l	**Large** (reducing plume width in aquifer increases RTV)
Plume thickness	2.6m	2m	Changing plume thickness from 2.0 to 2.6m alters RTV the groundwater RTV from: 177 µg/l to 213µg/l	**Large** (reducing plume thickness (mixing zone) significantly increases RTV)

8. Results of Controlled Waters DQRA Assessment

8.1. The RTVs derived using the RTM model for both soils and groundwater using either a 50m compliance point (for hazardous pollutants) and a 200m compliance point for non-hazardous pollutants are presented within Table 8.1 below. The worksheets of the RTM model are contained within Appendix B.

Table 8.1 RTV Assessment Results: Degradation applied (to dissolved pollutants only)

CoC	Compliance Point		Degradation applied to dissolved pollutants only		
		Soil GAC (Resi without plant uptake) 1% SOM	Soil: Tier 3 RTV	Groundwater: Tier 3 RTV	
		(mg/kg)	*(mg/kg)*	*(mg/l)*	*(µg/l)*
Benzene	50m	**0.38**	0.0268	0.0199	19.9
Toluene	50m	**869**	9.45	0.165	165
Ethylbenzene	50m	**83**	0.412	0.145	145
Xylene (Total)	50m	**79**	0.454	0.177	177
MTBE	200m	N/A	0.045	0.273	273
Aliphatic >C6-C8	200m	100	1.36E+06	4.03E+06 mg/l	
Aliphatic >C8-C10	200m	27	**No breakthrough**	**No breakthrough**	
Aliphatic >C10-C12	200m	48	**No breakthrough**	**No breakthrough**	
Aromatic >EC5-EC7	50m	**370**	0.0268	0.0199	19.9
Aromatic >EC7-EC8	50m	**860**	0.565	0.165	165
Aromatic >EC8-EC10	50m	**47**	0.467	0.182	182
Aromatic >EC10-EC12	200m	250	**4.34E+09**	**No breakthrough**	
PCE	50m	**0.18**	0.0723	0.0159	15.9
TCE	50m	0.017	**0.0586**	0.0141	14.1
(Cis) 1-2-Dichloroethene	200m	N/A	**1.17**	0.0693	69.3
Vinyl Chloride	50m	0.00077	**0.000864**	0.000612	0.612
Chloroform (tetra-chloromethane)	50m	**0.026**	0.00464	0.00569	5.69
Dichloromethane	200m	N/A	**0.158**	0.924	924
Phenol	50m	280	**96.1**	1,280mg/l	
	200m		2.94×10^{8}	2.2E+10 mg/l	

Cells shaded in grey show specific criteria to be adopted for soils.

8.2. Table 8.1 details both derived RTVs using RTM alongside Generic assessment criteria (GACs) that have been adopted (and previously agreed with regulatory authorities) for reuse and importation of fill materials, topsoil and subsoil within other phases of the Site.

8.3. It is intended that the above criteria for soils within the cells shaded in grey be used to assess both residual materials left in-situ following the planned excavation of unacceptably contaminated soils and additionally for any treated materials to assess their potential for retention within the site/confirm recovery under the site MMP.

Table 8.2: Concentrations of Contaminants of Concern at Plume Core against RTV for Groundwater

Contaminant of Concern	Contaminant Concentration within Groundwater (as µg/l unless otherwise indicated)	Justification	RTV exceedance? (RTV in µg/l unless otherwise stated)
Total Petroleum Hydrocarbons			
Aliphatic >C6-C8	30,699	RBH319 recorded in January 2023	**No (RTV: 4.03E+06mg/l)**
Aliphatic >C8-C10	10,022	RBH319 recorded in January 2023	**No (RTV: No breakthrough)**
Aromatic >EC5-EC7	233	Prior to the pump and treat trials within Phase 2B held between September and December 2022, concentrations of benzene within the plume core were recorded up to 500 µg/l. Since January 2023, the concentrations within the plume core have generally reduced to less than 100 µg/l. The highest reading of 233 µg/l was recorded in RBH324 in Jan 2023.	**Yes (RTV: 19.9)**
Aromatic >EC7-EC8	118,675	Prior to the pump and treat trials within Phase 2B held between September and December 2022, concentrations of TPH Aromatic C7-C8 carbon bandings within the plume core were recorded up to 155,780 µg/l (RBH320). The sampling of January 2023 recorded highest concentrations of 118,675 µg/l (in RBH319). Monitoring of October 2023 and April 2024, the concentrations have not exceeded 57,000 µg/l in any of the boreholes. As a realistic worst-case, the reading recorded in January 2023 from RBH319 has been used within the model.	**Yes (RTV: 165)**
Aromatic >EC8-EC10	41,555	RBH609(S) – recorded in April 2024. Xylene as an indicator compound.	**Yes (RTV: 182)**
Aromatic >EC10-EC12	676	RBH320 – recorded in January 2024	**No (RTV: No breakthrough)**
BTEX & MTBE			
Benzene	100	Prior to the pump and treat trials within Phase 2B held between September and December	**Yes (RTV: 19.9)**

		2022, concentrations of benzene within the plume core were recorded up to 500 µg/l. Since January 2023, the concentrations within the plume core have significantly reduced to around 50-89 µg/l with the highest reading of 100 µg/l recorded in RBH321 in April 2023.	
Toluene	119,318	Prior to the pump and treat trials within Phase 2B held between September and December 2022, concentrations of toluene within the plume core were recorded up to 196,000 µg/l and occasionally above 170,000 ug/l. The sampling of January 2023 recorded highest concentrations of 119,318 µg/l (in RBH319). Monitoring of October 2023 and April 2024, the concentrations of toluene have not exceeded 62,000 µg/l in any of the boreholes. As a realistic worst-case, the reading recorded in January 2023 from RBH319 has been used within the model.	**Yes (RTV: 165)**
Ethylbenzene	10,780	Prior to the pump and treat trials within Phase 2B held between September and December 2022, concentrations of ethylbenzene within the plume core were recorded up to in the region of 9,000 and 11,000 µg/l although an outlier if 352,056 µg/l was recorded within RBH325. Since January 2023, the readings within the plume core are reported at between 3,000 and 9,000 µg/l with the highest reported reading of 10,780 µg/l within RBH320 in January 2023, this value has been used as a realistic worst-case.	**Yes (RTV: 145)**
Total Xylenes	43,943	The highest readings of 366,050 and 277,267 µg/l were recorded in monitoring of October 2022 in RBH325 and 319, respectively during the pump and treat pilot trials. Since this time, the highest reported readings within the plume core have been between in the order of between 20,000 and 40,000 with the highest reading of 43,943 µg/l recorded within RBH321 (with RBH320 as 43,834 µg/l).	**Yes (RTV: 177)**
MTBE	187.6	The highest reading of 257.6ug/l has been recorded in monitoring of April 2021 in RBH325. Since January 2023, the highest reading of 187.6 ug/l has been reported in RBH324. This value has been used as a realistic worst-case despite the highest readings of 23 ug/l being recorded in any of the wells monitored since October 2023.	**Yes (RTV: 273)**
Chlorinated Solvents			
PCE	39	The highest concentration of 47 ug/l has been recorded within the plume core in Phase 2B during sampling of April 2021 (within RBH319). In January 2023 the highest reading of 39 µg/l has been recorded (within RBH319). This has been used as a realistic current worst-case value within the model despite nothing being recorded above 21 µg/l since October 2023.	**Yes (RTV: 15.9)**
TCE	94	The highest concentration of 110 ug/l has been recorded within the plume core in Phase 2B	**Yes (RTV: 14.1)**

		during sampling of April 2021 (within RBH319). In January 2023 the highest reading of 94 ug/l has been recorded (within RBH319). This has been used as a realistic current worst-case value within the model despite nothing being recorded above 23 µg/l since October 2023.	
(Cis) 1-2-Dichloroethene	105	The highest concentration of 351 µg/l was recorded in April 2021 and values between 169 and 194 µg/l were recorded in October 2022. In January 2023 three results were recorded between 92 and 105 ug/l but in 2024 the highest reading of 62 has been recorded. As a realistic current worst case, a value of 105 ug/l has been used within the model.	**Yes (RTV: 69.3)**
Vinyl Chloride	6.4	The highest concentration of 17.2 µg/l was recorded within RBH319 in April 2021. Since then, two further rounds of monitoring have been completed on this borehole both of which, are much lower. A similar trend has been recorded within RBH320 and RBH324. The highest recorded value since January 2023 is 6.4 µg/l which is considered to reflect a current worst-case scenario	**Yes (RTV: 0.612)**
Chloroform (tetrachloromethane)	10	The highest concentrations of 64 and 58 ug/l were all recorded within the plume core in Phase 2B during sampling of April 2021. In April 2024 the highest reading of 10 µg/l has been recorded (within RBH320). This has been used as a realistic current worst-case value within the model.	**Yes (RTV: 5.69)**
DCM	N/A	The highest concentrations of between 50 and 135 ug/l were all recorded within the plume core in Phase 2B during sampling of April 2021. In October 2022, concentrations have reduced in comparable wells to between 30 and 6 µg/l. Monitoring completed since January 2023 has not identified any elevated DCM above LOD.	**No (RTV: 924)**
Phenol			
Phenol	20	Maximum recorded concentration is within RBH609(S) for January & April 2024 monitoring rounds	**No (RTV: 1,280mg/l)**

9. Conclusions & Recommendations

9.1. Conclusions

9.1.1. From all lines of evidence as presented, the plume core is located in Ph2B and it is concluded that groundwater treatment should focus across the Ph2B area.

9.1.2. C.E. Geochem has provided primary, secondary and tertiary evidence that degradation within the Rough Rock Aquifer is occurring which is applicable to degradation within the dissolved phase.

9.1.3. The results of C.E. Geochem plume visualisation study has concluded that the plume mass has decreased substantially since 2021 Possibly as a result natural degradation and/or on-going remedial works which have included removal of hardstanding and soils and the URL pilot trial. BTEX compounds and chlorinated ethenes are declining with half-lives in the order of 1 to 5 yrs.

9.1.4. The influence of the coal band within the Rough Rock Aquifer as investigated has been identified to play a significant factor in absorbing BTEX and specific chlorinated solvents and limiting the vertical migration of the plume.

9.1.5. The results of the C.E. Geochem microbial profiling studies have identified bacteria that respire both aerobically and anaerobically are present within the contaminant plume with higher communities noted within the plume core as opposed to the plume fringe. This could form the basis of developing treatability trial for enhanced MNA as a potentially viable in-situ method for remediation of groundwater.

9.1.6. Vinyl chloride (VC) is present deeper in the aquifer below the coal, suggestive that it is not absorbing as well as BTEX. Some absorption of VC has, however, been recorded.

9.1.7. Fluctuations in recorded concentrations of VC and toluene/TPH aromatic EC7-EC8 in RBH603(S) suggests that there may be some movement in shallow groundwater (above the coal) to the southeast/east-southeast beyond Phase 2B to the former reservoir area. Nevertheless, the research that Geochem has undertaken has confirmed that despite some variability within the dataset, all CoCs have shown a downward trend in mass over the 4-year monitoring period (2021 to 2024).

9.1.8. Non aqueous phase liquids in the free phase have not been identified during ground investigation, groundwater monitoring and specialist C.E. Geochem studies.

9.1.9. A 50m compliance point down-gradient from the source area for confirmed hazardous pollutants and 200m down hydraulic gradient of the plume source for confirmed non-hazardous pollutants has been adopted. This has been agreed with the Environment Agency. It is considered this would be protective of the wider shallow aquifer and the open surface water features downstream of the Site, and risks to more distant receptors appear unlikely. It is noted that the site boundary is 200m down hydraulic gradient of the source zone and hence the adopted 50m compliance point is considered to be a conservative parameter within the model.

9.1.10. Using the RTVs generated as a basis for comparison, several of the potential source zones identified contain exceedances of the Tier-3 RTV criteria; this only indicates a potential risk of a viable pollutant linkage, under the definition applied above.

9.2. Recommendations

9.2.1. This report, and the supporting site investigation reports, should be submitted to the Regulators for comment. Once the derived Remedial Target Values outlined within this report are agreed then these will need to be incorporated into a Detailed Remediation Strategy for Phase 2A, 2B and the former Mill Lodge Reservoir. This report would also need to comprise an updated Options Appraisal containing both provision for soils treatment and, methods to address groundwater treatment, or treatment of the unsaturated part of the Rough Rock Aquifer, where residual secondary sources could remain following the preparatory earthworks.

9.2.2. Subject to approval by the regulatory authorities, the RTVs generated within this DQRA will be used to derive remedial criteria for groundwater and soils remedial works and as part of materials management to establish the feasibility of reuse of site won soils (subject to appropriate remediation as necessary). The remedial criteria and strategy will be determined within the Remedial Strategy. It should be noted that the Remedial Strategy will also take account of a reduction of the overall contaminant mass which is suitable for the remedial option adopted. Full details will be provided within the Remedial Strategy report to be produced for Phase 2A, Phase 2B. and the former reservoir.

9.3. Report Limitations

Stratigraphy

i. The evidence of stratigraphy is taken from discrete borehole and trial pit locations, and from factual information provided by other parties. Whilst it is usually reasonable to infer that similar conditions may extend between these locations, caution should be exercised, in particular where conflicting information has been highlighted during review of such information.

Contamination

ii. The Site investigation data used within this DQRA model has involved sampling at discrete locations, and it should be recognised that further areas or types of contamination may exist between investigation positions. The analyses performed are drawn from a typical suite of tests used to screen potentially contaminated land and specified to fall within the available budget made available for the site investigations. It is always possible that other substances may be present that have not been included within the standard range of tests.

Groundwater

iii. Any comments made on groundwater conditions are based on observations or tests made at the time that the work was carried out. It should be noted that groundwater levels and concentrations of substances may vary according to seasonal or weather-related effects, sometimes in an unpredictable fashion.

General

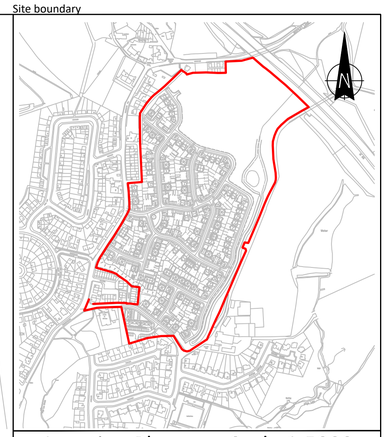
iv. This report has been prepared by Smith Grant LLP (SGP) for the sole and exclusive use of Barratt Developments PLC trading as Barratt Manchester. Reasonable skill, care and diligence has been exercised within the budget available, and in accordance with the technical requirements of the brief. Notwithstanding the efforts made by the professional team in undertaking the assessment and preparing this report, it is possible that other ground conditions and contamination as yet undetected may exist. Reliance on the findings of this report must therefore be limited accordingly. Such reliance must be based on the whole report and not on extracts which may lead to incomplete or incorrect conclusions when taken out of context.

v. SGP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

DRAWINGS



Site boundary



Location Plan Scale 1:5000

Notes:

Site boundary

Borehole Locations

Depth to coal layer (m AOD) 144.424-143.924

Notes

1. This plan is to be read in conjunction with the associated Completion Report.
2. The residential layout depicted on this plan is extracted from drawing ***'491-ED-08'*** supplied digitally by Barrat Homes Manchester.
3. Due to potential live services and issues associated with withdrawal of support; remediation works have been carried out to within circa 1m of the site boundary unless otherwise detailed.
4. All CBR tests were carried out by Murray Rix.

Survey Information:

Co-ord System:	Co-ord Type:	Primary Survey Control:	Secondary Survey Control:
Local Grid	Grid	Leica SmartNet	Site

Rev	Date	Amendment	Drawn	Checked

Urban Regen
ESTABLISHED 2001

Client:
Barratt Homes
Manchester

Project:
Waldmers Wood
Former Tetrosyl Works

Title:
Borehole Locations

Scale:	First Issue:	Drawn:	Checked:
1:200	12/01/2024	R. Corrigan	G. Bailey

Drawing No: 333/12/01/24

Revision:

WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

Buyers are warned that this is a working drawing and is not intended to be treated as descriptive material describing, in relation to any particular property or development, any of the Specified matters prescribed by any Order made under the above Act. The contents of this drawing may be subject to change at any time and alterations and variations can occur during the progress of the works without revision of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially from those shown. Nor do the contents of this drawing constitute a contract, part of any contract or warranty.

M66 MOTORWAY

Masons Arms (PH)

BENTLEY LANE

The Barn

158.5m

Existing Houses

Existing Houses

WALMERSLEY OLD ROAD

Path (um)

Existing retained public right of way

Proposed link to existing public right of way

Proposed link to existing public right of way

Existing retained public right of way

Existing Public House

Existing Houses

Existing Houses

PHASE 1A

PHASE 2A

PHASE 2B

PHASE 2H

PHASE 2C

PHASE 2G

PHASE 1B

PHASE 2D

PHASE 2F

PHASE 2E

Approximate location of proposed pond

Ecological protection zone

BL:145.70
Pond Area:
1008sqm

SITE ACCESS

Entrance Statement

Sales

Show Home

Show Home

Pedestrian Link onto Walmersley Old Road

Embankment

Embankment

Embankment

Bridleway

Existing Houses

BEVIS GREEN

LUMN STREET

Existing Houses

NOTE
Mill Road to be upgraded - Details to be agreed with Highway Officer

Proposed bollarded emergency link to Mill Road

Indicates line of proposed main watercourse (TBC)

Area to be retained as BOAT for farm access

Existing Houses

Existing Houses

Existing Farm Buildings

EXISTING OPEN SPACE (FARMLAND)

Scale Bar
0m 5m 10m 15m 20m 25m 30m 35m 40m 45m 50m 60m 70m 80m 90m 100m

REV	DESCRIPTION	DATE	DRAWN
G	Remediation phases updated to suit most recent phasing plan.	29.11.23	BJM
F	Remediation phases updated to suit Urban Regen Plan.	12.01.23	BJM
E	Remediation phases updated to suit NHBC comments.	26.10.22	BJM
D	Remediation phases updated to suit Urban Regen plan.	26.05.22	FB
C	Latest planning layout added. Approximate Vent Shaft location added.	18.11.21	RB
B	Amended to suit latest phase 1 remediation boundary & drainage design.	06.12.19	DK
A	Amended to show proposed phasing and new potential drainage outfalls.	15.03.18	DK

BARRATT HOMES

MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job
Tetrosyl
Bury

Title
Remediation Phasing Plan

Design By	Date	Drawing Number	Rev
DK	19.02.18	456/ED/05	G
C.A.D By DK	Scale 1:500		

APPENDIX A

RTM Input Values & Associated Justification

R2174 Tetroxyl

DQRA for Controlled Waters for Phase 2A, 2B Former Reservoir Jun-24

Physico-chemical parameter of CoC	Units	Benzene	Reference	Justification	Toluene	Reference	Justification	Ethylbenzene	Reference	Justification	Xylene (total)	Reference	Justification	TPHCWG Aliphatic C8-C8	Reference	Justification	TPHCWG Aliphatic C8-C10	Reference	Justification	TPHCWG Aliphatic C10-C12	Reference	Justification	TPHCWG Aromatic C5-C7	Reference	Justification	TPHCWG Aromatic C7-C8	Reference	Justification	TPHCWG Aromatic C8-C10	Reference	Justification	TPHCWG Aromatic C10-C12	Reference	Justification	MTBE	Reference	Justification	PCE	Reference	Justification	TCE	Reference	Justification	cis 1,2, DCE	Reference	Justification	Vinyl Chloride	Reference	Justification	Chlorofor m	Reference	Justification	DCM	Reference	Justification	Phenol	Reference	Justification
Chemical Type	N/A	Non-polar organic	SC050021 / Benzene SOV		Non-polar organic	SC050021 / Toluene SOV		Non-polar organic	SC050021 / Ethylbenz ene SOV		Non-polar organic	SC050021 / Xylene SOV		Non-polar organic			Non-polar organic			Non-polar organic			Non-polar organic	SC050021 / Benzene SOV		Non-polar organic	SC050021 / Toluene SOV		Non-polar organic			Non-polar organic	SAULs		Non-polar organic																							
Target Concentration	mol/l	0.01	WFD 2015	EQS See R2174C-R09	0.074	EQS (AA)		0.01	WFD 2015		0.03			1.0	DWS	WHO 2008	0.3	DWS	WHO 2008	0.3	DWS	WHO 2008	0.01	WFD 2015	EQS See R2174C-R09	0.074	DWS		0.09	DWS		0.09	DWS		0.015	DWS		0.01	EQS (AA)		0.01	EQS (AA)		0.05	DWS		0.0005	DWS		0.00025			0.02			0.0077		
Henry's Law Constant	Cm3/Cm3	0.182	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value	0.221	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value	0.270	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value	0.2405	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value for p- & m- xylenes (which predominate within Table 4.3. P102 average recommended value for p- & m- xylenes (which	27.3	S4Uls	Referred to as Air-water partition coefficien ts	41.5	S4Uls	Referred to as Air-water partition coefficien t	64.4	S4Uls	Referred to as Air-water partition coefficien t	0.182	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value for benzene	0.221	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value for toluene	0.2405	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value for p- & m- xylenes	0.0174	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 2.4. P29 for naphthalene	0.01	Determination of Henry's law constant for methyl tert-butyl ether (MTBE) at groundwater temperatures	at 10 degrees celcius	0.865	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 3.2 P.65. Recommended value	0.418	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 3.2 P.65. Recommended value	0.147	Chemical Properties for Calculation of Impact to Groundwater Soil Remediation Standards		0.779	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 3.2 P.65. Recommended value	0.15	https://apps.publ.ap.a.gov/wor ks/%2F179235.pdf p. 134			0.0898	Chemical Properties for Calculation of Impact to Groundwater Soil Remediation Standards		0.066	Chemical Properties for Calculation of Impact to Groundwater Soil Remediation Standards	
Organic carbon - water partition coefficient (Koc)	l/kg	79	CL:AIRE (2017)' Petroleum Hydrocarbons in Groundwater'*	Table 5.1. P23	250	CL:AIRE (2017)' Petroleum Hydrocarbons in Groundwate r'*	Table 5.1. P23	432	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102. Recommended value	470	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value for p- & m- xylenes (which	4000	CL:AIRE (2017)' Petroleum Hydrocarbons in Groundwa ter'*	Table 5.1. P23	32,000	CL:AIRE (2017)' Petroleum Hydrocarb ons in Groundwa ter'*	Table 5.1. P23	250,000	CL:AIRE (2017)' Petroleum Hydrocarb ons in Groundwa ter'*	Table 5.1. P23	79	CL:AIRE (2017)' Petroleum Hydrocarbons in Groundwa ter'*	Table 5.1. P23	250	CL:AIRE (2017)' Petroleum Hydrocarb ons in Groundwa ter'*	Table 5.1. P23	470	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 4.3. P102 average recommended value for p- & m- xylenes	1,288.20	EA, Draft R&D Technical Report PS-079/TR1 September 2003	Table 2.4. P29 for naphthalene inverse log for 3.11	12.3	Phenyl-tert-butyl ether (MTBE) bioremediation studies. An Microbial		269	SC050021 /SR7		141	SC050021 /SR7		36		See Kd				See Kd			3.35		
Half-life for degradation in water	days	480	C.E.Geochem Plume Visualisation Model	Site specific assessment	396	C.E.Geochem Plume Visualisation Model	Site specific assessment	880	C.E.Geochem Plume Visualisation Model	Site specific assessment	665	C.E.Geochem Plume Visualisation Model	Site specific assessment	9.90E+100	Internet search. Geneca	Based on octane. Recalcitrant unless oxidised	9.90E+100	Internet search. Geneca	Based on octane. Recalcitrant unless oxidised	9.90E+100	Internet search. Geneca	Based on octane. Recalcitrant unless oxidised	483	C.E.Geochem Plume Visualisation Model	Site-specific assessment using benzene as surrogate	396	C.E.Geochem Plume Visualisation Model	Site-specific assessment using toluene as surrogate	665	C.E.Geochem Plume Visualisation Model	Site-specific assessment using xylene (total) as surrogate	1,830	Average, Howard et al	Naphthalene as surrogate	730	EPA		1033.6	C.E.Geochem Plume Visualisation Model	Site specific assessment	607	C.E.Geochem Plume Visualisation Model	Site specific assessment	775	C.E.Geochem Plume Visualisation Model	Site specific assessment	760	C.E.Geochem Plume Visualisation Model	Site specific assessment	607	C.E.Geochem Plume Visualisation Model	Site specific assessment	365,000	General internet search	Doesn't readily degrade in groundwater	28	Howard et al 1990		6	Howard et al 1990	

APPENDIX B

RTM Worksheets

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Benzene		from Level 1
Target Concentration	C_T	1.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: **Simulate vertical dispersion in 1 direction**

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.00E-01	mg/l	*Maximum concentration recorded*
Half life for degradation of contaminant in water	$t_{1/2}$	2.97E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	2.33E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	6.75E+01	m	*SS calcs from gqwater sampling*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site-Specific for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone - water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.61E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	7.90E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.61E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

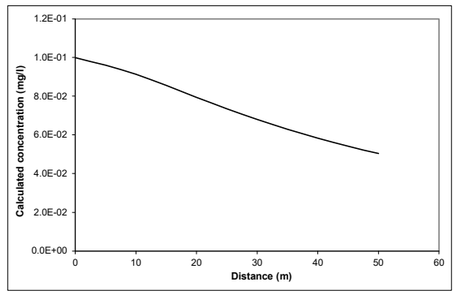
Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	3.61E+00	fraction
Decay rate used	λ	6.47E-04	d^{-1}
Rate of contaminant flow due to retardation	u	7.69E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.04E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.99E+00**	

Remedial Targets

Remedial Target		**1.99E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.04E-02**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	**1.0E-01**
2.5	**9.80E-02**
5.0	**9.60E-02**
7.5	**9.39E-02**
10.0	**9.14E-02**
12.5	**8.86E-02**
15.0	**8.56E-02**
17.5	**8.25E-02**
20.0	**7.94E-02**
22.5	**7.64E-02**
25.0	**7.35E-02**
27.5	**7.07E-02**
30.0	**6.80E-02**
32.5	**6.54E-02**
35.0	**6.29E-02**
37.5	**6.06E-02**
40.0	**5.83E-02**
42.5	**5.62E-02**
45.0	**5.42E-02**
47.5	**5.22E-02**
50.0	**5.04E-02**

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Benzene		from Level 1
Target Concentration	C_T	0.01	mg/l	from Level 1
Dilution Factor	DF	1.73E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	2.97E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	2.33E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	6.75E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled po*
Hydraulic gradient	i	1.53E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.61E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	6.59E-01	m/d
Retardation factor	Rf	3.61E+00	fraction
Decay rate used	λ	6.47E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.53E-01	fraction
Rate of contaminant flow due to retardation	u	1.83E-01	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.34E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.58E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**2.72E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		2.68E-02	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**6.34E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	7.90E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.61E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

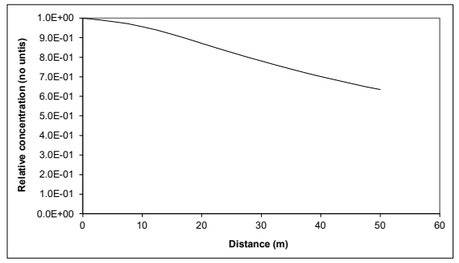
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.91E-01**	**0.00E+00**
5.0	**9.83E-01**	**0.00E+00**
7.5	**9.72E-01**	**0.00E+00**
10.0	**9.57E-01**	**0.00E+00**
12.5	**9.38E-01**	**0.00E+00**
15.0	**9.17E-01**	**0.00E+00**
17.5	**8.94E-01**	**0.00E+00**
20.0	**8.71E-01**	**0.00E+00**
22.5	**8.48E-01**	**0.00E+00**
25.0	**8.25E-01**	**0.00E+00**
27.5	**8.02E-01**	**0.00E+00**
30.0	**7.81E-01**	**0.00E+00**
32.5	**7.60E-01**	**0.00E+00**
35.0	**7.40E-01**	**0.00E+00**
37.5	**7.20E-01**	**0.00E+00**
40.0	**7.02E-01**	**0.00E+00**
42.5	**6.84E-01**	**0.00E+00**
45.0	**6.67E-01**	**0.00E+00**
47.5	**6.50E-01**	**0.00E+00**
50.0	**6.34E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Chloroform (Trichloromethan		from Level 1
Target Concentration	C_T	2.50E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.70E-02	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	3.65E+05	days	*Doesn't readily degrade in groundwater*
Calculated decay rate	λ	1.90E-06	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.62E+01	m	*RBH319 & 320*
Plume thickness at source	Sy	3.00E+00	m	*MW response zone is 3m*
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - water filled porosity for sandstone*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.25E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	9.53E+00	fraction
Decay rate used	λ	1.99E-07	d^{-1}
Rate of contaminant flow due to retardation	u	2.91E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	7.47E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.28E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	5.25E-01	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.25E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

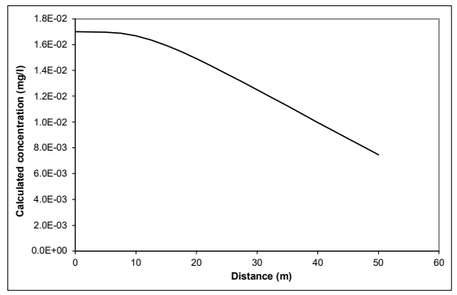
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.7E-02
2.5	1.70E-02
5.0	1.70E-02
7.5	1.69E-02
10.0	1.67E-02
12.5	1.64E-02
15.0	1.59E-02
17.5	1.55E-02
20.0	1.49E-02
22.5	1.43E-02
25.0	1.37E-02
27.5	1.31E-02
30.0	1.25E-02
32.5	1.19E-02
35.0	1.12E-02
37.5	1.06E-02
40.0	9.97E-03
42.5	9.34E-03
45.0	8.71E-03
47.5	8.09E-03
50.0	7.47E-03

Remedial Targets

Remedial Target		**5.69E-03**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**7.47E-03**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Chloroform (Trichlorometha		from Level 1
Target Concentration	C_T	0.0025	mg/l	from Level 1
Dilution Factor	DF	1.95E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	3.65E+05	days	*doesn't readily degrade in groundwater*
Calculated decay rate	λ	1.90E-06	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	1.62E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - water filled porosity for sandsto*
Hydraulic gradient	i	1.32E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.25E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	5.69E-01	m/d
Retardation factor	Rf	9.53E+00	fraction
Decay rate used	λ	1.99E-07	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.32E-01	fraction
Rate of contaminant flow due to retardation	u	5.97E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.06E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.65E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**8.04E-03**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		4.64E-03	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**6.06E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	5.25E-01	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.25E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

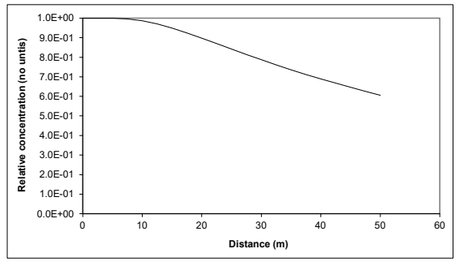
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**1.00E+00**	**0.00E+00**
5.0	**1.00E+00**	**0.00E+00**
7.5	**9.96E-01**	**0.00E+00**
10.0	**9.87E-01**	**0.00E+00**
12.5	**9.71E-01**	**0.00E+00**
15.0	**9.49E-01**	**0.00E+00**
17.5	**9.25E-01**	**0.00E+00**
20.0	**8.98E-01**	**0.00E+00**
22.5	**8.70E-01**	**0.00E+00**
25.0	**8.42E-01**	**0.00E+00**
27.5	**8.15E-01**	**0.00E+00**
30.0	**7.88E-01**	**0.00E+00**
32.5	**7.62E-01**	**0.00E+00**
35.0	**7.37E-01**	**0.00E+00**
37.5	**7.13E-01**	**0.00E+00**
40.0	**6.89E-01**	**0.00E+00**
42.5	**6.67E-01**	**0.00E+00**
45.0	**6.46E-01**	**0.00E+00**
47.5	**6.26E-01**	**0.00E+00**
50.0	**6.06E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Cis 1,2 Dichloroethene		from Level 1
Target Concentration	C_T	5.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.05E-01	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	5.77E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	1.20E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	2.50E+01	m	*RBH607 - 609*
Plume thickness at source	Sy	4.76E+00	m	*RBH610 and RBH321*
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	7.32E-02	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	2.19E+00	fraction
Decay rate used	λ	5.49E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.27E-01	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	7.58E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.39E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	3.60E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	7.32E-02	l/kg

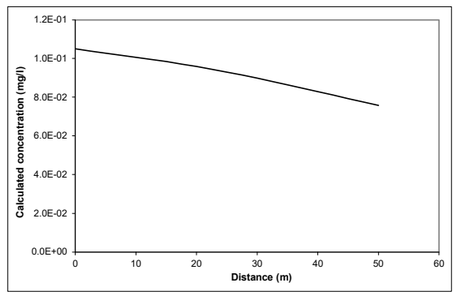
Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x
Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-01
2.5	1.04E-01
5.0	1.03E-01
7.5	1.02E-01
10.0	1.01E-01
12.5	9.95E-02
15.0	9.84E-02
17.5	9.72E-02
20.0	9.59E-02
22.5	9.45E-02
25.0	9.30E-02
27.5	9.15E-02
30.0	8.98E-02
32.5	8.82E-02
35.0	8.64E-02
37.5	8.47E-02
40.0	8.29E-02
42.5	8.11E-02
45.0	7.93E-02
47.5	7.75E-02
50.0	7.58E-02

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets

Remedial Target		**6.93E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**7.58E-02**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Cis 1,2 Dichloroethene		from Level 1
Target Concentration	C_T	0.05	mg/l	from Level 1
Dilution Factor	DF	2.84E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		0	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	5.77E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	1.20E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	5.50E+00	m	from Level 2
Plume thickness in aquifer at source	Sy	4.76E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	9.92E-03	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	7.32E-02	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	4.28E-02	m/d
Retardation factor	Rf	2.19E+00	fraction
Decay rate used	λ	5.49E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	9.92E-03	fraction
Rate of contaminant flow due to retardation	u	1.96E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	4.69E-02	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**2.13E+01**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**3.04E+00**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		1.17E+00	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**4.69E-02**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	3.60E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	7.32E-02	l/kg

Define dispersivity (click brown cell and use pull down list)

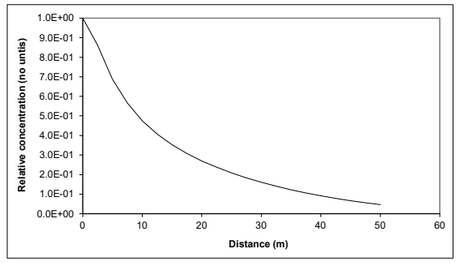
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**8.62E-01**	**0.00E+00**
5.0	**6.88E-01**	**0.00E+00**
7.5	**5.66E-01**	**0.00E+00**
10.0	**4.76E-01**	**0.00E+00**
12.5	**4.08E-01**	**0.00E+00**
15.0	**3.53E-01**	**0.00E+00**
17.5	**3.08E-01**	**0.00E+00**
20.0	**2.70E-01**	**0.00E+00**
22.5	**2.37E-01**	**0.00E+00**
25.0	**2.09E-01**	**0.00E+00**
27.5	**1.84E-01**	**0.00E+00**
30.0	**1.61E-01**	**0.00E+00**
32.5	**1.41E-01**	**0.00E+00**
35.0	**1.23E-01**	**0.00E+00**
37.5	**1.06E-01**	**0.00E+00**
40.0	**9.17E-02**	**0.00E+00**
42.5	**7.84E-02**	**0.00E+00**
45.0	**6.66E-02**	**0.00E+00**
47.5	**5.61E-02**	**0.00E+00**
50.0	**4.69E-02**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Dichloromethane		from Level 1
Target Concentration	C_T	2.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.70E-02	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	2.80E+01	days	*Average in water, Howard et al, 1991*
Calculated decay rate	λ	2.48E-02	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.62E+01	m	*RBH319 & 320*
Plume thickness at source	Sy	3.00E+00	m	*MW response zone is 3m*
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.17E-02	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	1.19E+00	fraction
Decay rate used	λ	2.08E-02	d^{-1}
Rate of contaminant flow due to retardation	u	2.33E-01	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	3.68E-04	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**4.62E+01**	

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 1.17E-02 — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction

Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{oc,n}$ — l/kg

Sorption coefficient for ionised species — $K_{oc,i}$ — l/kg

pH value — pH

acid dissociation constant — pKa

Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient	Kd	1.17E-02	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

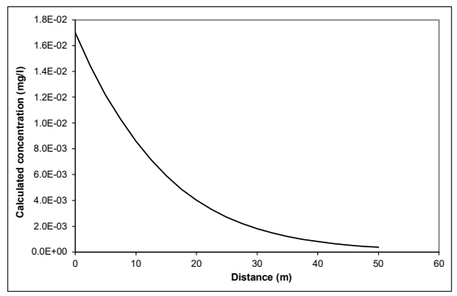
For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Remedial Targets

Remedial Target		**9.24E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**3.68E-04**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.7E-02
2.5	1.44E-02
5.0	1.22E-02
7.5	1.03E-02
10.0	8.59E-03
12.5	7.15E-03
15.0	5.92E-03
17.5	4.88E-03
20.0	4.01E-03
22.5	3.29E-03
25.0	2.69E-03
27.5	2.20E-03
30.0	1.80E-03
32.5	1.48E-03
35.0	1.21E-03
37.5	9.90E-04
40.0	8.11E-04
42.5	6.65E-04
45.0	5.46E-04
47.5	4.48E-04
50.0	3.68E-04

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Dichloromethane		from Level 1
Target Concentration	C_T	0.02	mg/l	from Level 1
Dilution Factor	DF	5.28E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	2.80E+01	days	*Average in water, Howard et al, 1991*
Calculated decay rate	λ	2.48E-02	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	1.62E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	7.93E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.17E-02	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.42E-01	m/d
Retardation factor	Rf	1.19E+00	fraction
Decay rate used	λ	2.08E-02	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	7.93E-02	fraction
Rate of contaminant flow due to retardation	u	2.88E-01	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	3.65E-02	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**2.74E+01**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**2.89E+00**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		1.58E-01	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**3.65E-02**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 1.17E-02 — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction
Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{oc,n}$ — l/kg
Sorption coefficient for ionised species — $K_{oc,i}$ — l/kg
pH value — pH
Acid dissociation constant — pKa
Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient — Kd — 1.17E-02 — l/kg

Define dispersivity (click brown cell and use pull down list)

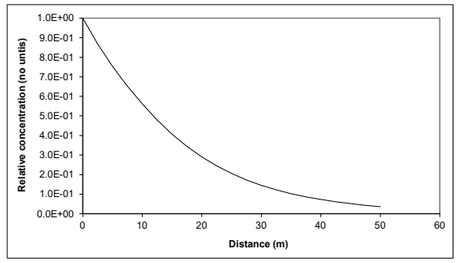
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**8.68E-01**	**0.00E+00**
5.0	**7.54E-01**	**0.00E+00**
7.5	**6.53E-01**	**0.00E+00**
10.0	**5.61E-01**	**0.00E+00**
12.5	**4.80E-01**	**0.00E+00**
15.0	**4.07E-01**	**0.00E+00**
17.5	**3.45E-01**	**0.00E+00**
20.0	**2.91E-01**	**0.00E+00**
22.5	**2.45E-01**	**0.00E+00**
25.0	**2.06E-01**	**0.00E+00**
27.5	**1.73E-01**	**0.00E+00**
30.0	**1.45E-01**	**0.00E+00**
32.5	**1.22E-01**	**0.00E+00**
35.0	**1.03E-01**	**0.00E+00**
37.5	**8.62E-02**	**0.00E+00**
40.0	**7.25E-02**	**0.00E+00**
42.5	**6.10E-02**	**0.00E+00**
45.0	**5.14E-02**	**0.00E+00**
47.5	**4.33E-02**	**0.00E+00**
50.0	**3.65E-02**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Ethylbenzene		from Level 1
Target Concentration	C_T	3.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.08E+01	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	6.42E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	1.08E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	6.75E+01	m	*SS calcs from gwater sampling*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone - for water filled posroity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP (hazardous substance - JAGDAG*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	8.77E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	1.52E+01	fraction
Decay rate used	λ	7.09E-05	d^{-1}
Rate of contaminant flow due to retardation	u	1.82E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.23E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**4.83E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	4.32E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	8.77E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

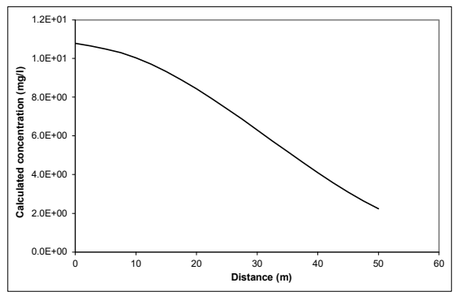
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E+01
2.5	1.06E+01
5.0	1.05E+01
7.5	1.03E+01
10.0	1.00E+01
12.5	9.71E+00
15.0	9.33E+00
17.5	8.90E+00
20.0	8.43E+00
22.5	7.93E+00
25.0	7.41E+00
27.5	6.86E+00
30.0	6.31E+00
32.5	5.75E+00
35.0	5.19E+00
37.5	4.63E+00
40.0	4.10E+00
42.5	3.58E+00
45.0	3.10E+00
47.5	2.65E+00
50.0	2.23E+00

Remedial Targets

Remedial Target		**1.45E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**2.23E+00**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Ethylbenzene		from Level 1
Target Concentration	C_T	0.03	mg/l	from Level 1
Dilution Factor	DF	1.74E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	6.42E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	1.08E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	6.75E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	1.51E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP (hazardous substance - JAGDAG)*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	8.77E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	6.53E-01	m/d
Retardation factor	Rf	1.52E+01	fraction
Decay rate used	λ	7.09E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.51E-01	fraction
Rate of contaminant flow due to retardation	u	4.28E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.50E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.54E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**8.02E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		4.12E-01	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**6.50E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	4.32E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	8.77E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

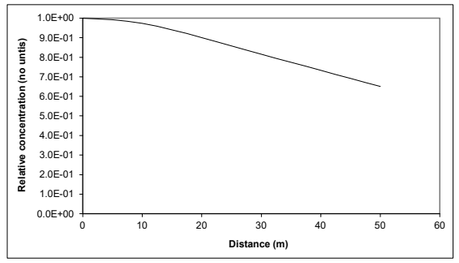
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.96E-01**	**0.00E+00**
5.0	**9.91E-01**	**0.00E+00**
7.5	**9.85E-01**	**0.00E+00**
10.0	**9.74E-01**	**0.00E+00**
12.5	**9.59E-01**	**0.00E+00**
15.0	**9.41E-01**	**0.00E+00**
17.5	**9.21E-01**	**0.00E+00**
20.0	**9.01E-01**	**0.00E+00**
22.5	**8.79E-01**	**0.00E+00**
25.0	**8.58E-01**	**0.00E+00**
27.5	**8.37E-01**	**0.00E+00**
30.0	**8.16E-01**	**0.00E+00**
32.5	**7.95E-01**	**0.00E+00**
35.0	**7.74E-01**	**0.00E+00**
37.5	**7.54E-01**	**0.00E+00**
40.0	**7.33E-01**	**0.00E+00**
42.5	**7.13E-01**	**0.00E+00**
45.0	**6.92E-01**	**0.00E+00**
47.5	**6.71E-01**	**0.00E+00**
50.0	**6.50E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		PCE		from Level 1
Target Concentration	C_T	1.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.90E-02	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	1.80E+03	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	3.86E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	4.43E+01	m	*Calculated*
Plume thickness at source	Sy	4.76E+00	m	*Calculated*
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.47E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	9.88E+00	fraction
Decay rate used	λ	3.90E-05	d^{-1}
Rate of contaminant flow due to retardation	u	2.81E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.45E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.59E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	2.69E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.47E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

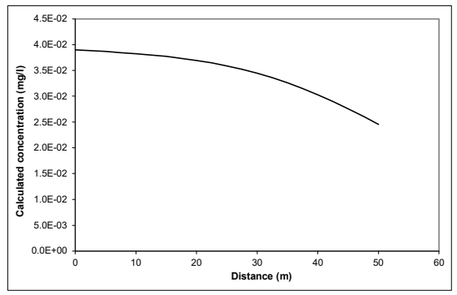
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	3.9E-02
2.5	3.88E-02
5.0	3.87E-02
7.5	3.85E-02
10.0	3.82E-02
12.5	3.80E-02
15.0	3.77E-02
17.5	3.73E-02
20.0	3.69E-02
22.5	3.65E-02
25.0	3.59E-02
27.5	3.52E-02
30.0	3.45E-02
32.5	3.36E-02
35.0	3.26E-02
37.5	3.15E-02
40.0	3.03E-02
42.5	2.90E-02
45.0	2.76E-02
47.5	2.61E-02
50.0	2.45E-02

Remedial Targets

Remedial Target		**1.59E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**2.45E-02**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		PCE		from Level 1
Target Concentration	C_T	0.01	mg/l	from Level 1
Dilution Factor	DF	1.98E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.80E+03	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	3.86E-04	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	3.50E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	4.76E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	1.30E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.47E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	5.60E-01	m/d
Retardation factor	Rf	9.88E+00	fraction
Decay rate used	λ	3.90E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.30E-01	fraction
Rate of contaminant flow due to retardation	u	5.67E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.08E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.10E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**2.18E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		7.23E-02	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**9.08E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	2.69E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.47E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

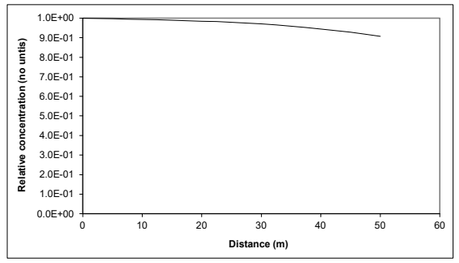
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.98E-01**	**0.00E+00**
5.0	**9.97E-01**	**0.00E+00**
7.5	**9.95E-01**	**0.00E+00**
10.0	**9.93E-01**	**0.00E+00**
12.5	**9.91E-01**	**0.00E+00**
15.0	**9.89E-01**	**0.00E+00**
17.5	**9.87E-01**	**0.00E+00**
20.0	**9.85E-01**	**0.00E+00**
22.5	**9.82E-01**	**0.00E+00**
25.0	**9.79E-01**	**0.00E+00**
27.5	**9.75E-01**	**0.00E+00**
30.0	**9.70E-01**	**0.00E+00**
32.5	**9.65E-01**	**0.00E+00**
35.0	**9.59E-01**	**0.00E+00**
37.5	**9.52E-01**	**0.00E+00**
40.0	**9.45E-01**	**0.00E+00**
42.5	**9.37E-01**	**0.00E+00**
45.0	**9.28E-01**	**0.00E+00**
47.5	**9.18E-01**	**0.00E+00**
50.0	**9.08E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		TCE		from Level 1
Target Concentration	C_T	1.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	9.40E-02	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	5.11E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	1.36E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.38E+01	m	*RBH6319- 610*
Plume thickness at source	Sy	4.76E+00	m	*RBH610 and RBH321 coal is not confining*
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP hazardous substance (JAGDAG)*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.38E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	6.48E+00	fraction
Decay rate used	λ	2.09E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.28E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	6.65E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.41E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	1.66E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.38E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

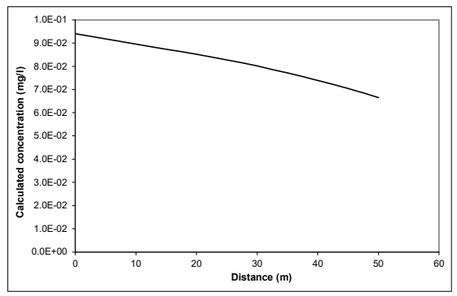
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	9.4E-02
2.5	9.29E-02
5.0	9.18E-02
7.5	9.07E-02
10.0	8.96E-02
12.5	8.85E-02
15.0	8.74E-02
17.5	8.63E-02
20.0	8.51E-02
22.5	8.39E-02
25.0	8.27E-02
27.5	8.14E-02
30.0	8.01E-02
32.5	7.86E-02
35.0	7.71E-02
37.5	7.56E-02
40.0	7.39E-02
42.5	7.22E-02
45.0	7.04E-02
47.5	6.85E-02
50.0	6.65E-02

Remedial Targets

Remedial Target		**1.41E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**6.65E-02**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		TCE		from Level 1
Target Concentration	C_T	0.01	mg/l	from Level 1
Dilution Factor	DF	2.37E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		0	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	5.11E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	1.36E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	3.38E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	4.76E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as wter filled poro*
Hydraulic gradient	i	1.11E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP hazardous substance (JAGDAG)*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.38E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	4.80E-01	m/d
Retardation factor	Rf	6.48E+00	fraction
Decay rate used	λ	2.09E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.11E-01	fraction
Rate of contaminant flow due to retardation	u	7.40E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	8.25E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.21E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**2.88E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		5.86E-02	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**8.25E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	1.66E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.38E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

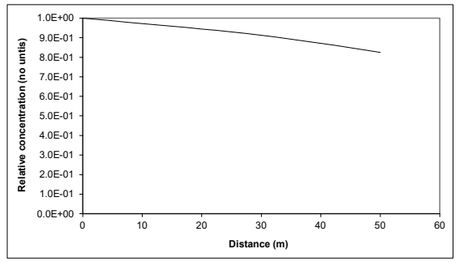
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.93E-01**	**0.00E+00**
5.0	**9.86E-01**	**0.00E+00**
7.5	**9.79E-01**	**0.00E+00**
10.0	**9.72E-01**	**0.00E+00**
12.5	**9.66E-01**	**0.00E+00**
15.0	**9.59E-01**	**0.00E+00**
17.5	**9.52E-01**	**0.00E+00**
20.0	**9.45E-01**	**0.00E+00**
22.5	**9.37E-01**	**0.00E+00**
25.0	**9.29E-01**	**0.00E+00**
27.5	**9.21E-01**	**0.00E+00**
30.0	**9.12E-01**	**0.00E+00**
32.5	**9.03E-01**	**0.00E+00**
35.0	**8.93E-01**	**0.00E+00**
37.5	**8.83E-01**	**0.00E+00**
40.0	**8.72E-01**	**0.00E+00**
42.5	**8.61E-01**	**0.00E+00**
45.0	**8.49E-01**	**0.00E+00**
47.5	**8.37E-01**	**0.00E+00**
50.0	**8.25E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Toluene		from Level 1
Target Concentration	C_T	7.40E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: **Simulate vertical dispersion in 1 direction**

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.19E+02	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	4.48E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	1.55E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	6.75E+01	m	*RBH320 to RBH326*
Plume thickness at source	Sy	2.60E+00	m	*Plume thickness recorded above coal band*
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone for water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP (hazardous substance) (JAGDAC*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.09E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	2.50E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.09E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

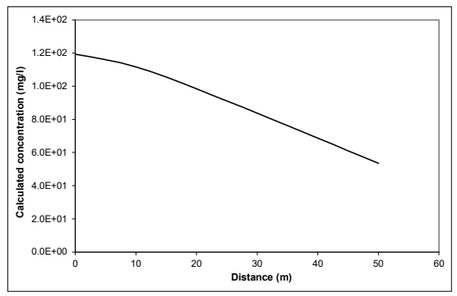
Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	9.26E+00	fraction
Decay rate used	λ	1.67E-04	d^{-1}
Rate of contaminant flow due to retardation	u	3.00E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.35E+01	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.23E+00**	

Remedial Targets

Remedial Target		**1.65E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.35E+01**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	**1.2E+02**
2.5	**1.18E+02**
5.0	**1.16E+02**
7.5	**1.14E+02**
10.0	**1.12E+02**
12.5	**1.09E+02**
15.0	**1.05E+02**
17.5	**1.02E+02**
20.0	**9.84E+01**
22.5	**9.48E+01**
25.0	**9.11E+01**
27.5	**8.74E+01**
30.0	**8.37E+01**
32.5	**8.00E+01**
35.0	**7.62E+01**
37.5	**7.25E+01**
40.0	**6.87E+01**
42.5	**6.49E+01**
45.0	**6.11E+01**
47.5	**5.73E+01**
50.0	**5.35E+01**

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Toluene		from Level 1
Target Concentration	C_T	0.074	mg/l	from Level 1
Dilution Factor	DF	1.71E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	4.48E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	1.55E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	6.75E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS recorded in rough rock sstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	1.54E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP (hazardous substance) (JAGDAG)*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.09E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	6.66E-01	m/d
Retardation factor	Rf	9.26E+00	fraction
Decay rate used	λ	1.67E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.54E-01	fraction
Rate of contaminant flow due to retardation	u	7.20E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.72E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.49E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**1.89E-01**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		5.65E-01	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**6.72E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	2.50E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.09E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

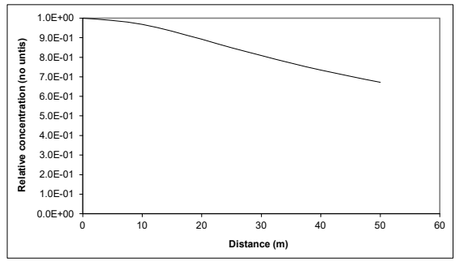
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.94E-01**	**0.00E+00**
5.0	**9.88E-01**	**0.00E+00**
7.5	**9.80E-01**	**0.00E+00**
10.0	**9.68E-01**	**0.00E+00**
12.5	**9.52E-01**	**0.00E+00**
15.0	**9.33E-01**	**0.00E+00**
17.5	**9.13E-01**	**0.00E+00**
20.0	**8.92E-01**	**0.00E+00**
22.5	**8.71E-01**	**0.00E+00**
25.0	**8.50E-01**	**0.00E+00**
27.5	**8.29E-01**	**0.00E+00**
30.0	**8.09E-01**	**0.00E+00**
32.5	**7.89E-01**	**0.00E+00**
35.0	**7.71E-01**	**0.00E+00**
37.5	**7.52E-01**	**0.00E+00**
40.0	**7.35E-01**	**0.00E+00**
42.5	**7.18E-01**	**0.00E+00**
45.0	**7.02E-01**	**0.00E+00**
47.5	**6.87E-01**	**0.00E+00**
50.0	**6.72E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		TPH Aromatic C5-C7		from Level 1
Target Concentration	C_T	1.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.33E-01	mg/l	*Maximum concentration recorded*
Half life for degradation of contaminant in water	$t_{1/2}$	2.97E+02	days	*Site Specific from Geochem for benzene*
Calculated decay rate	λ	2.33E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	6.75E+01	m	*Site specific: RBH320 to RBH326*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.61E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	3.61E+00	fraction
Decay rate used	λ	6.47E-04	d^{-1}
Rate of contaminant flow due to retardation	u	7.69E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.17E-01	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.99E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	7.90E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.61E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

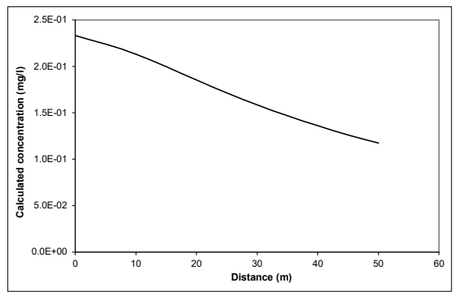
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	2.3E-01
2.5	2.28E-01
5.0	2.24E-01
7.5	2.19E-01
10.0	2.13E-01
12.5	2.06E-01
15.0	1.99E-01
17.5	1.92E-01
20.0	1.85E-01
22.5	1.78E-01
25.0	1.71E-01
27.5	1.65E-01
30.0	1.58E-01
32.5	1.52E-01
35.0	1.47E-01
37.5	1.41E-01
40.0	1.36E-01
42.5	1.31E-01
45.0	1.26E-01
47.5	1.22E-01
50.0	1.17E-01

Remedial Targets

Remedial Target		**1.99E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**1.17E-01**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		TPH Aromatic C5-C7		from Level 1
Target Concentration	C_T	0.01	mg/l	from Level 1
Dilution Factor	DF	1.73E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		0	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	2.97E+02	days	*Site Specific from Geochem for benzene*
Calculated decay rate	λ	2.33E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	6.75E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled po*
Hydraulic gradient	i	1.53E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.61E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	6.59E-01	m/d
Retardation factor	Rf	3.61E+00	fraction
Decay rate used	λ	6.47E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.53E-01	fraction
Rate of contaminant flow due to retardation	u	1.83E-01	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.34E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.58E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**2.72E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		2.68E-02	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**6.34E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	7.90E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.61E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

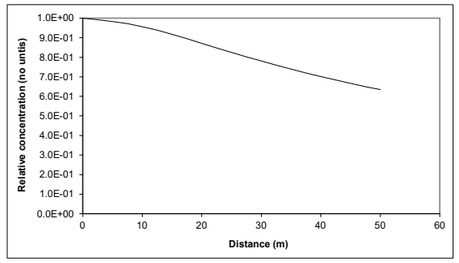
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.91E-01**	**0.00E+00**
5.0	**9.83E-01**	**0.00E+00**
7.5	**9.72E-01**	**0.00E+00**
10.0	**9.57E-01**	**0.00E+00**
12.5	**9.38E-01**	**0.00E+00**
15.0	**9.17E-01**	**0.00E+00**
17.5	**8.94E-01**	**0.00E+00**
20.0	**8.71E-01**	**0.00E+00**
22.5	**8.48E-01**	**0.00E+00**
25.0	**8.25E-01**	**0.00E+00**
27.5	**8.02E-01**	**0.00E+00**
30.0	**7.81E-01**	**0.00E+00**
32.5	**7.60E-01**	**0.00E+00**
35.0	**7.40E-01**	**0.00E+00**
37.5	**7.20E-01**	**0.00E+00**
40.0	**7.02E-01**	**0.00E+00**
42.5	**6.84E-01**	**0.00E+00**
45.0	**6.67E-01**	**0.00E+00**
47.5	**6.50E-01**	**0.00E+00**
50.0	**6.34E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		TPH Arom C7-C8		from Level 1
Target Concentration	C_T	7.40E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.19E+02	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	4.48E+02	days	*Site Specific from Geochem for toluene*
Calculated decay rate	λ	1.55E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	6.75E+01	m	*RBH326 to RBH320*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP (based on toluene as hazardous*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.09E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	9.26E+00	fraction
Decay rate used	λ	1.67E-04	d^{-1}
Rate of contaminant flow due to retardation	u	3.00E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.32E+01	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.23E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	2.50E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.09E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

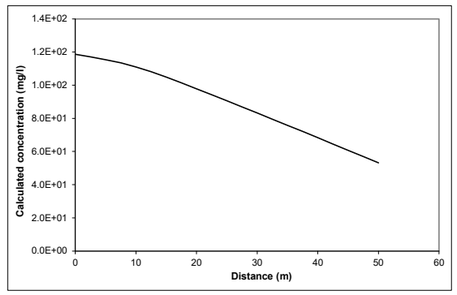
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report $ax = 0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.2E+02
2.5	1.17E+02
5.0	1.15E+02
7.5	1.13E+02
10.0	1.11E+02
12.5	1.08E+02
15.0	1.05E+02
17.5	1.01E+02
20.0	9.79E+01
22.5	9.43E+01
25.0	9.06E+01
27.5	8.69E+01
30.0	8.32E+01
32.5	7.95E+01
35.0	7.58E+01
37.5	7.21E+01
40.0	6.83E+01
42.5	6.45E+01
45.0	6.08E+01
47.5	5.70E+01
50.0	5.32E+01

Remedial Targets

Remedial Target		**1.65E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**5.32E+01**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		TPH Arom C7-C8		from Level 1
Target Concentration	C_T	0.074	mg/l	from Level 1
Dilution Factor	DF	1.71E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		0	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	4.48E+02	days	*Site Specific from Geochem for toluene*
Calculated decay rate	λ	1.55E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	6.75E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS recorded in rough rock sstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	1.54E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP (based on toluene as hazardous substance - JAGDAG)*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.09E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	6.66E-01	m/d
Retardation factor	Rf	9.26E+00	fraction
Decay rate used	λ	1.67E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.54E-01	fraction
Rate of contaminant flow due to retardation	u	7.20E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.72E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.49E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**1.89E-01**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		5.65E-01	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**6.72E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	2.50E+02	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.09E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

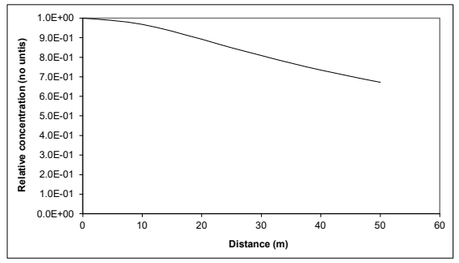
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.94E-01**	**0.00E+00**
5.0	**9.88E-01**	**0.00E+00**
7.5	**9.80E-01**	**0.00E+00**
10.0	**9.68E-01**	**0.00E+00**
12.5	**9.52E-01**	**0.00E+00**
15.0	**9.33E-01**	**0.00E+00**
17.5	**9.13E-01**	**0.00E+00**
20.0	**8.92E-01**	**0.00E+00**
22.5	**8.71E-01**	**0.00E+00**
25.0	**8.50E-01**	**0.00E+00**
27.5	**8.29E-01**	**0.00E+00**
30.0	**8.09E-01**	**0.00E+00**
32.5	**7.89E-01**	**0.00E+00**
35.0	**7.71E-01**	**0.00E+00**
37.5	**7.52E-01**	**0.00E+00**
40.0	**7.35E-01**	**0.00E+00**
42.5	**7.18E-01**	**0.00E+00**
45.0	**7.02E-01**	**0.00E+00**
47.5	**6.87E-01**	**0.00E+00**
50.0	**6.72E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		TPH Aromatic C8-C10		from Level 1
Target Concentration	C_T	3.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.16E+01	mg/l	RBH609(S) April 24 monitoring round
Half life for degradation of contaminant in water	$t_{1/2}$	8.04E+02	days	Site Specific from Geochem for Xylenes
Calculated decay rate	λ	8.62E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.12E+01	m	RBH326 to RBH612
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	Site specific - for sandstone
Effective porosity of aquifer	n	1.49E-01	fraction	Site specific - for sandstone as water filled porosity
Hydraulic gradient	i	6.43E-02	fraction	Site specific
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	Calculated from FHT
Distance to compliance point	x	5.00E+01	m	50m CP (based on Xylene - hazardous su
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	time variant options only
Parameters values determined from options				
Partition coefficient	Kd	9.56E-01	l/kg	see options
Longitudinal dispersivity	ax	5.00E+00	m	see options
Transverse dispersivity	az	5.00E-01	m	see options
Vertical dispersivity	ay	5.00E-02	m	see options

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	1.65E+01	fraction
Decay rate used	λ	5.22E-05	d^{-1}
Rate of contaminant flow due to retardation	u	1.68E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	6.84E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**6.07E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — 2.03E-03 — fraction

Organic carbon partition coefficient — Koc — 4.70E+02 — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{oc,n}$ — l/kg

Sorption coefficient for ionised species — $K_{oc,i}$ — l/kg

pH value — pH

acid dissociation constant — pKa

Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient — Kd — 9.56E-01 — l/kg

Define dispersivity (click brown cell and use pull down list)

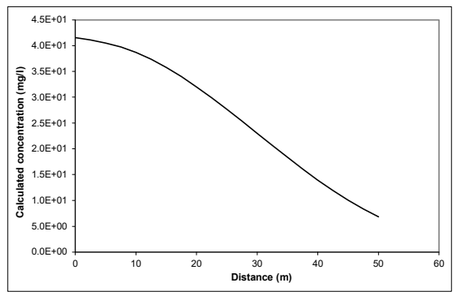
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	4.2E+01
2.5	4.11E+01
5.0	4.05E+01
7.5	3.97E+01
10.0	3.87E+01
12.5	3.74E+01
15.0	3.58E+01
17.5	3.40E+01
20.0	3.20E+01
22.5	2.99E+01
25.0	2.77E+01
27.5	2.54E+01
30.0	2.30E+01
32.5	2.07E+01
35.0	1.83E+01
37.5	1.61E+01
40.0	1.39E+01
42.5	1.19E+01
45.0	1.00E+01
47.5	8.34E+00
50.0	6.84E+00

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets

Remedial Target		**1.82E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**6.84E+00**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		TPH Aromatic C8-C10		from Level 1
Target Concentration	C_T	0.03	mg/l	from Level 1
Dilution Factor	DF	1.74E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	8.04E+02	days	*Site Specific from Geochem for Xylenes*
Calculated decay rate	λ	8.62E-04	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	3.12E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone aswater filled porc*
Hydraulic gradient	i	1.51E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP (based on Xylene - hazardous substance JAGDAG)*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	9.56E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	6.53E-01	m/d
Retardation factor	Rf	1.65E+01	fraction
Decay rate used	λ	5.22E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.51E-01	fraction
Rate of contaminant flow due to retardation	u	3.95E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.23E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.61E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**8.38E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		4.67E-01	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**6.23E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	4.70E+02	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	9.56E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

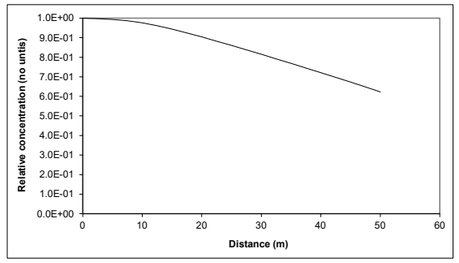
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.97E-01**	**0.00E+00**
5.0	**9.93E-01**	**0.00E+00**
7.5	**9.87E-01**	**0.00E+00**
10.0	**9.77E-01**	**0.00E+00**
12.5	**9.62E-01**	**0.00E+00**
15.0	**9.45E-01**	**0.00E+00**
17.5	**9.25E-01**	**0.00E+00**
20.0	**9.04E-01**	**0.00E+00**
22.5	**8.83E-01**	**0.00E+00**
25.0	**8.60E-01**	**0.00E+00**
27.5	**8.38E-01**	**0.00E+00**
30.0	**8.15E-01**	**0.00E+00**
32.5	**7.92E-01**	**0.00E+00**
35.0	**7.69E-01**	**0.00E+00**
37.5	**7.45E-01**	**0.00E+00**
40.0	**7.21E-01**	**0.00E+00**
42.5	**6.97E-01**	**0.00E+00**
45.0	**6.73E-01**	**0.00E+00**
47.5	**6.48E-01**	**0.00E+00**
50.0	**6.23E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Vinyl Chloride		from Level 1
Target Concentration	C_T	5.00E-04	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	6.40E-03	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	7.30E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	9.50E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	7.80E+01	m	*calculated from site data RBH319- 326*
Plume thickness at source	Sy	4.76E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP (hazardous substance (JAGDAG*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.28E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	3.08E+00	fraction
Decay rate used	λ	3.08E-04	d^{-1}
Rate of contaminant flow due to retardation	u	9.00E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.23E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.22E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	6.30E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.28E-01	l/kg

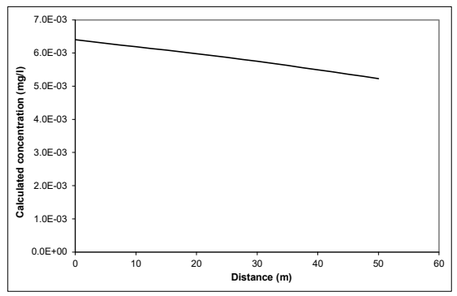
Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x
Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	6.4E-03
2.5	6.35E-03
5.0	6.29E-03
7.5	6.24E-03
10.0	6.19E-03
12.5	6.14E-03
15.0	6.08E-03
17.5	6.03E-03
20.0	5.98E-03
22.5	5.92E-03
25.0	5.87E-03
27.5	5.81E-03
30.0	5.75E-03
32.5	5.69E-03
35.0	5.63E-03
37.5	5.56E-03
40.0	5.50E-03
42.5	5.43E-03
45.0	5.36E-03
47.5	5.30E-03
50.0	5.23E-03

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets

Remedial Target		**6.12E-04**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**5.23E-03**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Vinyl Chloride		from Level 1
Target Concentration	C_T	0.0005	mg/l	from Level 1
Dilution Factor	DF	1.26E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	7.30E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	9.50E-04	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	3.50E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	4.76E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled po*
Hydraulic gradient	i	3.10E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP (hazardous substance (JAGDAG))*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.28E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	1.34E-01	m/d
Retardation factor	Rf	3.08E+00	fraction
Decay rate used	λ	3.08E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	3.10E-02	fraction
Rate of contaminant flow due to retardation	u	4.35E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.47E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.55E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**9.75E-04**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		8.64E-04	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**6.47E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	6.30E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.28E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

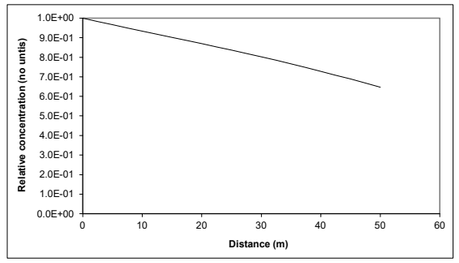
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.83E-01**	**0.00E+00**
5.0	**9.66E-01**	**0.00E+00**
7.5	**9.50E-01**	**0.00E+00**
10.0	**9.33E-01**	**0.00E+00**
12.5	**9.17E-01**	**0.00E+00**
15.0	**9.01E-01**	**0.00E+00**
17.5	**8.85E-01**	**0.00E+00**
20.0	**8.69E-01**	**0.00E+00**
22.5	**8.53E-01**	**0.00E+00**
25.0	**8.37E-01**	**0.00E+00**
27.5	**8.20E-01**	**0.00E+00**
30.0	**8.02E-01**	**0.00E+00**
32.5	**7.85E-01**	**0.00E+00**
35.0	**7.66E-01**	**0.00E+00**
37.5	**7.48E-01**	**0.00E+00**
40.0	**7.28E-01**	**0.00E+00**
42.5	**7.09E-01**	**0.00E+00**
45.0	**6.89E-01**	**0.00E+00**
47.5	**6.68E-01**	**0.00E+00**
50.0	**6.47E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Xylenes (total)		from Level 1
Target Concentration	C_T	3.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.39E+01	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	8.04E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	8.62E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	6.75E+01	m	*RBH326 to RBH320*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	5.00E+01	m	*50m CP (hazardous substance - JAGDAG*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	9.56E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.00E+00	m	*see options*
Transverse dispersivity	az	5.00E-01	m	*see options*
Vertical dispersivity	ay	5.00E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	1.65E+01	fraction
Decay rate used	λ	5.22E-05	d^{-1}
Rate of contaminant flow due to retardation	u	1.68E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	7.44E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.91E+00**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	4.70E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	9.56E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

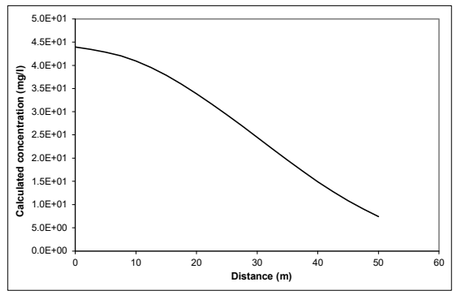
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report $ax = 0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	4.4E+01
2.5	4.34E+01
5.0	4.28E+01
7.5	4.20E+01
10.0	4.09E+01
12.5	3.95E+01
15.0	3.78E+01
17.5	3.59E+01
20.0	3.39E+01
22.5	3.17E+01
25.0	2.93E+01
27.5	2.69E+01
30.0	2.45E+01
32.5	2.20E+01
35.0	1.96E+01
37.5	1.72E+01
40.0	1.49E+01
42.5	1.28E+01
45.0	1.08E+01
47.5	9.04E+00
50.0	7.44E+00

Remedial Targets

Remedial Target		**1.77E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**50**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**7.44E+00**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Xylenes (total)		from Level 1
Target Concentration	C_T	0.03	mg/l	from Level 1
Dilution Factor	DF	1.74E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	8.04E+02	days	*Site Specific provided by Geochem*
Calculated decay rate	λ	8.62E-04	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	6.75E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	1.51E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	5.00E+01	m	*50m CP (hazardous substance - JAGDAG)*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	9.56E-01	l/kg	*see options*
Longitudinal dispersivity	ax	5.000	m	*see options*
Transverse dispersivity	az	0.500	m	*see options*
Vertical dispersivity	ay	0.050	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	6.53E-01	m/d
Retardation factor	Rf	1.65E+01	fraction
Decay rate used	λ	5.22E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.51E-01	fraction
Rate of contaminant flow due to retardation	u	3.95E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.40E-01	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.56E+00**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**8.15E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		4.54E-01	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**50**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**6.40E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	4.70E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	9.56E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

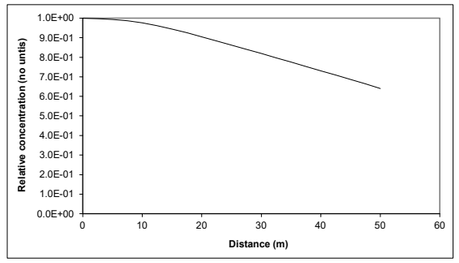
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	5.00E+00	2.98E+00	m
Transverse dispersivity	**az**	0.00E+00	5.00E-01	2.98E-01	m
Vertical dispersivity	**ay**	0.00E+00	5.00E-02	2.98E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
2.5	**9.97E-01**	**0.00E+00**
5.0	**9.93E-01**	**0.00E+00**
7.5	**9.87E-01**	**0.00E+00**
10.0	**9.77E-01**	**0.00E+00**
12.5	**9.62E-01**	**0.00E+00**
15.0	**9.45E-01**	**0.00E+00**
17.5	**9.25E-01**	**0.00E+00**
20.0	**9.05E-01**	**0.00E+00**
22.5	**8.84E-01**	**0.00E+00**
25.0	**8.62E-01**	**0.00E+00**
27.5	**8.40E-01**	**0.00E+00**
30.0	**8.19E-01**	**0.00E+00**
32.5	**7.97E-01**	**0.00E+00**
35.0	**7.75E-01**	**0.00E+00**
37.5	**7.53E-01**	**0.00E+00**
40.0	**7.31E-01**	**0.00E+00**
42.5	**7.09E-01**	**0.00E+00**
45.0	**6.87E-01**	**0.00E+00**
47.5	**6.64E-01**	**0.00E+00**
50.0	**6.40E-01**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		MTBE		from Level 1
Target Concentration	C_T	1.50E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.88E-01	mg/l	*Maximum concentration recorded*
Half life for degradation of contaminant in water	$t_{1/2}$	7.30E+02	days	*EPA.gov April 2001 p.8*
Calculated decay rate	λ	9.50E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.50E+01	m	*Site specific: RBH317R to RBH325*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - water filled porosity for sandstone*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	2.00E+02	m	*200m CP to Piggs Lee inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.49E-02	l/kg	*see options*
Longitudinal dispersivity	ax	2.00E+01	m	*see options*
Transverse dispersivity	az	2.00E+00	m	*see options*
Vertical dispersivity	ay	2.00E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	1.40E+00	fraction
Decay rate used	λ	6.76E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.98E-01	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.03E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.82E+01**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.02E-03	fraction
Organic carbon partition coefficient	Koc	1.23E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.49E-02	l/kg

Define dispersivity (click brown cell and use pull down list)

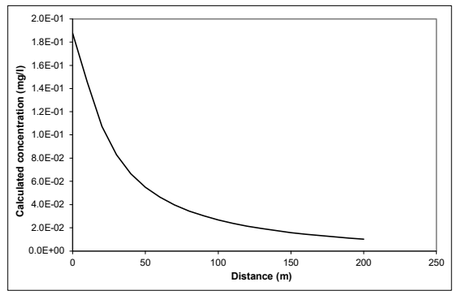
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.9E-01
10.0	1.46E-01
20.0	1.07E-01
30.0	8.29E-02
40.0	6.66E-02
50.0	5.50E-02
60.0	4.64E-02
70.0	3.97E-02
80.0	3.45E-02
90.0	3.03E-02
100.0	2.68E-02
110.0	2.39E-02
120.0	2.14E-02
130.0	1.93E-02
140.0	1.75E-02
150.0	1.59E-02
160.0	1.45E-02
170.0	1.33E-02
180.0	1.22E-02
190.0	1.12E-02
200.0	1.03E-02

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets

Remedial Target		**2.73E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**200**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.03E-02**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		MTBE		from Level 1
Target Concentration	C_T	0.015	mg/l	from Level 1
Dilution Factor	DF	2.42E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	7.30E+02	days	*Halflife in water. Howard et al 1990*
Calculated decay rate	λ	9.50E-04	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	3.68E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - water filled porosity for sandstor*
Hydraulic gradient	i	1.10E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	2.00E+02	m	*200m CP to Piggs Lee inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.49E-02	l/kg	*see options*
Longitudinal dispersivity	ax	20.000	m	*see options*
Transverse dispersivity	az	2.000	m	*see options*
Vertical dispersivity	ay	0.200	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	4.73E-01	m/d
Retardation factor	Rf	1.40E+00	fraction
Decay rate used	λ	6.76E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.10E-01	fraction
Rate of contaminant flow due to retardation	u	3.37E-01	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	7.53E-02	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.33E+01**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**4.82E-01**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		8.45E-02	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**200**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**7.53E-02**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.02E-03	fraction
Organic carbon partition coefficient	Koc	1.23E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.49E-02	l/kg

Define dispersivity (click brown cell and use pull down list)

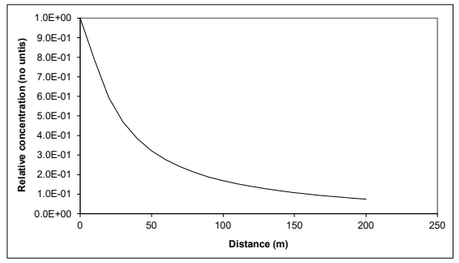
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
10.0	**7.88E-01**	**0.00E+00**
20.0	**5.93E-01**	**0.00E+00**
30.0	**4.68E-01**	**0.00E+00**
40.0	**3.83E-01**	**0.00E+00**
50.0	**3.22E-01**	**0.00E+00**
60.0	**2.76E-01**	**0.00E+00**
70.0	**2.40E-01**	**0.00E+00**
80.0	**2.11E-01**	**0.00E+00**
90.0	**1.88E-01**	**0.00E+00**
100.0	**1.69E-01**	**0.00E+00**
110.0	**1.53E-01**	**0.00E+00**
120.0	**1.39E-01**	**0.00E+00**
130.0	**1.27E-01**	**0.00E+00**
140.0	**1.17E-01**	**0.00E+00**
150.0	**1.08E-01**	**0.00E+00**
160.0	**9.97E-02**	**0.00E+00**
170.0	**9.26E-02**	**0.00E+00**
180.0	**8.62E-02**	**0.00E+00**
190.0	**8.05E-02**	**0.00E+00**
200.0	**7.53E-02**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Phenol		from Level 1
Target Concentration	C_T	7.70E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.00E-02	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	6.00E+00	days	*Average from Howard et al 1991*
Calculated decay rate	λ	1.16E-01	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	5.00E+00	m	RBH609(S) & previously RBH321
Plume thickness at source	Sy	2.00E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	2.00E+02	m	*200m CP (Non-hazardous substance) JAC*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	6.82E-03	l/kg	*see options*
Longitudinal dispersivity	ax	2.00E+01	m	*see options*
Transverse dispersivity	az	2.00E+00	m	*see options*
Vertical dispersivity	ay	2.00E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	1.11E+00	fraction
Decay rate used	λ	1.04E-01	d^{-1}
Rate of contaminant flow due to retardation	u	2.50E-01	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	7.01E-15	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.85E+12**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	3.35E+00	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	6.82E-03	l/kg

Define dispersivity (click brown cell and use pull down list)

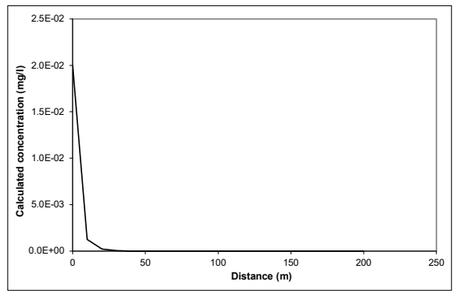
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	2.0E-02
10.0	1.25E-03
20.0	2.02E-04
30.0	4.12E-05
40.0	9.31E-06
50.0	2.23E-06
60.0	5.55E-07
70.0	1.42E-07
80.0	3.70E-08
90.0	9.78E-09
100.0	2.62E-09
110.0	7.08E-10
120.0	1.93E-10
130.0	5.29E-11
140.0	1.46E-11
150.0	4.05E-12
160.0	1.13E-12
170.0	3.15E-13
180.0	8.84E-14
190.0	2.49E-14
200.0	7.01E-15

Remedial Targets

Remedial Target		**2.20E+10**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**200**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**7.01E-15**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Phenol		from Level 1
Target Concentration	C_T	0.0077	mg/l	from Level 1
Dilution Factor	DF	4.59E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	6.00E+00	days	*Average in water Howard et al, 1991*
Calculated decay rate	λ	1.16E-01	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	5.00E+00	m	from Level 2
Plume thickness in aquifer at source	Sy	2.00E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	8.22E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	2.00E+02	m	*200m CP (Non-Hazardous substance) JAGDAG*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	6.82E-03	l/kg	*see options*
Longitudinal dispersivity	ax	20.000	m	*see options*
Transverse dispersivity	az	2.000	m	*see options*
Vertical dispersivity	ay	0.200	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.55E-01	m/d
Retardation factor	Rf	1.11E+00	fraction
Decay rate used	λ	1.04E-01	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	8.22E-02	fraction
Rate of contaminant flow due to retardation	u	3.20E-01	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.46E-12	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**1.06E+11**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**3.73E+09**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		2.94E+08	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**200**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**9.46E-12**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	3.35E+00	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	6.82E-03	l/kg

Define dispersivity (click brown cell and use pull down list)

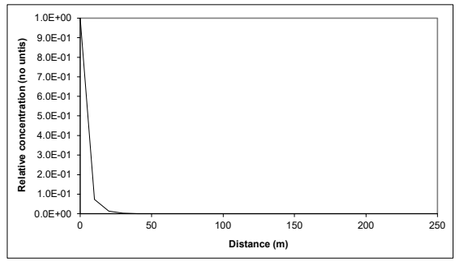
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
10.0	**7.34E-02**	**0.00E+00**
20.0	**1.40E-02**	**0.00E+00**
30.0	**3.38E-03**	**0.00E+00**
40.0	**9.00E-04**	**0.00E+00**
50.0	**2.54E-04**	**0.00E+00**
60.0	**7.46E-05**	**0.00E+00**
70.0	**2.25E-05**	**0.00E+00**
80.0	**6.91E-06**	**0.00E+00**
90.0	**2.15E-06**	**0.00E+00**
100.0	**6.80E-07**	**0.00E+00**
110.0	**2.17E-07**	**0.00E+00**
120.0	**6.96E-08**	**0.00E+00**
130.0	**2.25E-08**	**0.00E+00**
140.0	**7.33E-09**	**0.00E+00**
150.0	**2.40E-09**	**0.00E+00**
160.0	**7.86E-10**	**0.00E+00**
170.0	**2.59E-10**	**0.00E+00**
180.0	**8.57E-11**	**0.00E+00**
190.0	**2.84E-11**	**0.00E+00**
200.0	**9.46E-12**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		TPH Aliphatic C6-C8		from Level 1
Target Concentration	C_T	1.50E+01	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.07E+01	mg/l	*RBH319 recorded in January 2023*
Half life for degradation of contaminant in water	$t_{1/2}$	9.90E+100	days	*Recalcitrant unless oxidised*
Calculated decay rate	λ	7.00E-102	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	5.53E+01	m	*SS calcs from gqwater sampling*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site-Specific for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - for sandstone for water filed porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	2.00E+02	m	*200m CP. To Piggs Lee Brook Inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	8.14E-01	l/kg	*see options*
Longitudinal dispersivity	ax	2.00E+01	m	*see options*
Transverse dispersivity	az	2.00E+00	m	*see options*
Vertical dispersivity	ay	2.00E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	1.42E+01	fraction
Decay rate used	λ	4.93E-103	d^{-1}
Rate of contaminant flow due to retardation	u	1.95E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.14E-04	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.68E+05**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-04	fraction
Organic carbon partition coefficient	Koc	4.00E+03	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	8.14E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

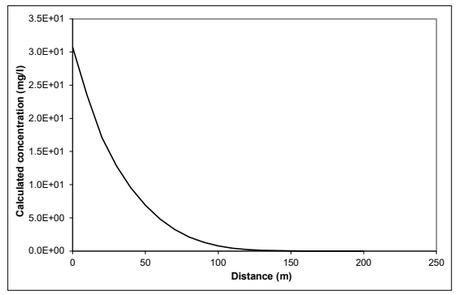
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	3.1E+01
10.0	2.34E+01
20.0	1.71E+01
30.0	1.28E+01
40.0	9.53E+00
50.0	6.91E+00
60.0	4.85E+00
70.0	3.28E+00
80.0	2.12E+00
90.0	1.31E+00
100.0	7.73E-01
110.0	4.33E-01
120.0	2.30E-01
130.0	1.16E-01
140.0	5.51E-02
150.0	2.48E-02
160.0	1.06E-02
170.0	4.24E-03
180.0	1.61E-03
190.0	3.42E-04
200.0	1.14E-04

Remedial Targets

Remedial Target		**4.03E+06**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**200**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.14E-04**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		TPH Aliphatic C6-C8		from Level 1
Target Concentration	C_T	15	mg/l	from Level 1
Dilution Factor	DF	2.34E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	9.90E+100	days	*recalcitrant unless oxidised*
Calculated decay rate	λ	7.00E-102	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	5.53E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - water filled porosity for sandstor*
Hydraulic gradient	i	1.12E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	2.00E+02	m	*200m CP. To Piggs Lee Brook Inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	8.14E-01	l/kg	*see options*
Longitudinal dispersivity	ax	20.000	m	*see options*
Transverse dispersivity	az	2.000	m	*see options*
Vertical dispersivity	ay	0.200	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	4.85E-01	m/d
Retardation factor	Rf	1.42E+01	fraction
Decay rate used	λ	4.93E-103	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.12E-01	fraction
Rate of contaminant flow due to retardation	u	3.41E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.41E-03	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**7.12E+02**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**2.50E+04**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		1.36E+06	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**200**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**1.41E-03**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-04	fraction
Organic carbon partition coefficient	Koc	4.00E+03	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	8.14E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

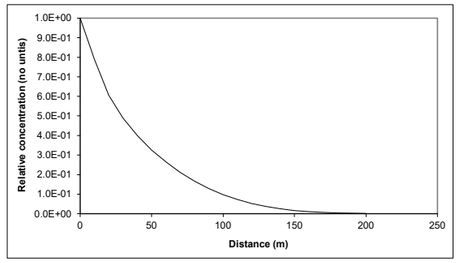
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
10.0	**7.89E-01**	**0.00E+00**
20.0	**6.06E-01**	**0.00E+00**
30.0	**4.88E-01**	**0.00E+00**
40.0	**3.99E-01**	**0.00E+00**
50.0	**3.26E-01**	**0.00E+00**
60.0	**2.64E-01**	**0.00E+00**
70.0	**2.12E-01**	**0.00E+00**
80.0	**1.67E-01**	**0.00E+00**
90.0	**1.29E-01**	**0.00E+00**
100.0	**9.80E-02**	**0.00E+00**
110.0	**7.26E-02**	**0.00E+00**
120.0	**5.24E-02**	**0.00E+00**
130.0	**3.69E-02**	**0.00E+00**
140.0	**2.53E-02**	**0.00E+00**
150.0	**1.68E-02**	**0.00E+00**
160.0	**1.09E-02**	**0.00E+00**
170.0	**6.84E-03**	**0.00E+00**
180.0	**4.16E-03**	**0.00E+00**
190.0	**2.46E-03**	**0.00E+00**
200.0	**1.41E-03**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		TPH Aliphatic C8-C10		from Level 1
Target Concentration	C_T	3.00E-01	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.00E+04	mg/l	*RBH319 recorded in January 2023*
Half life for degradation of contaminant in water	$t_{1/2}$	9.90E+100	days	*Recalcitrant unless oxidised*
Calculated decay rate	λ	7.00E-102	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	7.80E+01	m	*SS calcs from gqwater sampling*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site-Specific for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	2.00E+02	m	*200m CP. To Piggs Lee Brook inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	6.51E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.00E+01	m	*see options*
Transverse dispersivity	az	2.00E+00	m	*see options*
Vertical dispersivity	ay	2.00E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-04	fraction
Organic carbon partition coefficient	Koc	3.20E+04	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	6.51E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

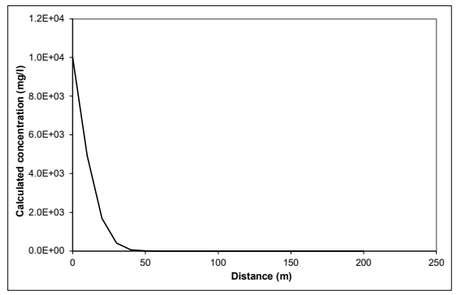
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	1.07E+02	fraction
Decay rate used	λ	6.56E-104	d^{-1}
Rate of contaminant flow due to retardation	u	2.60E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	0.00E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**breakthrough at compliance point**	

Remedial Targets

Remedial Target		No impact	mg/l	
Ogata Banks				
Distance to compliance point		**200**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**0.00E+00**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.0E+04
10.0	4.94E+03
20.0	1.69E+03
30.0	4.18E+02
40.0	7.02E+01
50.0	7.76E+00
60.0	5.55E-01
70.0	2.54E-02
80.0	3.90E-04
90.0	0.00E+00
100.0	0.00E+00
110.0	0.00E+00
120.0	0.00E+00
130.0	0.00E+00
140.0	0.00E+00
150.0	0.00E+00
160.0	0.00E+00
170.0	0.00E+00
180.0	0.00E+00
190.0	0.00E+00
200.0	0.00E+00

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		TPH Aliphatic C8-C10		from Level 1
Target Concentration	C_T	0.3	mg/l	from Level 1
Dilution Factor	DF	2.33E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	9.90E+100	days	*recalcitrant unless oxidised*
Calculated decay rate	λ	7.00E-102	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	5.53E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	1.13E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	2.00E+02	m	*200m CP. To Piggs Lee Brook inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	6.51E+00	l/kg	*see options*
Longitudinal dispersivity	ax	20.000	m	*see options*
Transverse dispersivity	az	2.000	m	*see options*
Vertical dispersivity	ay	0.200	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	4.85E-01	m/d
Retardation factor	Rf	1.07E+02	fraction
Decay rate used	λ	6.56E-104	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.13E-01	fraction
Rate of contaminant flow due to retardation	u	4.55E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	0.00E+00	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**breakthrough at c**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	2.03E-04	fraction
Organic carbon partition coefficient	Koc	3.20E+04	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	6.51E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

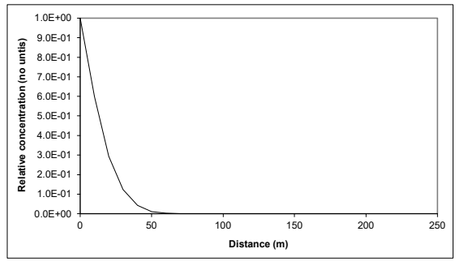
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	0.00E+00
10.0	5.99E-01	0.00E+00
20.0	2.93E-01	0.00E+00
30.0	1.23E-01	0.00E+00
40.0	4.26E-02	0.00E+00
50.0	1.18E-02	0.00E+00
60.0	2.57E-03	0.00E+00
70.0	4.40E-04	0.00E+00
80.0	5.87E-05	0.00E+00
90.0	6.07E-06	0.00E+00
100.0	2.64E-07	0.00E+00
110.0	1.61E-08	0.00E+00
120.0	0.00E+00	0.00E+00
130.0	0.00E+00	0.00E+00
140.0	0.00E+00	0.00E+00
150.0	0.00E+00	0.00E+00
160.0	0.00E+00	0.00E+00
170.0	0.00E+00	0.00E+00
180.0	0.00E+00	0.00E+00
190.0	0.00E+00	0.00E+00
200.0	0.00E+00	0.00E+00

Remedial Targets

Level 3 Remedial Target		**No impact**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		No impact	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**200**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**0.00E+00**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		TPH Aliphatic C10-C12		from Level 1
Target Concentration	C_T	3.00E-01	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.00E+04	mg/l	*RBH319 recorded in January 2023*
Half life for degradation of contaminant in water	$t_{1/2}$	9.90E+100	days	*Recalcitrant unless oxidised*
Calculated decay rate	λ	7.00E-102	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	7.80E+01	m	*SS calcs from gqwater sampling*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site-Specific for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled porosity*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	2.00E+02	m	*200m CP. To Piggs Lee Brook Inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.09E+02	l/kg	*see options*
Longitudinal dispersivity	ax	2.00E+01	m	*see options*
Transverse dispersivity	az	2.00E+00	m	*see options*
Vertical dispersivity	ay	2.00E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	8.26E+03	fraction
Decay rate used	λ	8.48E-106	d^{-1}
Rate of contaminant flow due to retardation	u	3.36E-05	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	0.00E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**breakthrough at compliance point**	

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	2.50E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.09E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

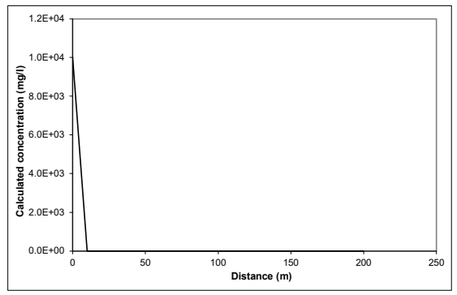
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.0E+04
10.0	0.00E+00
20.0	0.00E+00
30.0	0.00E+00
40.0	0.00E+00
50.0	0.00E+00
60.0	0.00E+00
70.0	0.00E+00
80.0	0.00E+00
90.0	0.00E+00
100.0	0.00E+00
110.0	0.00E+00
120.0	0.00E+00
130.0	0.00E+00
140.0	0.00E+00
150.0	0.00E+00
160.0	0.00E+00
170.0	0.00E+00
180.0	0.00E+00
190.0	0.00E+00
200.0	0.00E+00

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Remedial Targets

Remedial Target		No impact	mg/l	
Ogata Banks				For comparison with measured groundwater concentration.
Distance to compliance point		**200**	**m**	
Concentration of contaminant at compliance point	C_{ED}/C_0	**0.00E+00**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		TPH Aliphatic C10-C12		from Level 1
Target Concentration	C_T	0.3	mg/l	from Level 1
Dilution Factor	DF	2.33E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	9.90E+100	days	*recalcitrant unless oxidised*
Calculated decay rate	λ	7.00E-102	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	5.53E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*SS for Rough Rock Sstone as water filled por*
Hydraulic gradient	i	1.13E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	2.00E+02	m	*200m CP. To Piggs Lee Brook Inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.09E+02	l/kg	*see options*
Longitudinal dispersivity	ax	20.000	m	*see options*
Transverse dispersivity	az	2.000	m	*see options*
Vertical dispersivity	ay	0.200	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	4.85E-01	m/d
Retardation factor	Rf	8.26E+03	fraction
Decay rate used	λ	8.48E-106	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.13E-01	fraction
Rate of contaminant flow due to retardation	u	5.88E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	0.00E+00	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**breakthrough at cc**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**No impact**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		No impact	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**200**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**0.00E+00**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	2.50E+05	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.09E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

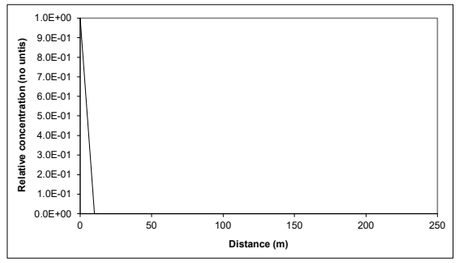
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
10.0	**4.29E-06**	**0.00E+00**
20.0	**0.00E+00**	**0.00E+00**
30.0	**0.00E+00**	**0.00E+00**
40.0	**0.00E+00**	**0.00E+00**
50.0	**0.00E+00**	**0.00E+00**
60.0	**0.00E+00**	**0.00E+00**
70.0	**0.00E+00**	**0.00E+00**
80.0	**0.00E+00**	**0.00E+00**
90.0	**0.00E+00**	**0.00E+00**
100.0	**0.00E+00**	**0.00E+00**
110.0	**0.00E+00**	**0.00E+00**
120.0	**0.00E+00**	**0.00E+00**
130.0	**0.00E+00**	**0.00E+00**
140.0	**0.00E+00**	**0.00E+00**
150.0	**0.00E+00**	**0.00E+00**
160.0	**0.00E+00**	**0.00E+00**
170.0	**0.00E+00**	**0.00E+00**
180.0	**0.00E+00**	**0.00E+00**
190.0	**0.00E+00**	**0.00E+00**
200.0	**0.00E+00**	**0.00E+00**

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		TPH Arom C10-C12		from Level 1
Target Concentration	C_T	9.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.28E+00	mg/l	*Maximum concentration recorded post treatment trials (RBH319)*
Half life for degradation of contaminant in water	$t_{1/2}$	1.83E+03	days	*Average from Howard et al 1991*
Calculated decay rate	λ	3.79E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.12E+01	m	*RBH609 to RBH320*
Plume thickness at source	Sy	2.60E+00	m	
Saturated aquifer thickness	da	1.24E+01	m	
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*Site specific - for sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - water filled porosity for sandstone*
Hydraulic gradient	i	6.43E-02	fraction	*Site specific*
Hydraulic conductivity of aquifer	K	6.41E-01	m/d	*Calculated from FHT*
Distance to compliance point	x	2.00E+02	m	*200m CP. To Piggs Lee Brook Inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.62E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.00E+01	m	*see options*
Transverse dispersivity	az	2.00E+00	m	*see options*
Vertical dispersivity	ay	2.00E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	1.29E+03	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.62E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

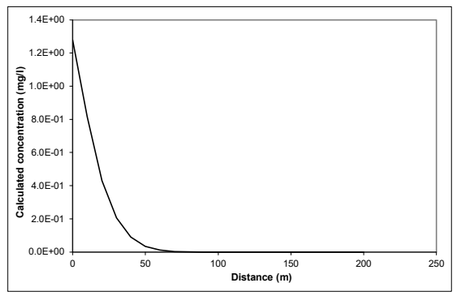
Calculated Parameters	Variable		
Groundwater flow velocity	v	2.77E-01	m/d
Retardation factor	Rf	4.35E+01	fraction
Decay rate used	λ	8.70E-06	d^{-1}
Rate of contaminant flow due to retardation	u	6.37E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	0.00E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**breakthrough at compliance point**	

Remedial Targets

Remedial Target		No impact	mg/l	
Ogata Banks				
Distance to compliance point		**200**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**0.00E+00**	**mg/l**	Ogata Banks
after		**2.0E+03**	**days**	

For comparison with measured groundwater concentration.

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.3E+00
10.0	8.17E-01
20.0	4.30E-01
30.0	2.07E-01
40.0	8.93E-02
50.0	3.37E-02
60.0	1.10E-02
70.0	3.04E-03
80.0	7.12E-04
90.0	1.41E-04
100.0	2.33E-05
110.0	3.22E-06
120.0	2.06E-07
130.0	1.96E-08
140.0	1.55E-09
150.0	0.00E+00
160.0	0.00E+00
170.0	0.00E+00
180.0	0.00E+00
190.0	0.00E+00
200.0	0.00E+00

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		TPH Arom C10-C12		from Level 1
Target Concentration	C_T	0.09	mg/l	from Level 1
Dilution Factor	DF	2.07E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		0	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.83E+03	days	*Average from Howard et al 1991*
Calculated decay rate	λ	3.79E-04	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	3.12E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	2.60E+00	m	from Level 2
Bulk density of aquifer materials	ρ	2.41E+00	g/cm^3	*SS for Rough Rock Sandstone*
Effective porosity of aquifer	n	1.49E-01	fraction	*Site specific - water filled porosity for sandstor*
Hydraulic gradient	i	1.25E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.41E-01	m/d	from Level 2
Distance to compliance point	x	2.00E+02	m	*200m CP. To Piggs Lee Brook Inlet*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	2.01E+03	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.62E+00	l/kg	*see options*
Longitudinal dispersivity	ax	20.000	m	*see options*
Transverse dispersivity	az	2.000	m	*see options*
Vertical dispersivity	ay	0.200	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	5.38E-01	m/d
Retardation factor	Rf	4.35E+01	fraction
Decay rate used	λ	8.70E-06	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.25E-01	fraction
Rate of contaminant flow due to retardation	u	1.24E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.26E-09	fraction
Attenuation factor (C_O/C_{ED})	**AF**	**7.96E+08**	**fraction**
Calculated soil leachate concentration	Co	0.00E+00	mg/l

Remedial Targets

Level 3 Remedial Target		**1.48E+08**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		4.34E+09	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**200**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**1.26E-09**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient Kd [ ] l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	2.03E-03	fraction
Organic carbon partition coefficient	Koc	1.29E+03	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.62E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

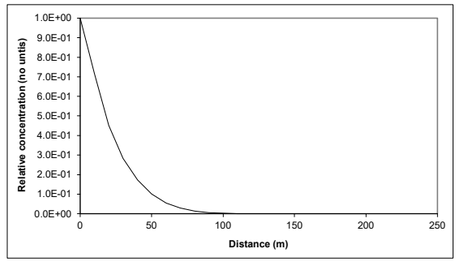
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+01	6.21E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E+00	6.21E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-01	6.21E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Tetrosyl Phase 2A/2B
Completed by:	LS
Date:	########
Version:	1.01

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	**1.0E+00**	**0.00E+00**
10.0	**7.15E-01**	**0.00E+00**
20.0	**4.52E-01**	**0.00E+00**
30.0	**2.83E-01**	**0.00E+00**
40.0	**1.73E-01**	**0.00E+00**
50.0	**1.01E-01**	**0.00E+00**
60.0	**5.56E-02**	**0.00E+00**
70.0	**2.87E-02**	**0.00E+00**
80.0	**1.37E-02**	**0.00E+00**
90.0	**6.08E-03**	**0.00E+00**
100.0	**2.48E-03**	**0.00E+00**
110.0	**9.30E-04**	**0.00E+00**
120.0	**3.19E-04**	**0.00E+00**
130.0	**1.00E-04**	**0.00E+00**
140.0	**2.87E-05**	**0.00E+00**
150.0	**7.51E-06**	**0.00E+00**
160.0	**1.03E-06**	**0.00E+00**
170.0	**2.21E-07**	**0.00E+00**
180.0	**4.34E-08**	**0.00E+00**
190.0	**7.75E-09**	**0.00E+00**
200.0	**1.26E-09**	**0.00E+00**

APPENDIX C

CE Geochem Ltd Specialist Laboratory Work & Modelling

APPENDIX C.1

A231001B Tetrosyl Advanced Characterisation and Sorption Studies. Project Memo II. Ref: A231001/PMII, dated 26/02/2024

Project Memo

Project No	A231001B	**Date**	26/02/2024
Project ID	Tetrosyl Advanced Characterisation and Sorption Studies	**Ref**	A231001/PMII
Client	Barratt Homes		
Recipients	Bradley Massey (BH), Louise Stock (SGL), Thomas Mullan (CEG), Jamie Cutting (CEG)		

SUBJECT: A231001 Tetrosyl Advanced Characterisation and Sorption Studies

1. Introduction

CE Geochem have been commissioned by Barratt Homes to aid the advanced characterisation of the former Tetrosyl site located within Bevis Green Works in Bury, UK. The site is currently undergoing remediation to develop the site for residential end-use with current work focusing on understanding the distribution of contamination within the Phase 2B area. To assist with ongoing site investigation works, CE Geochem have performed a depth profiling study on snap frozen borehole cores to develop an understanding of source term mass distribution within the aquifer. This depth profiling study involved the quantification of volatile organic compounds (VOCs) along with Sudan IV staining and UV fluorescence photography for the qualitative identification of non-aqueous phase liquids (NAPLs). Results of the depth profiling studies indicated that solid phase concentrations of VOCs in the core sections analysed were generally below 50 µg/kg except in COAL layers where elevated concentrations were detected. The highest amounts recorded were for toluene which had a peak concentration of 610 µg/kg.

In addition to the depth profiling study, a sorption isotherm study was performed investigating the sorption capacity of COAL and seat earth CLAY recovered from the former Tetrosyl site towards contaminants of concern. Results demonstrated that the COAL had a high sorption capacity for benzene, toluene, ethylbenzene, m-, p-, and o-xylene (BTEX), tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-1,2-dichloroethylene (cis-1,2-DCE) and, therefore, may have an important role in limiting contaminant mobility in groundwater.

2. Project Appreciation

CE Geochem understand that Barratt Homes are developing the former Tetrosyl site, located within Bevis Green Works in Bury, UK, for residential end-use. The site has a long history of industrial use and was operated as an automotive products manufacturing plant by Tetrosyl Limited between the mid-1960s and the early 2000s. Since industrial activity ceased, a series of ground investigations and remedial works have taken place. Phase 1 of the remedial works has recently completed, while the remediation of the Phase 2 area is currently ongoing. The Phase 2B area, which broadly overlaps with the former solvent recovery area, is the primary focus of current remediation efforts and is mainly impacted by high concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX) compounds, although concentrations of the

chlorinated solvents (PCE,TCE, cis-1,2,-DCE, and vinyl chloride (VC) and methyl tert-butyl ether (MTBE) in excess of threshold values have also been recorded [1].

Correspondence from the Environment Agency (EA) has indicated that further work is required to satisfy the regulator that the site has been sufficiently remediated [2]. The current site investigation works (coordinated by Smith Grant LLP) are indicated to address these concerns and further develop an understanding of the site and the hydrogeological/geochemical processes influencing contaminant distribution and persistence to aid the production of a refined Detailed Quantitative Risk Assessment (DQRA). To assist with this programme of advanced site characterisation, CE Geochem have been commissioned to conduct a depth profiling study to better understand the source term mass distribution within the aquifer and a sorption isotherm study to understand the intrinsic capacity of on-site materials to retard contaminant mobility.



Figure 1 Map of locations sampled as part of January 2024 site investigation. Locations circled in red indicate core received by CE Geochem for photography and logging only, locations circled in blue indicate cores received by CE Geochem for photography, logging, and depth profiling. Map modified from [3].

[1] CE Geochem, "A231001 Tetrosyl Gap Analysis, Ref. A231001/PMI," 2023.
[2] Environment Agency, "FURTHER DETAILS FOR REVIEW - BEVIS GREEN WORKS, MILL ROAD, BURY, Ref. 63533," 2023.
[3] Urban Regen, "Borehole Locations, Drawing No. 333/12/01/24," 2024.

A total of 21 No. core lengths (from RHB610, RBH612, RHB614, and RHB615) were received by CE Geochem during the drilling of boreholes in December 2023. Sections were identified in advance based upon the review of data from previous site investigations. These sections were snap frozen in dry ice to minimise VOC loss immediately after drilling before being transported to the CEG Laboratories where they were stored at –20 °C until testing. Cores and samples were always immediately returned to –20 °C when they were not actively being worked on. A further 6 No. core lengths (from RBH602 and RBH606) were received during the drilling of boreholes in January 2024. These cores were not snap frozen as they were only identified as being of interest after drilling based on discussions with Smith Grant LLP. However, temperatures during drilling were low (ranging from –2 to 6 ºC between the time of sampling and collection) and, therefore, any loss of VOCs was likely limited. Once received by the CE Geochem, these core sections were treated equivalently to the sections received in December 2023.

All retrieved cores were initially photographed and logged. Subsequently, 6 No. sections were selected based upon previous site data and client correspondence for more detailed depth profiling investigations. The sections investigated were:

- RBH606: 8.2–9.5 m & 10.0–10.8 m
- RBH610: 5.0–6.0 m & 7.0–8.0 m
- RBH615: 10.0–11.0 m & 11.0–12.0 m

In addition to the snap-frozen cores, samples of COAL and seat earth CLAY sampled from site were received by CE Geochem for use in the sorption studies.

3. Core Logging

Core logging was performed on intact, frozen core sections to minimise any loss of volatiles. The full logs are presented in Appendix A, with a summary of the sections logged presented in Table 1.

Borehole ID	Date Sampled	Location	Description	Sections received
RBH610	06/12/2023	Main plume core in Phase 2B	SANDSTONE above and below COAL at 5.4–6.0 m	3–6 m & 7–8 m
RBH612	07/12/2023	South of former wall	SANDSTONE	4.7–5 m
RBH614	07/12/2023	Fringe of Phase 2A	SANDSTONE with occasional black staining	4–6 m
RBH615	06/12/2023 & 07/12/2023	Fringe of Phase 2A	SANDSTONE	3–15 m
RBH602	06/01/2024	Former reservoir (east)	SANDSTONE	7.5–10.5 m
RBH606	05/01/2024	Former reservoir (west)	SANDSTONE (8.0–9.2 m), COAL (9.2–9.5 m), SILTSTONE (10.0–10.8 m)	8–10.8 m

Table 1 Summary of cores received by CE Geochem.

The cores received by CE Geochem predominantly represented the Rough Rock SANDSTONE, with RBH606 and RBH610 intersecting the COAL layer that runs through the site. The lower 10–10.8 m core length retrieved from RBH606 was a SILTSTONE, likely of the Rossendale Formation.

4. Depth Profiling of Cores

Based on previous site investigations and on-site observations during the December 2023/January 2024 drilling, 6 No. core lengths were identified for detailed investigation by depth profiling for quantitative VOC analysis, Sudan IV staining for qualitative free phase NAPL identification, moisture content (MC) to identify flow zones, and UV fluorescence photography to image NAPL distribution throughout the core.

Cores were sectioned longitudinally using a diamond blade slab saw, with one half retained for UV fluorescence photography and the other half sectioned laterally using a diamond blade chop saw for analysis of MC, VOCs, and Sudan IV staining. Core lengths were generally sectioned into ~100 mm lengths except where substantial changes in lithology occurred (e.g., sandstone into coal) or where pre-existing fractures made cutting 100 mm lengths impractical. Each section was then disaggregated using a lump hammer to produce samples for analysis. Results of the depth profiling studies are contained in Appendix B as interactive Microsoft Excel worksheets. Importantly, all concentrations of contaminants of concern were below preliminary soil RTVs (as based on the values used for the DQRA covering the southern half of the Phase 2 area) [4, 5] and no evidence of free phase NAPL was observed.

[4] Smith Grant LLP, "Former Tetrosyl Bevis Green Works Walmersley Old Rd. Bury, BL9 6RE: Briefing Note for Prospective Groundwater Treatment Remediation Contractors, R2174".
[5] Groundtech Consulting Limited, *Re: Tetrosyl Bevis Green Works, Bury Project (Ref: ENVPAC/1/GMC/00429), Ref. GRO-21459-4595,* 2023.

4.1. VOC Analysis

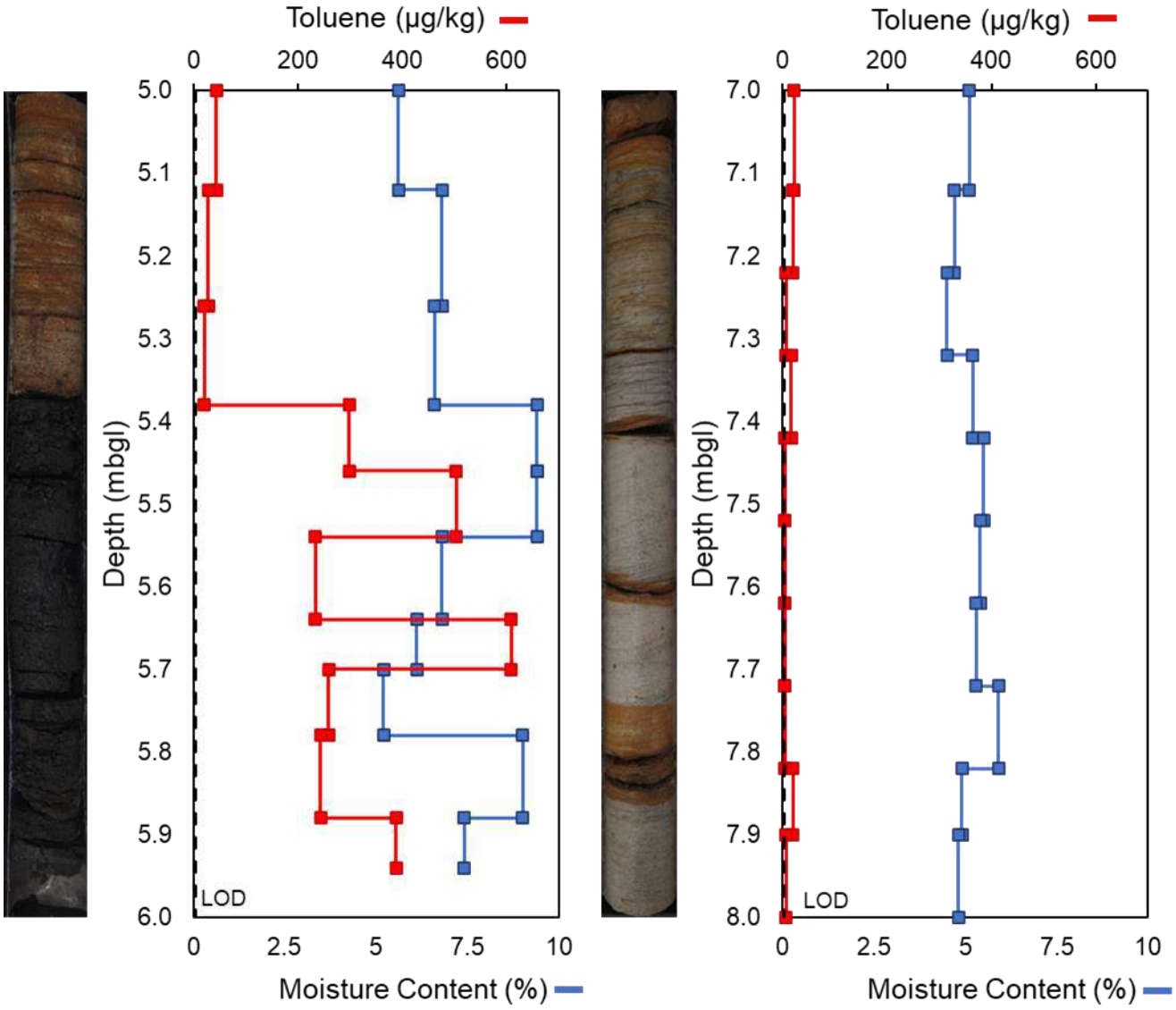


Figure 2 Core photographs and toluene and moisture content versus depth for RBH610 between 5 and 6 mbgl and between 7 and 8 mbgl.

RBH610 is located within the approximate centre of the contaminant plume. Sections above, through, and below the COAL layer that runs through this part of the site were selected to investigate the influence of COAL on the depth profile of contaminants. Figure 2 shows toluene concentrations and MC plotted against depth for the 5–6 m and 7–8 m sections of borehole RBH10. The depth profile shows a substantial elevation in toluene concentrations within the COAL layer between 5.4 mbgl and 5.94 mbgl. Concentrations within this section range from 230 to 610 µg/kg compared to between 20 and 40 µg/kg in the upper SANDSTONE and between 4 and 20 µg/kg in the lower SANDSTONE. Similar trends are observed for benzene, ethylbenzene, m/p-xylene, o-xylene, Isopropylbenzene, 1,1,2,2-Tetrachloroethane, Bromobenzene, 1,2,3-Trichloropropane, Propylbenzene, 2-Chlorotoluene, 1,3,5-Trimethylbenzene, 4-Chlorotoluene, tert-Butylbenzene, 1,2,4-Trimethylbenzene, sec-Butylbenzene, 4-Isopropyltoluene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, n-Butylbenzene, 1,2-Dichlorobenzene, 1,2-Dibromo-3-chloropropane, 1,2,4-Trichlorobenzene, Hexachlorobutadiene, Naphthalene. These compounds were all below laboratory detection limits except within the COAL. The only detectable compounds that did not follow this trend

were the chlorinated solvents TCE, cis-1,2-DCE, and Freon-12. TCE and cis-1,2-DCE were generally below the limit of detection (LOD) except between 7.8 and 7.9 m where low levels were detected (17 µg/kg and 4 µg/kg, respectively). Core photographs show there are two fractures within this section indicating it may be a flow zone for low levels of contaminants to pass through. Freon-12 was below LOD above and through the COAL but present at between 7 and 8 m at levels between 5 and 95 µg/kg with no obvious correlation to MC or fracture zones.

Comparing the results of the depth profiling presented in this report and the most recent groundwater monitoring data (January 2024) from below the COAL (RBH610) and adjacent boreholes above the COAL (RBH320 and RBH321) further indicates that the COAL is likely limiting the vertical migration of contaminants. For example, concentrations of toluene in RBH320 and RBH321 (response zones of 3–6 mbgl) are around 45 mg/L but decrease to below the LOD of 5 µg/L in RBH610 (response zone of 6.5–8.0 mbgl). Similar trends are observed for benzene, ethylbenzene, the xylenes, and MTBE. However, it should be noted that VC concentrations in RBH320 and RBH 321 (~ 3.5 µg/L) and RBH 610 (4.5 µg/L) were similar and in excess of the RTV of 0.943 µg/L. This is consistent with the depth profiling results which indicated that solid phase VC concentrations were below the LOD, even within the COAL layer.

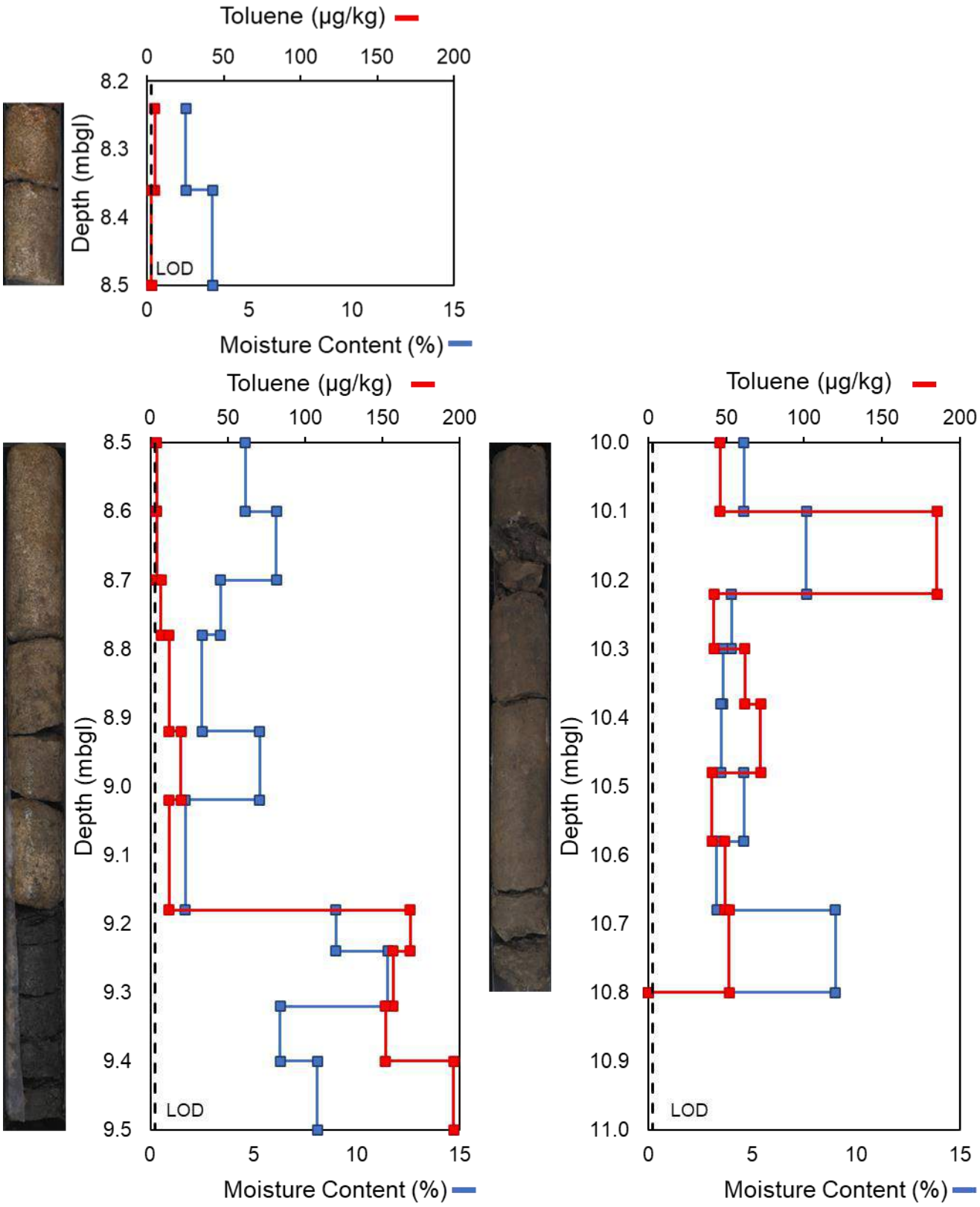


Figure 3 Core photographs and toluene and moisture content versus depth for RBH606 between 8.2 and 8.5 mbgl, 8.5 and 9.5 mbgl, and 10.0 and 10.8 mbgl.

RBH606 is located within the former reservoir. Sections of SANDSTONE, COAL, and SILTSTONE were selected to investigate the migration of contaminants into the former reservoir and the influence of the different strata on the contaminant depth profiles. Figure 3

shows toluene concentrations and MC plotted against depth for the tested sections. All contaminants apart from toluene were below LODs in the SANDSTONE between 8.2 and 9.2 mbgl, with toluene concentrations between 3 and 20 µg/kg. As with RBH610, there was an increase in VOC concentrations in the COAL with toluene concentrations between 150 and 200 µg/kg, and concentrations of ethylbenzene, m/p-xylene, and o-xylene between 12 and 120 µg/kg. Note that benzene was below the LOD in the COAL. Other compounds detected in the COAL included between 30 and 120 µg/kg 1,2,4-trimethylbenzene, up to 40 µg/kg naphthalene, 8 µg/kg Freon-12, and between 5 and 15 µg/kg isopropylbenzene, propylbenzene, and 1,3,5-trimethylbenzene. Concentrations in the SILTSTONE decreased again, although there was a spike in toluene concentrations between 10.1 and 10.2 mbgl. This section of the core was recovered as non-intact gravel with a relatively high MC, which may indicate a flow zone for contaminants. The only other compounds detected in the SILTSTONE were m/p-xylene, o-xylene, 1,3,5-trimethylbenzene, and 1,2,4-trimethylbenzene, all of which were below 25 µg/kg.

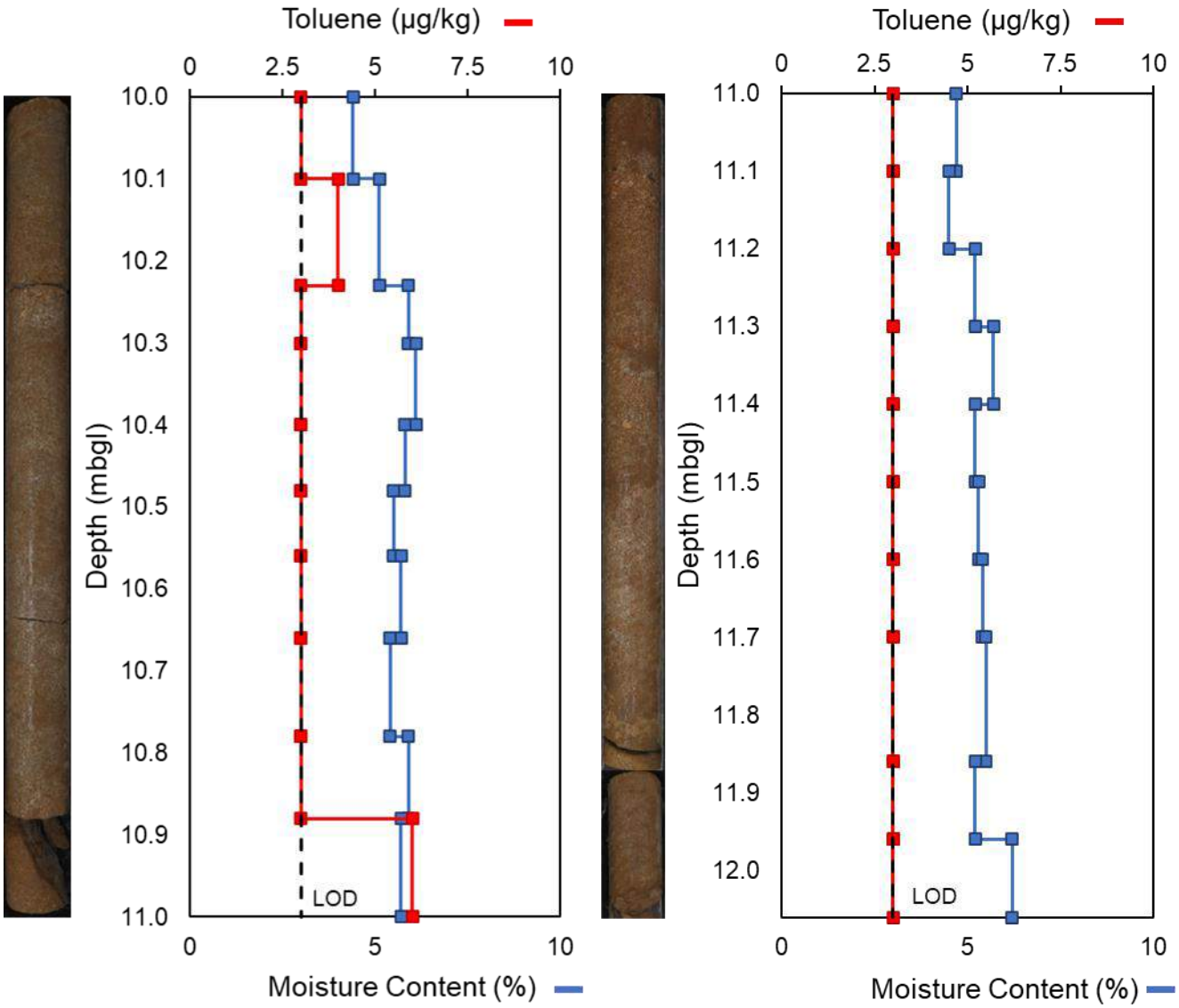


Figure 4 Core photographs and toluene and moisture content versus depth for RBH615 between 10 and 12 mbgl.

RBH615 is located on the border of Phase 2A and Phase 2B, an important location due to houses having already been built on Phase 2A. During drilling, a sweet odour was noted

between 9 and 12 mbgl and so sections between 10 and 12 mbgl were selected for depth profiling. Concentrations of contaminants of concern in RBH615 were generally close to or below the LOD. Toluene (Figure 4) was only detected between 10.1–10.2 mbgl and 10.9–11.0 mbgl at 4 and 6 µg/kg, respectively. The partially intact section from 10.9–11.0 mbgl also contained detectable levels of m/p-xylene (44 µg/kg), ethylbenzene (6 µg/kg), 1,3,5-trimethylbenzene (4 µg/kg), and 1,2,4-trimethylbenzene (17 µg/kg). The fractured section at 11.7–11.9 mbgl also contained low levels of ethylbenzene (8 µg/kg) and m/p-xylene (6 µg/kg). The only compound detected throughout the entire 2 m core section profiled was Freon-12, with concentrations ranging from 6 to 43 µg/kg.

4.2. Sudan IV Staining & UV Fluorescence Photography

Two qualitative tests were used to identify the presence of NAPL in the core sections used for depth profiling. Sudan IV acts as an indicator of the presence of dense non-aqueous phase liquids (DNAPL). A sample containing DNAPL will become stained with a bright red colour upon mixing with Sudan IV [6]. In UV fluorescence photography, a sample is irradiated with 254 nm wavelength UV light. Under these conditions, aromatic hydrocarbons such as BTEX compounds may fluoresce and emit visible light [7].

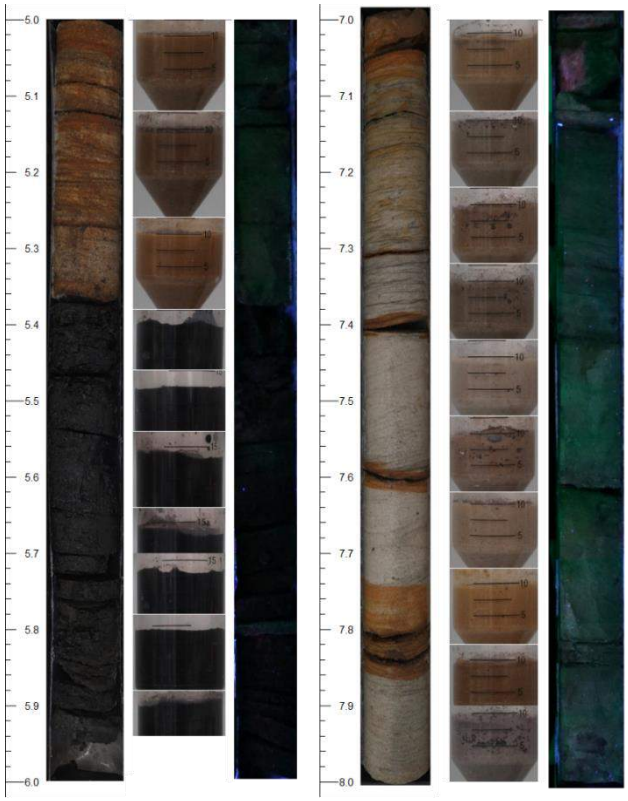


Figure 5 Core photographs (left), Sudan IV staining photographs (middle), and UV fluorescence photographs (right) for RBH610 between 5 and 6 mbgl and between 7 and 8 mbgl.

[6] CLU-IN, "Dense nonaqueous phase liquids (dnapls) Detection and Site Characterization," [Online]. Available: https://clu-in.org/contaminantfocus/default.focus/sec/dense_nonaqueous_phase_liquids_(dnapls)/cat/Detection_and_Site_Characterization/p/0d/

[7] siteLAB, "Improving NAPL Site Investigations using UVF and LIF Technologies Together," [Online]. Available: https://cese.utulsa.edu/wp-content/uploads/2017/05/IPEC-2014-Improving-NAPL-Site-Investigations.pdf

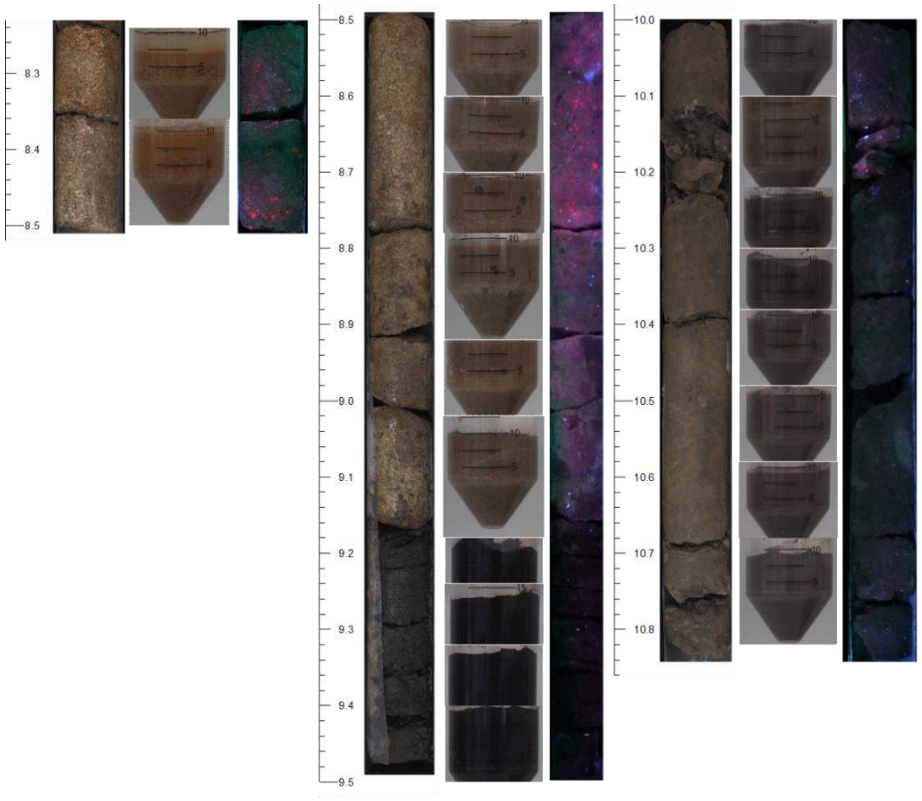


Figure 6 Core photographs (left), Sudan IV staining photographs (middle), and UV fluorescence photographs (right) for RBH606 between 8.2 and 8.5 mbgl, 8.5 and 9.5 mbgl, and 10.0 and 10.8 mbgl.

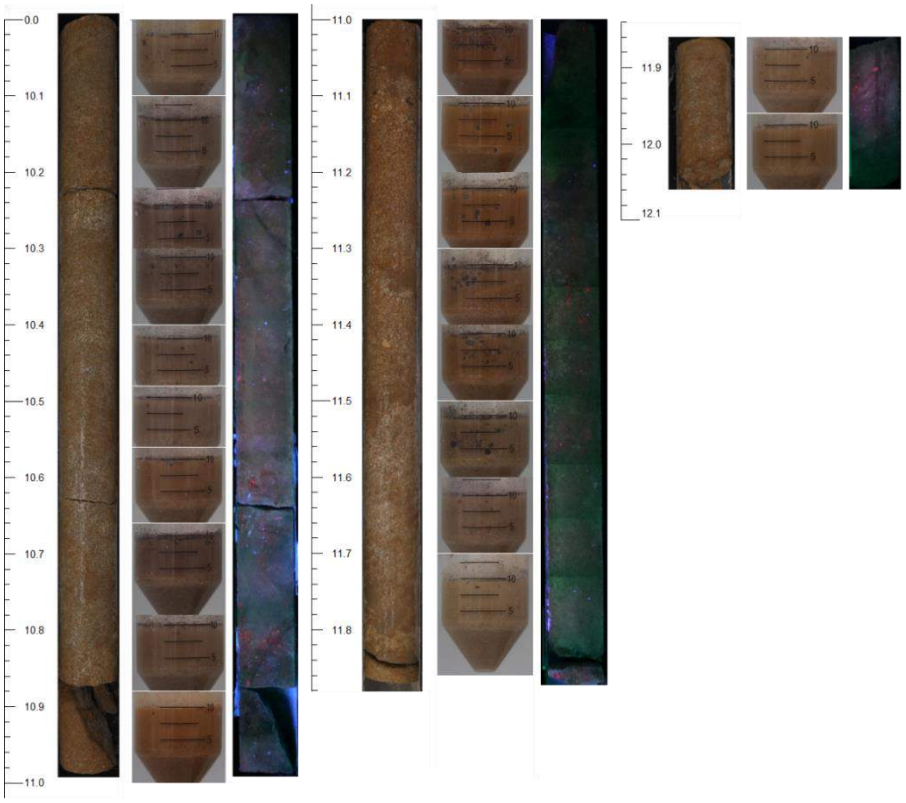


Figure 7 Core photographs (left), Sudan IV staining photographs (middle), and UV fluorescence photographs (right) for RBH615 between 10 and 12 mbgl.

Figures 5–7 show results of the Sudan IV staining and UV fluorescence photography. No red staining (indicative of DNAPL) was apparent in any of the samples mixed with Sudan IV.

In the UV fluorescence photography, rare fluorescent inclusions were observed in some core sections. The orange fluorescence most likely indicates a mineral phase such as calcite. This orange fluorescence was most prevalent in the SANDSTONE of RBH606. In contrast, there was no conclusive evidence of any fluorescence associated with aromatic hydrocarbon NAPL residue.

5. Sorption Studies

Site investigations have identified the presence of materials such as COAL and the seat earth CLAY which may have a sorption capacity for VOCs and thereby retard the migration of contaminants through the subsurface. Samples of COAL and seat earth CLAY were retrieved from areas of the former Tetrosyl site which have experienced low impact from contamination. The samples were dried at 40 °C for 72 h and gently ground in a mortar and pestle to produce a homogenous sample to use as sorbents.

The sorption experiments were performed as competitive sorption isotherm experiments. A VOC spike solution contained MTBE, BTEX, PCE, TCE, and cis-1,2-DCE each at concentrations ranging from 0.5 to 40 mg/L. The VOC spike solution was then mixed with 1 g of COAL or seat earth CLAY and sealed in a glass vial with zero headspace. The experiments were mixed on an end-over-end shaker for 48 h before filtrates were analysed for concentrations of VOCs remaining in solution. Analysis of the COAL and seat earth CLAY in the absence of spiked VOCs indicated that contaminants of concern were present at less than 30 µg/kg. Additionally, VOCs were below LODs in filtrates taken from mixtures of COAL or seat earth CLAY with deionised water. Analytical data for the sorption studies is contained in Appendix C with sorption isotherm fits contained in Appendix D.

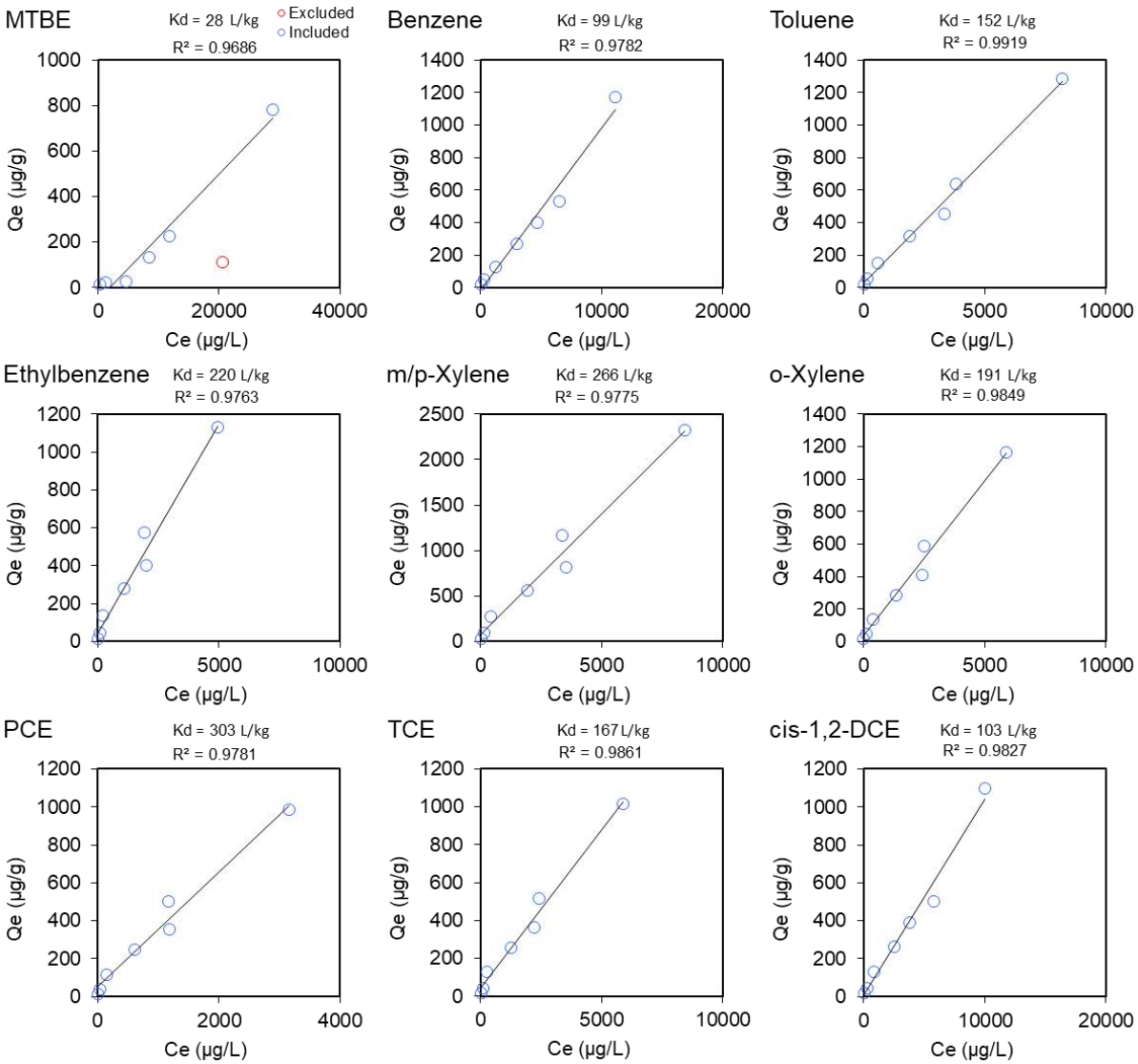


Figure 8 Linear sorption isotherms for VOCs onto COAL. Qe = equilibrium sorbed concentration, Ce = equilibrium solution concentration, K_d = distribution coefficient. Data points excluded from isotherm fits are indicated in red.

The COAL had a high sorption capacity for BTEX compounds and the chlorinated solvents tested, with between 65% and 98% removed from solution. The sorption capacity for MTBE was much lower, with between 60% and 90% remaining in solution except at the lowest initial concentration (C_0) of 0.5 mg/L, where 40% remained in solution. It was not possible to fit the data to either Langmuir or Freundlich isotherms but a reasonable fit to a linear isotherm (with R^2 values between 0.97 and 0.99) was possible for all compounds (Figure 8). The derived K_d values from linear isotherms were generally comparable to published organic carbon partition coefficient (K_{oc}) values (Table 2) which provides confidence in the fits used.

Compound	K_d (L/kg)		Published K_{oc} (L/kg)	Data Source
	COAL	Seat Earth CLAY		
MTBE	28	10	11–12	[8]
Benzene	99	9	31–100	[9]
Toluene	152	15	94–247 (145)	[9]
Ethylbenzene	220	24	165–255 (207)	[9]
m/p-Xylene	266	26	m-xylene: 158–289 (204) p-xylene: 260–347 (313)	[9]
o-Xylene	191	15	222–258 (241)	[9]
PCE	303	62	177–373 (272)	[9]
TCE	167	22	57–150 (97)	[9]
cis-1,2-DCE	103	12	49	[10]

Table 2 K_d values calculated from linear isotherms for COAL and seat earth CLAY and comparisons of the values to published K_{oc} values. Where a range of values has been reported, the average is given in brackets. Note the analytical procedures used involve reporting m- and p-xylene concentrations combined so calculating individual K_d values is not possible.

[8] Parsons Engineering Science, Inc., "Methyl tert-Butyl Ether (MTBE) – Its Movement and Fate in the Environment and Potential for Natural Attenuation, Ref. 022/733939/18.doc," 1999.
[9] U.S. EPA, "Soil Screening Guidance Technical Background Document APPENDIX K Soil Organic Carbon (Koc) / Water (Kow) Partition Coefficients, Ref. EPA/540/R95/128," 1995.
[10] U.S. EPA, "TOXICOLOGICAL REVIEW OF cis-1,2-DICHLOROETHYLENE and trans-1,2-DICHLOROETHYLENE, Ref. EPA/635/R-09/006F," 2010.

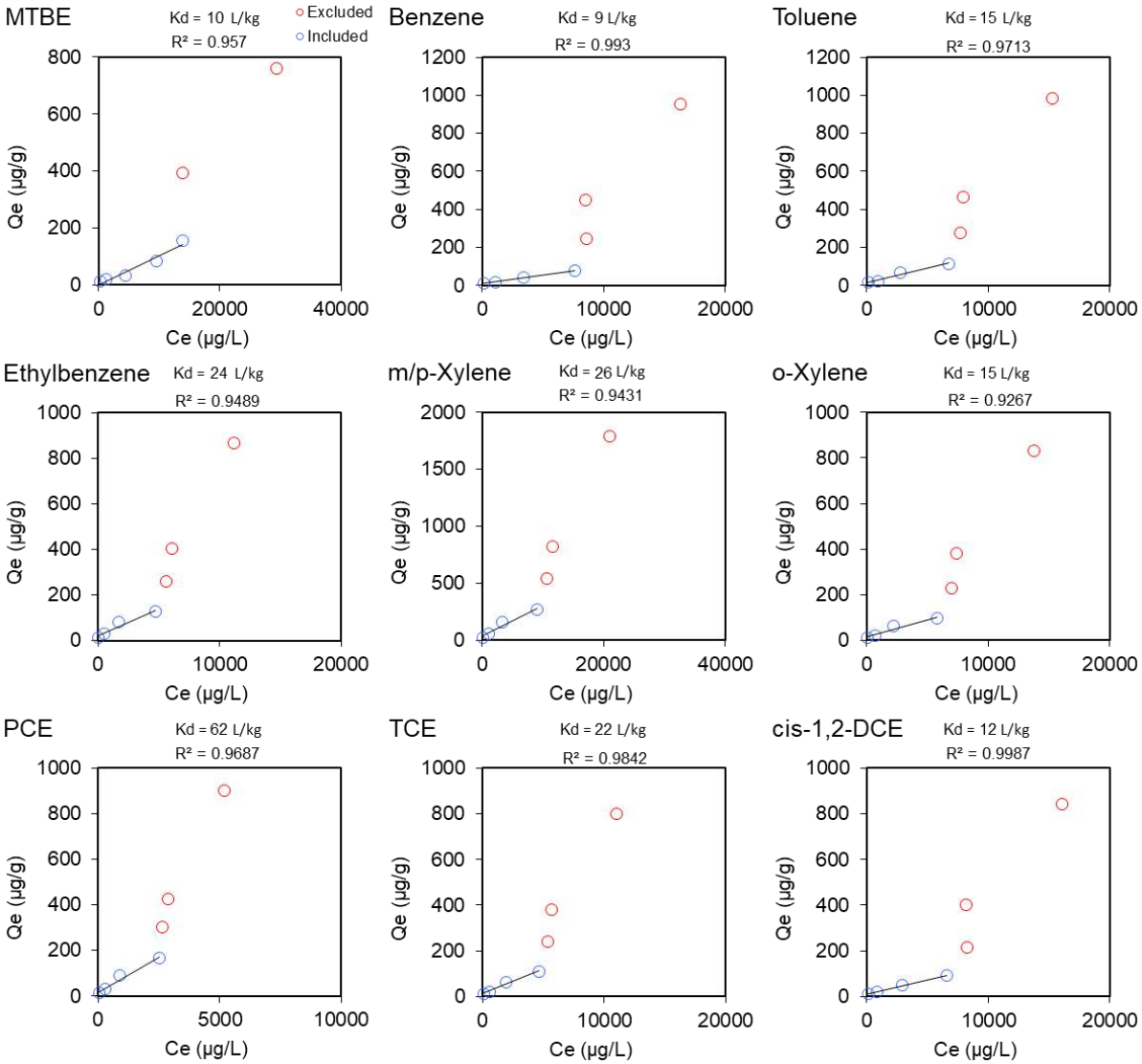


Figure 9 Linear sorption isotherms for VOCs onto seat earth CLAY. Qe = equilibrium sorbed concentration, Ce = equilibrium solution concentration, K_d = distribution coefficient. Data points excluded from isotherm fits are indicated in red.

Sorption onto the seat earth CLAY was lower than onto the COAL, although it still was able to remove between 40% and 90% of tested compounds from solution. The highest amounts removed were ~90% for PCE and ethylbenzene at C_0 = 0.5 mg/L. Sorption isotherms onto the seat earth CLAY appeared to follow an S-shaped curve. However, below C_0 = 10 mg/L a reasonable fit (R^2 ranging from 0.93 to 0.99) to a linear isotherm could be made (Figure 9). Because groundwater concentrations of the VOCs tested aside from toluene are typically lower than 10 mg/L, it was decided to derive K_d values from this lower range of the isotherm so as to provide a conservative estimate of sorption behaviour.

6. Conclusions and Recommendations

CE Geochem have performed a depth profiling and sorption study to better understand source term mass distribution and the interactions of contaminants of concern with aquifer matrix materials at the former Tetrosyl site within Bevis Green Works in Bury, UK. The results presented within this project memorandum indicate that free phase NAPL is non-detectable within the materials tested and solid phase concentrations of contaminants of concern are enriched within COAL layers, consistent with the determined high sorption capacity of COAL towards contaminants other than MTBE. These results are also consistent with recent groundwater monitoring data that indicate that groundwater concentrations of contaminants are typically higher above the COAL layer than below it.

Following on from this study, we recommend that the next phase of work prioritises determining whether natural attenuation is occurring at a rate sufficient to justify employing Monitored Natural Attenuation (MNA) as the primary remediation strategy for the site. To do this, we propose 2 No. work activities. Firstly, to refine the 3D plume model initially presented in Project Memorandum A231001/PMI to incorporate recent groundwater data and use this along with historical data to estimate plume mass over time. If a consistent downward trend is observed, it may be possible to determine rates of biodegradation. Secondly, genetic analysis of microbial communities within the plume core and fringe should be undertaken to quantify the presence of microorganisms with the capacity to biodegrade contaminants of concern. Together, this work may be sufficient to justify MNA as a remedial approach or, alternatively, will serve as a basis for subsequent treatability trials.

We trust the information contained in this document provides a suitable summary of the advanced characterisation and sorption studies undertaken by CE Geochem. Should you wish to discuss any of the information presented in further detail, please do not hesitate to contact the undersigned.

Kind Regards



Dr Thomas Mullan

Environmental Geochemist

For and on behalf of **CE Geochem Ltd.**

Enc.

Appendix A Borehole Logs

Appendix B Depth Profiling Logs

Appendix C Analytical Data

Appendix D Sorption Isotherms

Core Logging

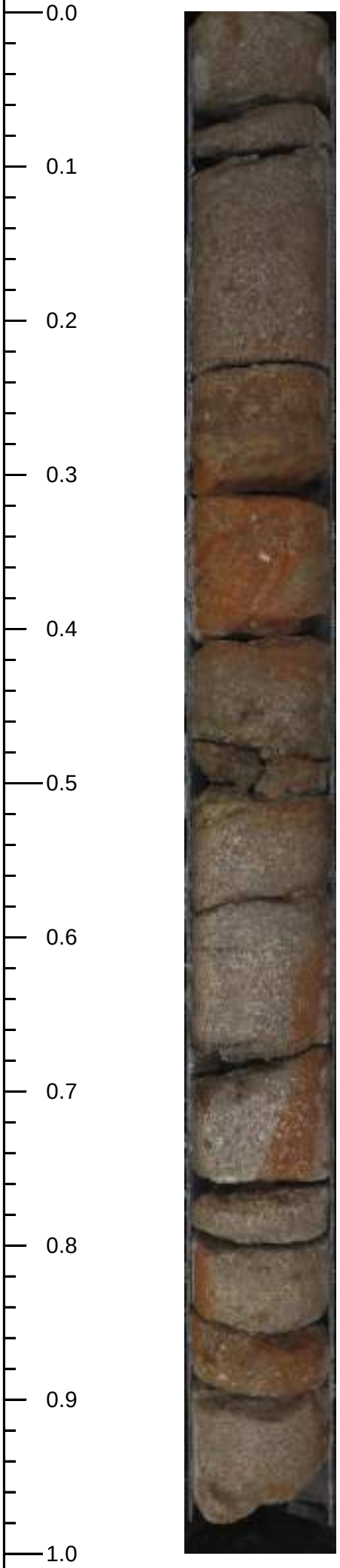
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.031 m (GL)	602
Client	**Barratt Homes**	**Co-ordinates**	E: 381046.116, N: 413921.152	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/01/2024	7.5–8.5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			7.50–7.60	Light greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK)
			7.60–7.66	Light greyish-brown orange stained medium grained SANDSTONE with closely spaced sub-horizontal fractures
			7.66–7.74	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK)
			7.74–7.80	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK) with closely spaced sub-horizontal fractures
			7.80–7.88	Light grey medium grained SANDSTONE with sub-horizontal orange-brown staining (THE ROUGH ROCK)
			7.88–7.94	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with frequent fine, angular dark brown gravel
			7.94–8.01	Greyish brown medium grained SANDSTONE
			8.01–8.50	AZCL 8–8.5 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 51%. Rock Quality Designation = 30%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

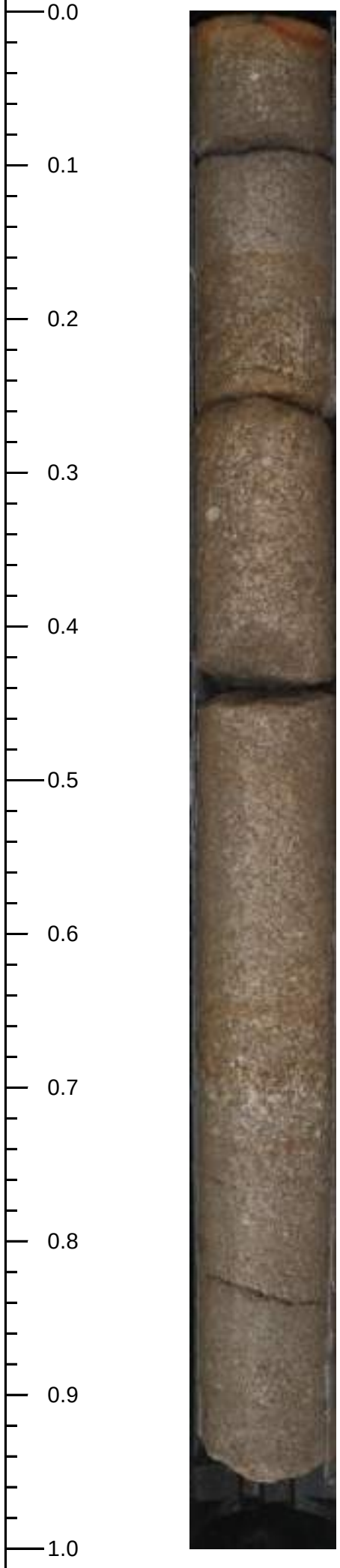
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.031 m (GL)	602
Client	**Barratt Homes**	**Co-ordinates**	E: 381046.116, N: 413921.152	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/01/2024	8.5–9.5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			8.5–8.74	Light grey mottled dark grey medium grained SANDSTONE with rare orange staining (THE ROUGH ROCK); occasional sub-horizontal to horizontal fractures
			8.74–8.90	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with medium space horizontal fractures
			8.90–9.48	Light grey medium grained SANDSTONE with occasional orange staining; close to medium space sub-horizontal fractures
			9.48–9.50	AZCL: 9.48–9.50 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 95%. Rock Quality Designation = 12%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.031 m (GL)	602
Client	**Barratt Homes**	**Co-ordinates**	E: 381046.116, N: 413921.152	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/01/2024	9.5–10.5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			9.52–9.54	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
			9.54–9.66	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK); medium spaced sub-horizontal fractures
			9.66–10.22	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK) with rare orange staining; medium spaced sub-horizontal fractures
			10.22–10.46	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK); medium spaced sub-horizontal fractures
			10.46–10.50	AZCL: 10.46–10.50 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 92%. Rock Quality Designation = 79%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

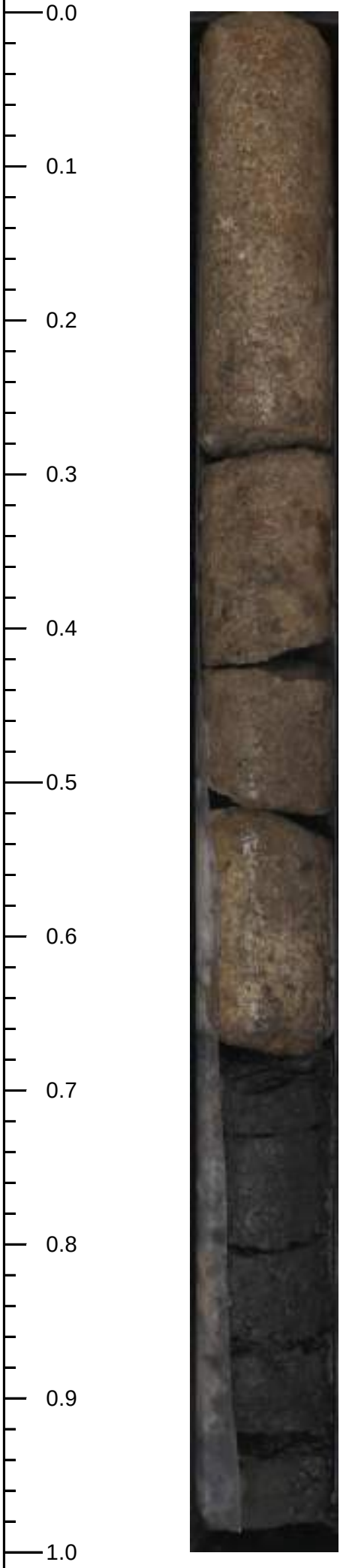
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	7.5–8.5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 			7.50–8.04	AZCL: 7.5–8.04 m
			8.04–8.08	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with rare black staining
			8.08–8.36	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with medium spaced sub-horizontal fractures
			8.36–8.5	Light grey medium grained SANDSTONE (THE ROUGH ROCK)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 48%. Rock Quality Designation = 30%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

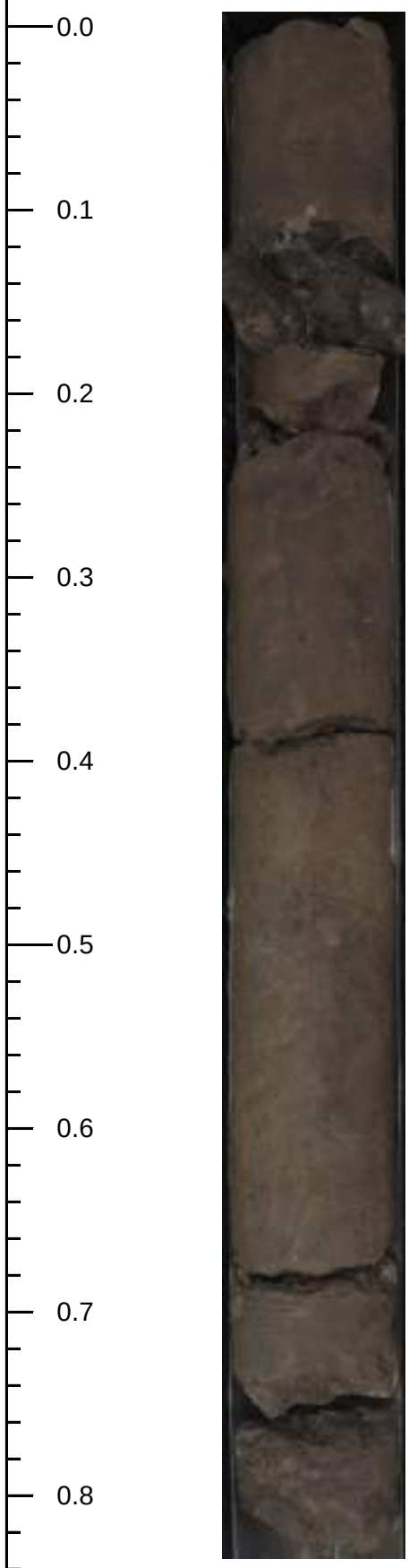
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	8.5–9.5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			8.50–8.60	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with occasional orange staining
			8.60–9.18	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with frequent black staining and occasional orange staining
			9.18–9.48	COAL with closely spaced horizontal to sub-horizontal fractures
			9.48–9.50	COAL gravel (No recovery)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 94%. Rock Quality Designation = 51%. COAL gravel (9.48–9.50 m) not received by CE Geochem. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

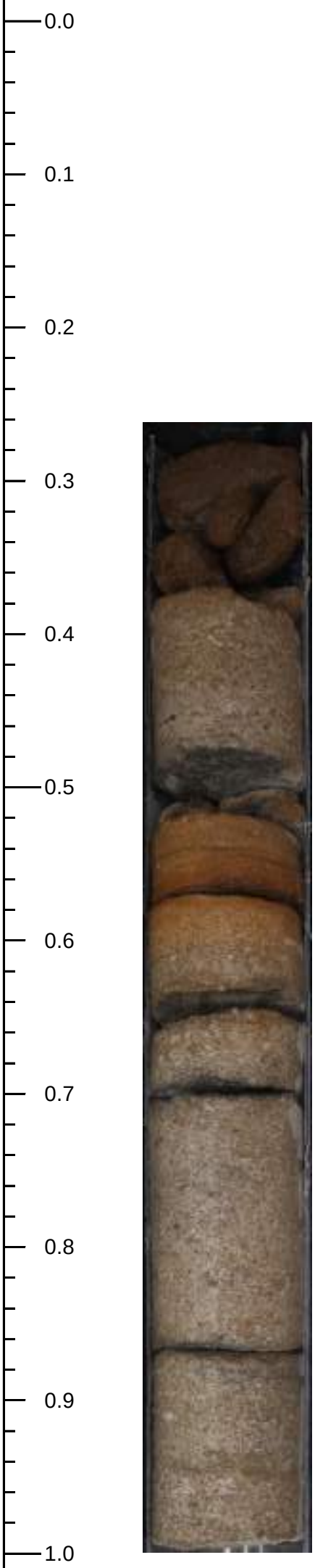
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	10–10.8 m

Core Photography	**Sampling** Depth (mbgl)	**Sampling** Results	**Depth** (mbgl)	**Stratum Description**
			10.00–10.10	Brownish dark grey sandy SILTSTONE
			10.10–10.24	Non-intact brownish dark grey sandy SILTSTONE
			10.24–10.82	Brownish dark grey sandy SILTSTONE with very closely to medium spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 95%. Rock Quality Designation = 60%. TCR and RQD given in reference to a nominal 0.8 m core length. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

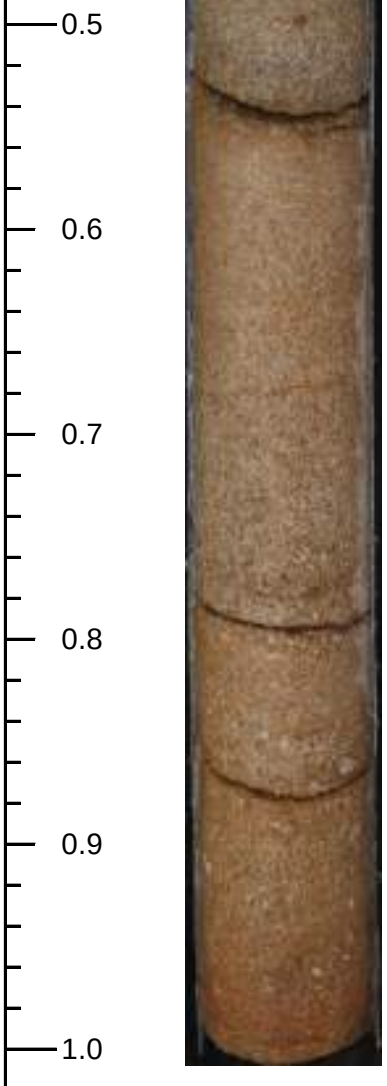
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	3–4 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			3.00–3.28	AZCL 3–3.28
			3.28–3.40	Non-intact brown-orange medium grained SANDSTONE (THE ROUGH ROCK) recovered as medium to coarse gravel
			3.40–3.52	Light grey medium grained SANDSTONE (THE ROUGH ROCK); moderately wide horizontal fracture with non-intact SANDSTONE fragments
			3.52–3.58	Orange stained medium grained SANDSTONE (THE ROUGH ROCK) with horizontal fracture
			3.58–4.00	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with very closely to closely spaced horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 70%. Rock Quality Designation = 35%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

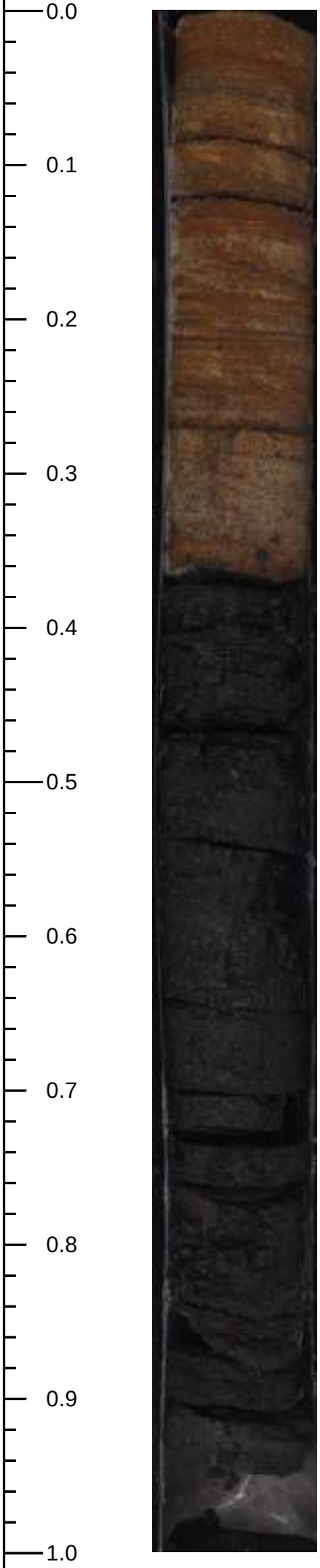
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	4–5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			4.00–4.42	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with very closely to closely spaced fractures
			4.42–5.00	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with light becoming dark orange staining; with very closely to closely spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 76%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

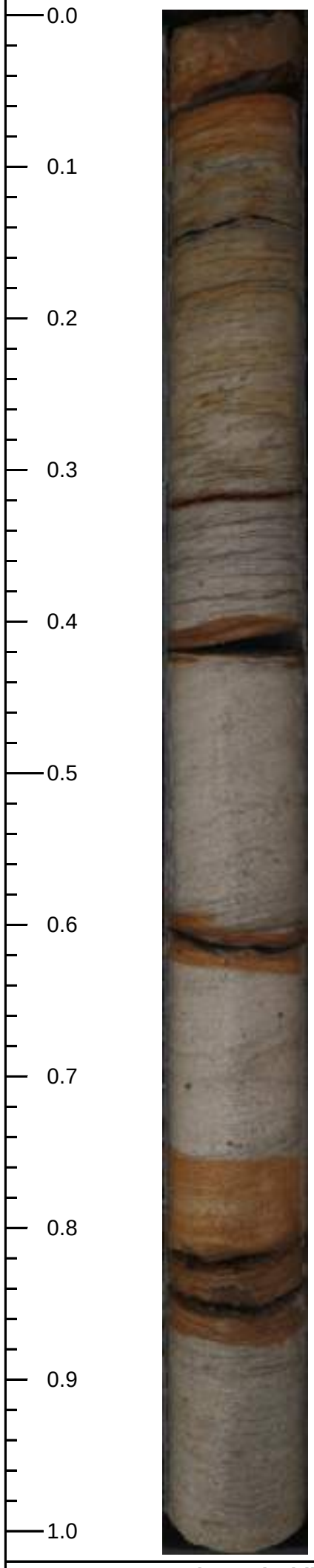
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	5–6 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			5.00–5.38	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with very closely to closely spaced sub-horizontal fractures
			5.38–5.94	COAL with rare orange staining; very closely to closely spaced horizontal to sub-horizontal fractures
			5.94–6.00	AZCL 5.94–6.00

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 92%. Rock Quality Designation = 39%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	7–8 m

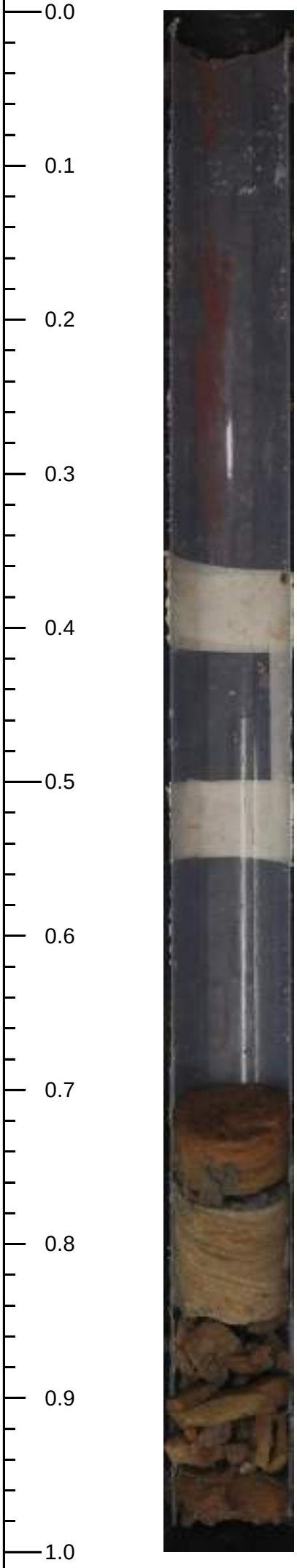
Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			7.00–7.30	Greyish white with dark orange becoming light orange staining fine grained SANDSTONE (THE ROUGH ROCK) with very closely spaced sub-horizontal dark grey laminations and closely to medium spaced sub-horizontal fractures
			7.30–7.42	Greyish white fine grained SANDSTONE (THE ROUGH ROCK) with very closely spaced sub-horizontal dark grey laminations and dark orange staining around closely spaced sub-horizontal fractures
			7.42–7.60	Greyish white fine grained SANDSTONE (THE ROUGH ROCK) with rare orange staining
			7.60–7.62	Orange stained fine grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal fracture
			7.62–7.74	Greyish white fine grained SANDSTONE (THE ROUGH ROCK), rarely mottled brown
			7.74–7.88	Orange stained fine grained SANDSTONE (THE ROUGH ROCK) with closely spaced sub-horizontal fractures
			7.88–8.00	Greyish white fine grained SANDSTONE (THE ROUGH ROCK)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 68%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.421 (GL)	612
Client	**Barratt Homes**	**Co-ordinates**	E: 380948.393; N: 413908.523	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	4–5 m

Core Photography

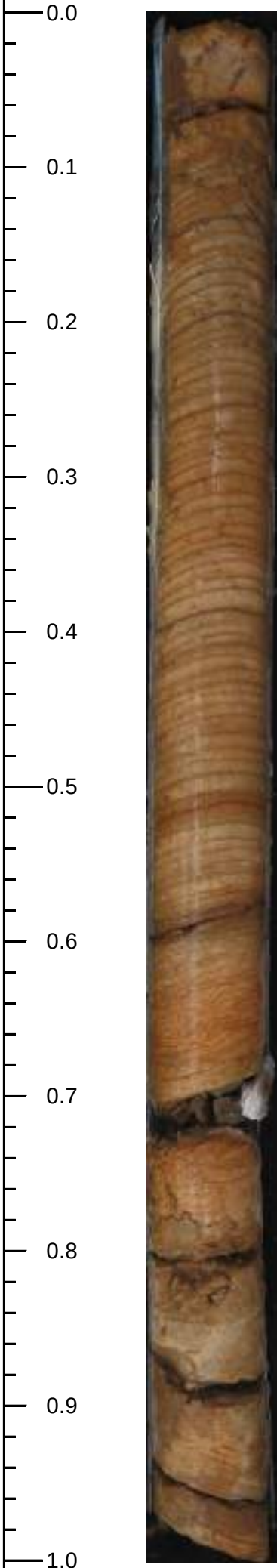


Sampling		Depth (mbgl)	Stratum Description
Depth (mbgl)	Results		
		4.00–4.70	AZCL: 4.0–4.7 m
		4.70–4.76	Orange stained medium grained SANDSTONE (THE ROUGH ROCK) with dark horizontal laminations; sub-horizontal fracture
		4.76–4.86	Brownish grey medium grained SANDSTONE (THE ROUGH ROCK with dark sub-horizontal laminations
		4.86–5.00	Non-intact brownish grey orange-stained medium grained SANDSTONE (THE ROUGH ROCK) recovered as fine to coarse gravel

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 28%. Rock Quality Designation = 0%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.421 (GL)	612
Client	**Barratt Homes**	**Co-ordinates**	E: 380948.393; N: 413908.523	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	5–6 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			5.00–5.06	Brownish grey oranged-stained fine grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal fracture
			5.06–5.60	Brownish grey orange-stained fine grained SANDSTONE (THE ROUGH ROCK) with numerous sub-horizontal and sub-vertical cracks and frequent extremely closely spaced dark orange sub-horizontal laminations
			5.60–5.70	Brownish grey orange-stained fine grained SANDSTONE (THE ROUGH ROCK) with abundant extremely closely spaced dark orange sub-horizontal laminations
			5.70–5.72	Dark grey fine sub-angular gravel
			5.72–6.00	Brownish grey orange-stained fine grained SANDSTONE (THE ROUGH ROCK) with frequent extremely closely spaced dark orange sub-horizontal laminations and very closely spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 62%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.108 (GL)	614
Client	**Barratt Homes**	**Co-ordinates**	E: 380959.793; N: 413950.404	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	4–5 m

Core Photography



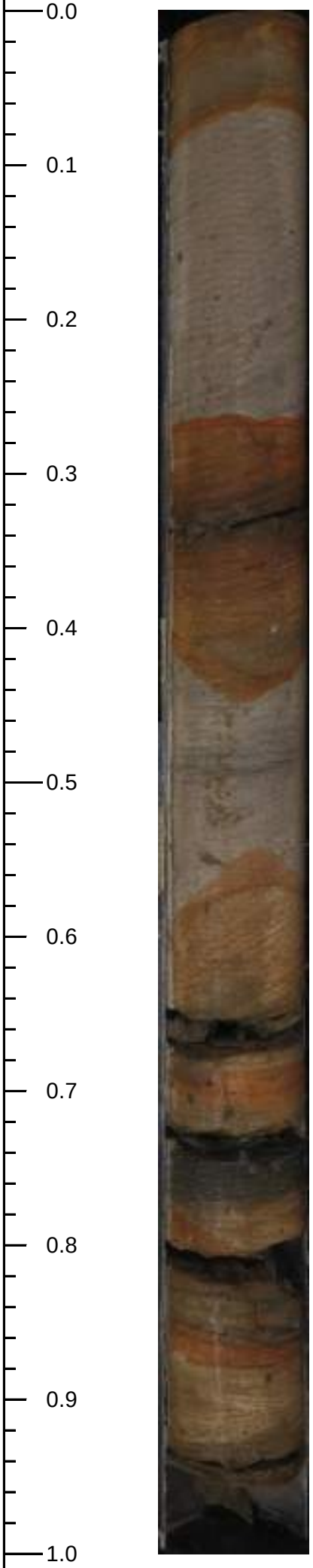
Sampling		Depth (mbgl)	Stratum Description
Depth (mbgl)	Results		
		4.00–4.06	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		4.06–4.12	Grey medium grained SANDSTONE (THE ROUGH ROCK) with thin dark grey laminations
		4.12–4.40	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal fracture
		4.40–4.50	Brown to grey orange stained SANDSTONE (THE ROUCH ROCK) with sub-horizontal and sub-vertical cracks
		4.50–4.54	Non-intact brownish grey orange stained SANDSTONE (THE ROUCH ROCK) fine angular gravel
		4.54–4.66	Incomplete section. Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with dark grey laminations
		4.66–4.72	Non-intact brownish grey orange stained SANDSTONE (THE ROUCH ROCK) fine to medium sub-angular gravel
		4.72–4.98	Grey to dark grey orange medium grained SANDSTONE (THE ROUGH ROCK) with dark grey laminations
		4.98–5.00	AZCL: 5.98–6.00 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 98%. Rock Quality Designation = 66%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.108 (GL)	614
Client	**Barratt Homes**	**Co-ordinates**	E: 380959.793; N: 413950.404	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	5–6 m

Core Photography

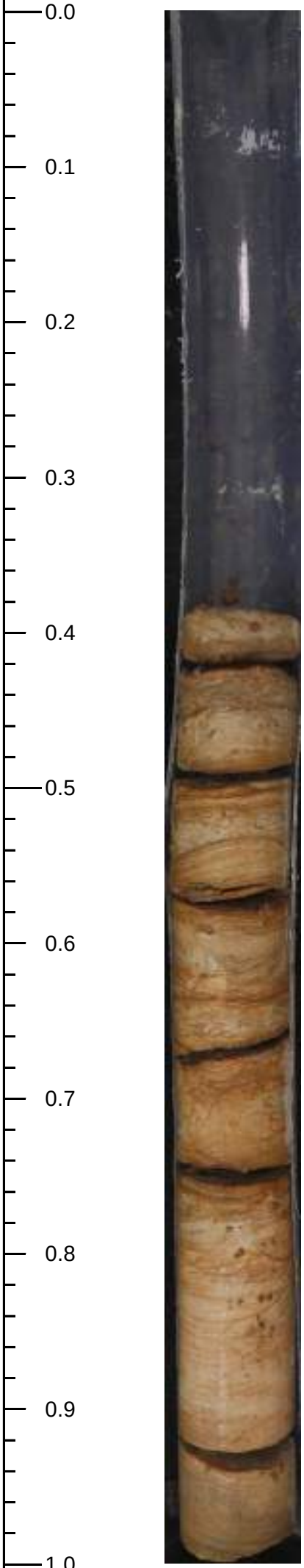


Sampling		Depth (mbgl)	Stratum Description
Depth (mbgl)	Results		
		5.00–5.08	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.08–5.26	Grey medium grained SANDSTONE (THE ROUGH ROCK), occasionally mottled brown
		5.26–5.44	Grey orange stained, occasionally brown, medium grained SANDSTONE (THE ROUGH ROCK); sub-horizonal fracture
		5.44–5.56	Grey medium grained SANDSTONE (THE ROUGH ROCK), occasionally mottled brown
		5.56–5.66	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.66–5.68	Horizontal fracture with dark brown sub-angular fine gravel
		5.68–5.72	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.72–5.76	Horizontal fracture; black stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.76–5.92	Brownish grey medium grained SANDSTONE (THE ROUGH ROCK) with occasional sub-horizontal orange stained bands; sub-horizontal fracture
		5.92–5.96	Dark brown medium grained SANDSTONE (THE ROUGH ROCK)
		5.96–6.00	AZCL: 5.96–6.00 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 96%. Rock Quality Designation = 73%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

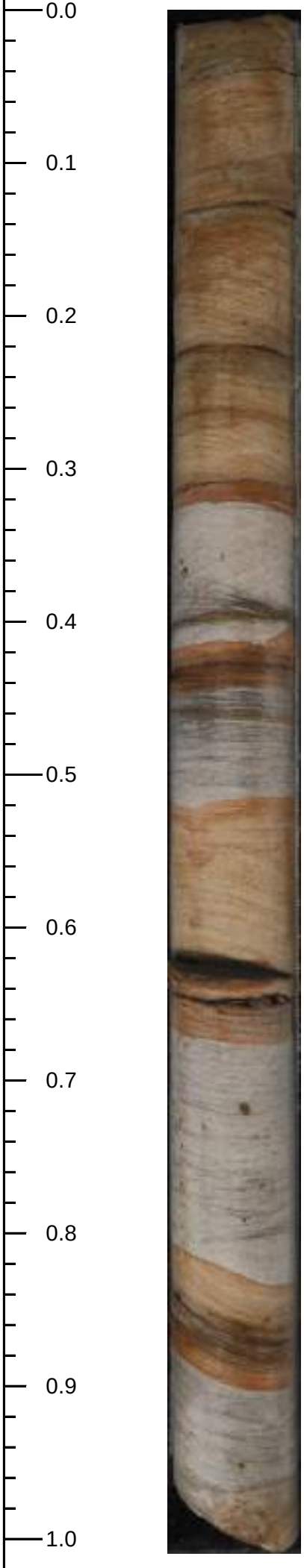
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	3–4 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			3.00–3.38	AZCL: 3.00–3.38 m
			3.38–3.82	Greyish-brown SANDSTONE (THE ROUGH ROCK) with frequent orange staining; sub-horizontal closely to medium spaced fractures
			3.82–4.00	Greyish-brown SANDSTONE (THE ROUGH ROCK) with occasional orange staining, occasional mottled brown ; sub-horizontal closely to medium spaced fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 55%. Rock Quality Designation = 17%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

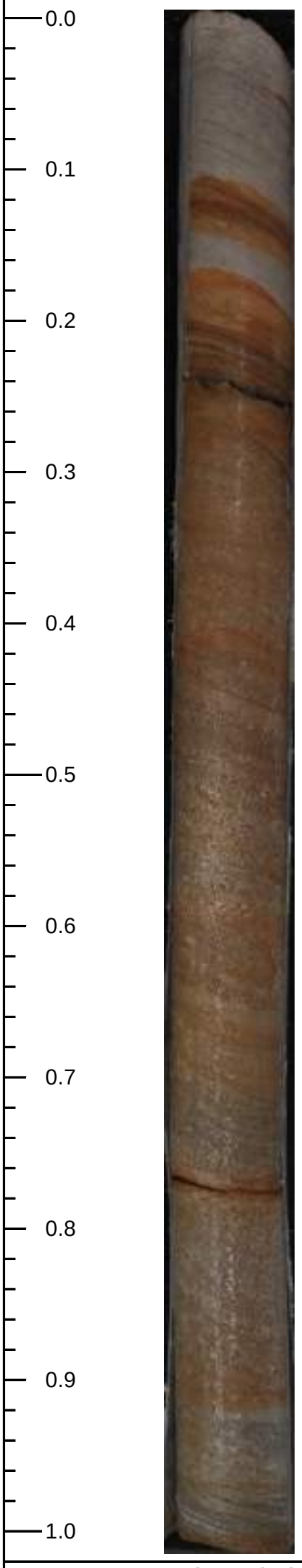
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	4–5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			4.00–4.32	Greyish-brown orange stained fine grained SANDSTONE (THE ROUGH ROCK); sub-horizontal closely spaced fractures
			4.32–4.40	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			4.40–4.46	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK) with horizontal fracture
			4.46–4.52	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			4.52–4.68	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK); sub-horizontal closely spaced fractures
			4.68–4.82	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			4.82–4.90	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal crack
			4.90–5.00	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 98%. Rock Quality Designation = 62%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

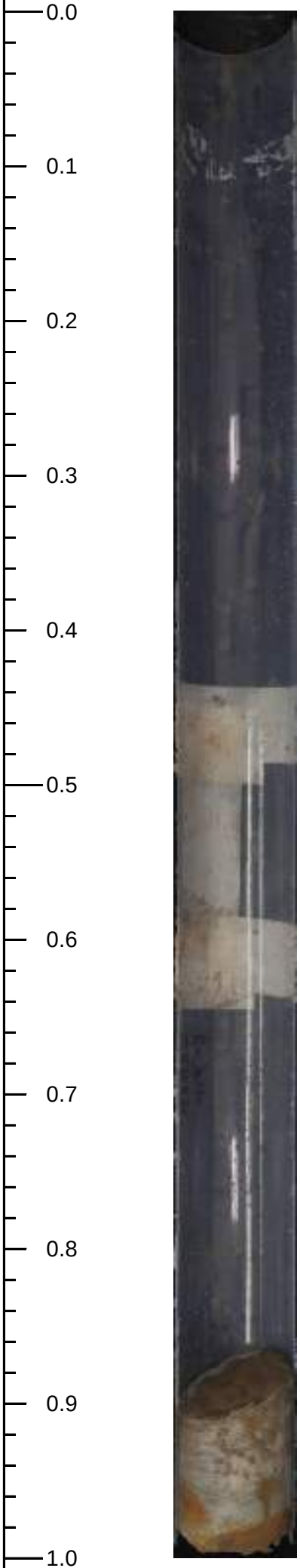
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	5–6 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0			5.00–5.10	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			5.10–5.14	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK)
			5.14–5.16	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			5.16–5.28	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK)
			5.28–6.00	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with widely spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 96%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	6–7 m

Core Photography	**Sampling**		**Depth** (mbgl)		**Stratum Description**
	Depth (mbgl)	Results			
			6.00–6.88		AZCL: 6.00–6.88 m
			6.88–7.00		Greyish-white fine grained SANDSTONE (THE ROUGH ROCK) with occasional orange staining

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 11%. Rock Quality Designation = 11%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

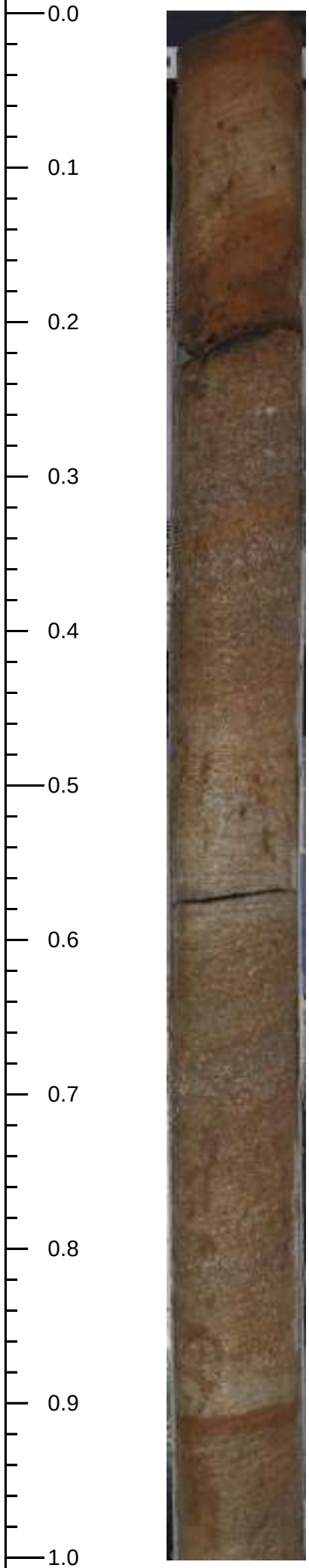
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	7–8 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			7.00–7.72	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with closely to widely spaced sub-horizontal fractures
			7.72–7.96	Greyish-brown mottled dark brown fine grained SANDSTONE (THE ROUGH ROCK)
			7.96–8.00	AZCL: 7.96–8.00 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 94%. Rock Quality Designation = 72%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	8–9 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			8.00–8.22	Greyish-brown orange stained mottled black medium grained SANDSTONE (THE ROUGH ROCK)
			8.22–9.00	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining and medium space fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 100%. Rock Quality Designation = 96%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

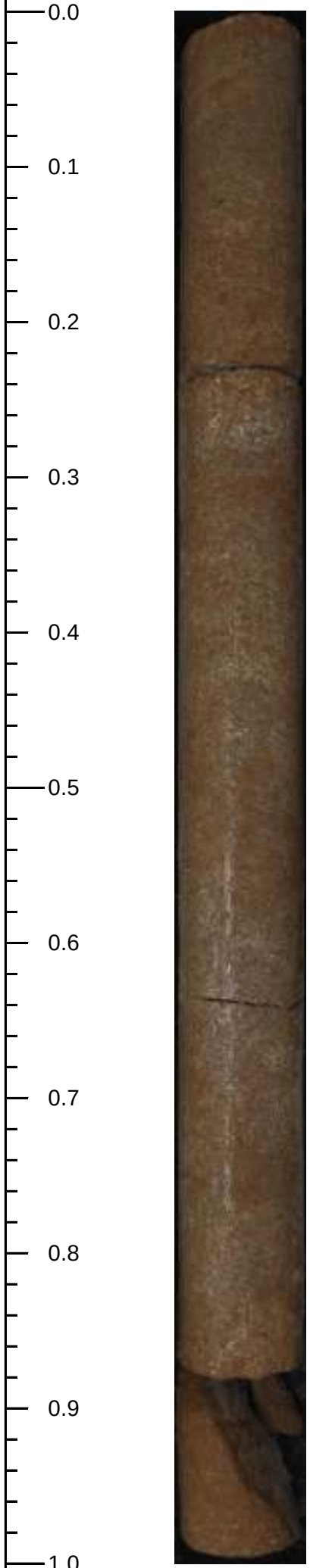
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	9–10 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			9.00–9.12	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining
			9.12–9.44	AZCL: 9.12–9.44 m
			9.44–10.00	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with closely spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 71%. Rock Quality Designation = 31%. 9.00–9.12 m section recovered from preceeding run. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

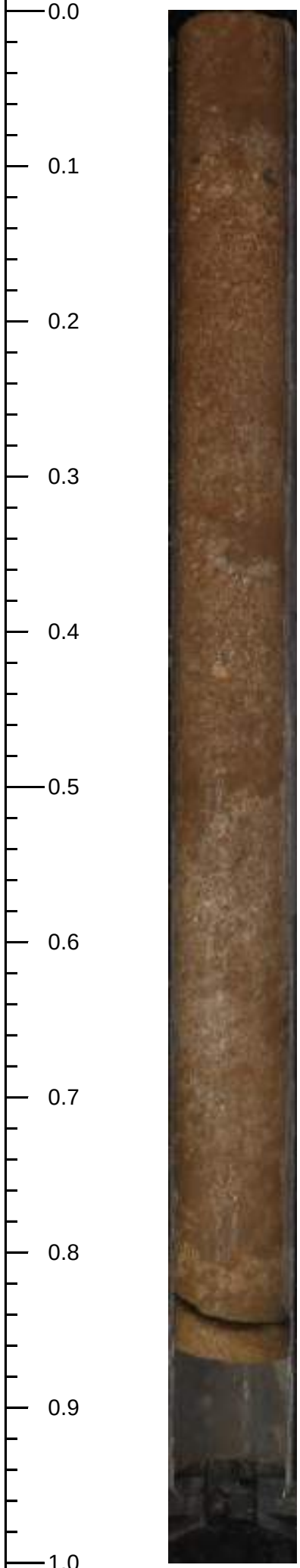
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	10–11 m

Core Photography	**Sampling**		**Depth** (mbgl)	**Stratum Description**
	Depth (mbgl)	Results		
			10.00–10.88	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining; closely to medium spaced sub-horizontal fractures
			10.88–11.00	Partial recovery. Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 90%. Rock Quality Designation = 88%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	11–11.86 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			11.00–11.12	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with occasional black inclusions
			11.12–11.50	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK)
			11.50–11.86	Partial recovery. Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 100%. Rock Quality Designation = 98%. TCR and RQD based upon 0.86 m section. Remainder of core section recovered as part of following run. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	11.86–12.06 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			11.86–12.06	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 100%. Rock Quality Designation = 100%. TCR and RQD based on 0.2 m section. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

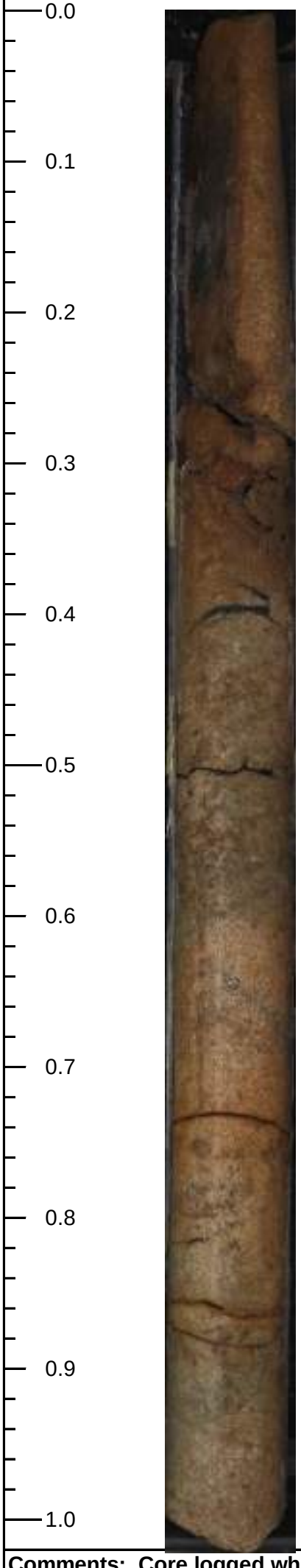
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	12–13 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 			12.00–12.80	AZCL: 12.0–12.8 m
			12.80–13.00	Non-intact greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) recovered as medium to coarse gravel

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 20%. Rock Quality Designation = 0%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

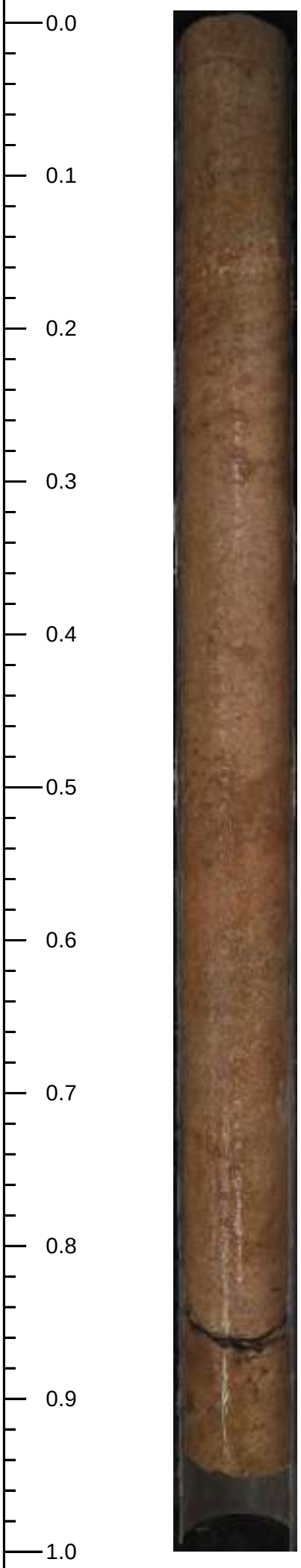
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	13–14 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			13.00–13.36	Partial recovery. Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK)
			13.36–13.60	Dark greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with closely spaced fractures
			13.60–14.00	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining; very closely to closely spaced fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 96%. Rock Quality Designation = 43%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	14–15 m

Core Photography	**Sampling** Depth (mbgl)	**Sampling** Results	**Depth** (mbgl)	**Stratum Description**
			14.00–14.84	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining
			14.84–14.88	Thin band of possible COAL
			14.88–14.96	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining
			14.96–15.00	AZCL: 14.96–15.00

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 94%. Rock Quality Designation = 85%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413925.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	7.5–8.5 m

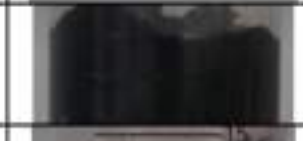
Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Sudan IV staining		
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0			7.50–8.04	AZCL: 7.5–8.04 m
			8.04–8.08	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with rare black staining
			8.08–8.36	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with medium spaced sub-horizontal fractures
	8.24–8.36			
	8.36–8.50		8.36–8.5	Light grey medium grained SANDSTONE (THE ROUGH ROCK)



Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 48%. Rock Quality Designation = 30%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

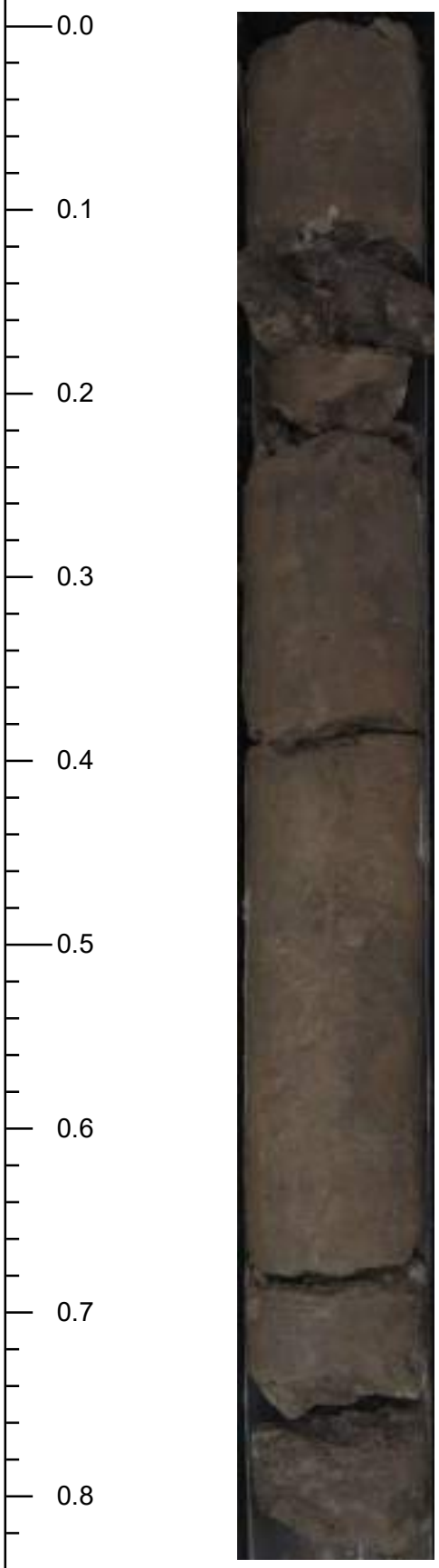
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413925.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	8.5–9.5 m

Core Photography	Sampling: Depth (mbgl)	Sampling: Sudan IV staining	Depth (mbgl)	Stratum Description
	8.50–8.60		8.50–8.60	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with occasional orange staining
	8.60–8.70		8.60–9.18	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with frequent black staining and occasional orange staining
	8.70–8.78			
	8.78–8.92			
	8.92–9.02			
	9.02–9.18			
	9.18–9.24		9.18–9.48	COAL with closely spaced horizontal to sub-horizontal fractures
	9.24–9.32			
	9.32–9.40			
	9.40–9.50		9.48–9.50	COAL gravel (No recovery)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 94%. Rock Quality Designation = 51%. COAL gravel (9.48–9.50 m) not received by CE Geochem. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	10–10.8 m

Core Photography	Sampling: Depth (mbgl)	Sampling: Sudan IV staining	Depth (mbgl)	Stratum Description
	10.00–10.10		10.00–10.10	Brownish dark grey sandy SILTSTONE
	10.10–10.22		10.10–10.22	Non-intact brownish dark grey sandy SILTSTONE
	10.22–10.30		10.22–10.82	Brownish dark grey sandy SILTSTONE with very closely to medium spaced sub-horizontal fractures
	10.30–10.38			
	10.38–10.48			
	10.48–10.58			
	10.58–10.68			
	10.68–10.82			

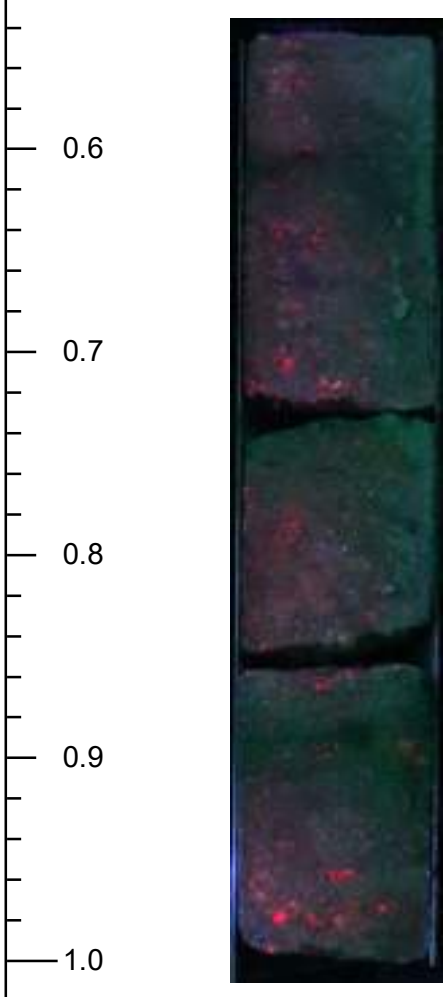
Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 95%. Rock Quality Designation = 60%. TCR and RQD given in reference to a nominal 0.8 m core length. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

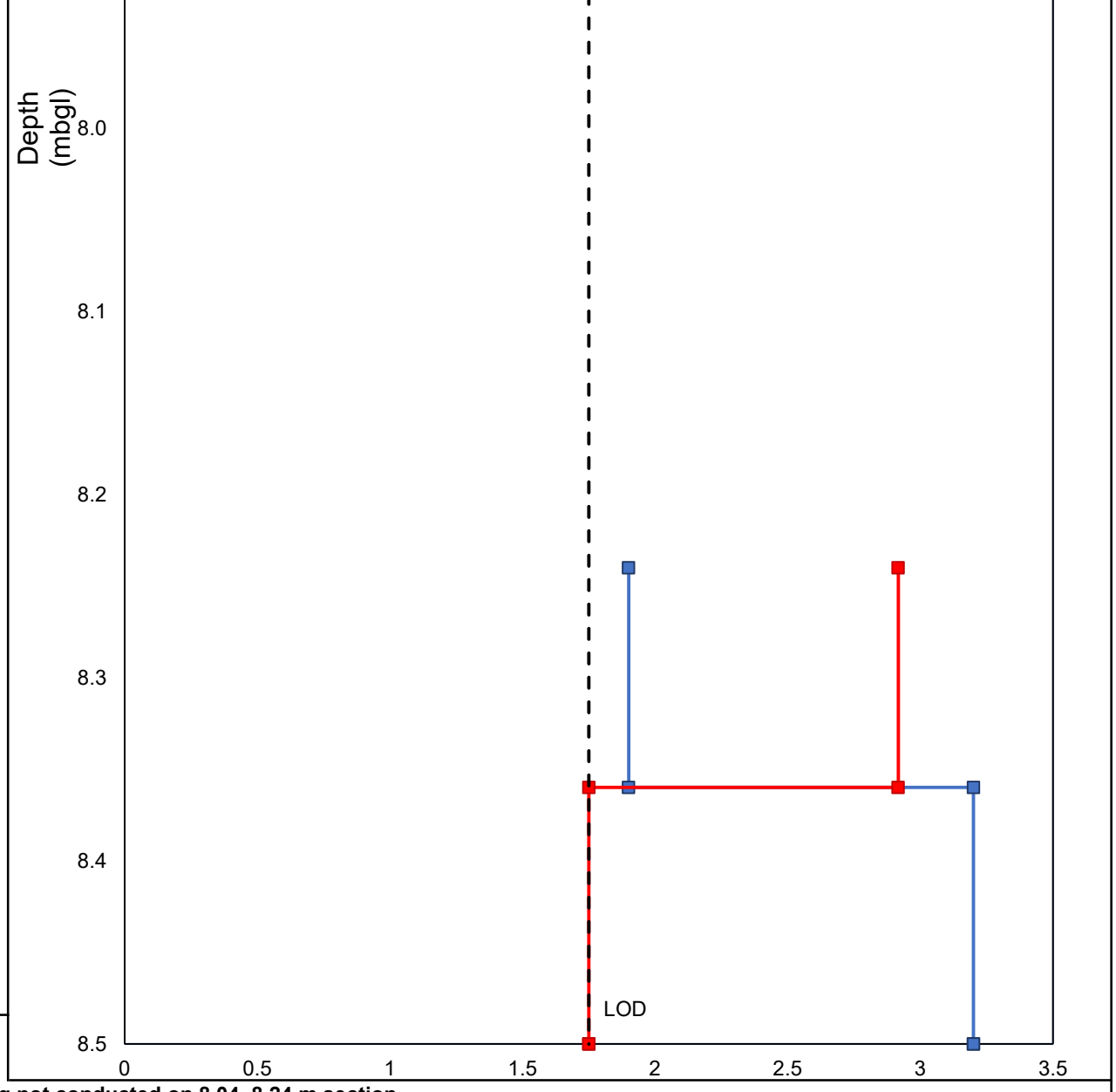
CE Geotech, CEG Laboratories, Matlock Road, S45 0DX, Tel. 01629 584 416

Depth Profiling

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	7.5–8.5 m

UV Fluorescence Imaging





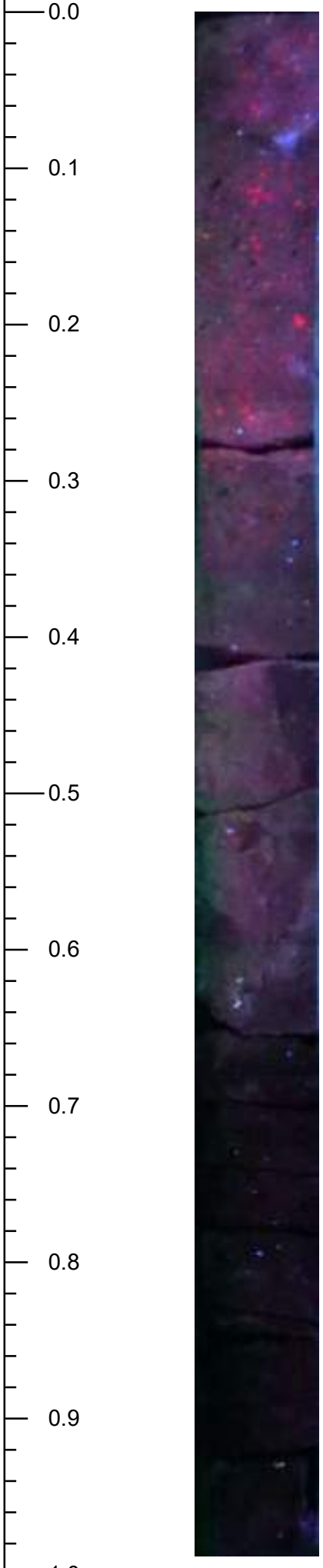
Comments:

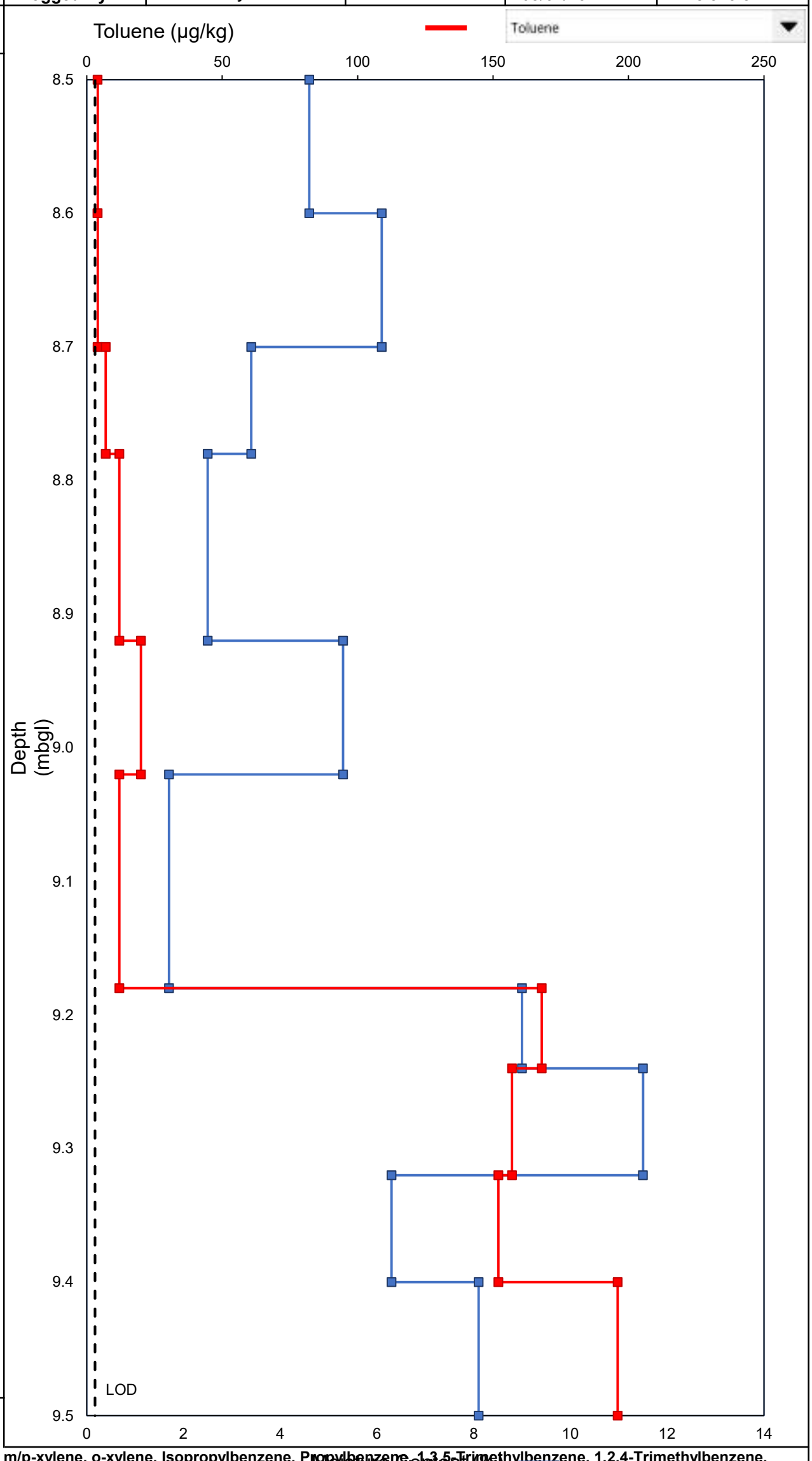
Compounds above LOD = Toluene. Depth profiling not conducted on 8.04–8.24 m section.

Depth Profiling

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	8.5–9.5 m

UV Fluorescence Imaging





Comments:

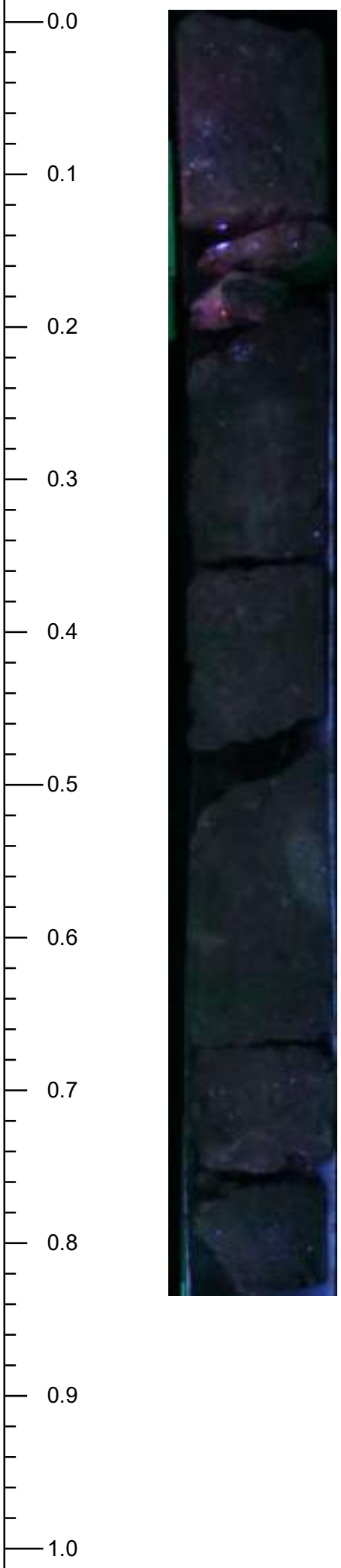
Compounds above LOD = Toluene, Ethylbenzene, m/p-xylene, o-xylene, Isopropylbenzene, Propylbenzene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene, Naphthalene.

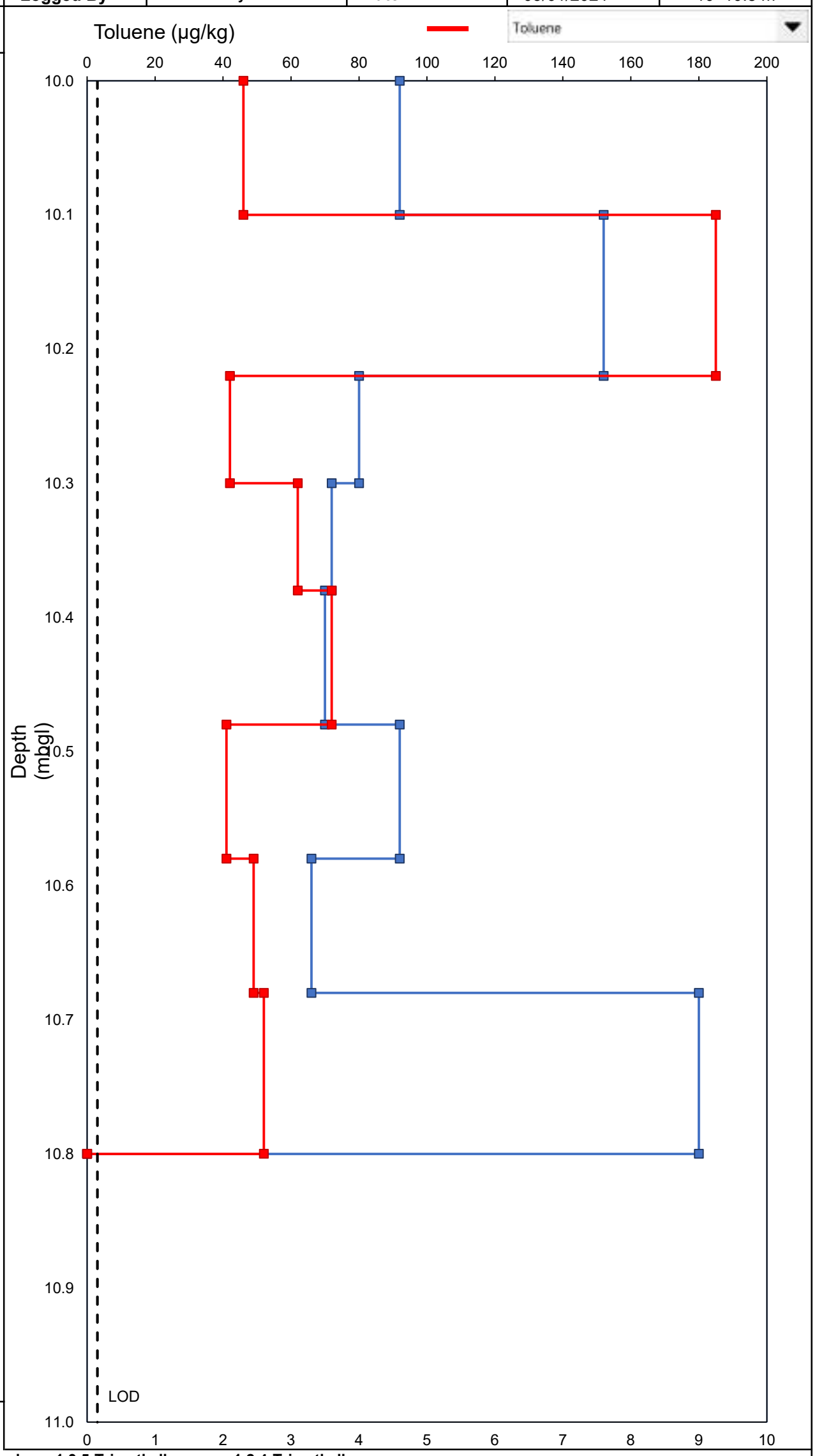
CE Geotech, CEG Laboratories, Matlock Road, S45 0DX, Tel. 01629 584 416

Depth Profiling

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	10–10.8 m

UV Fluorescence Imaging





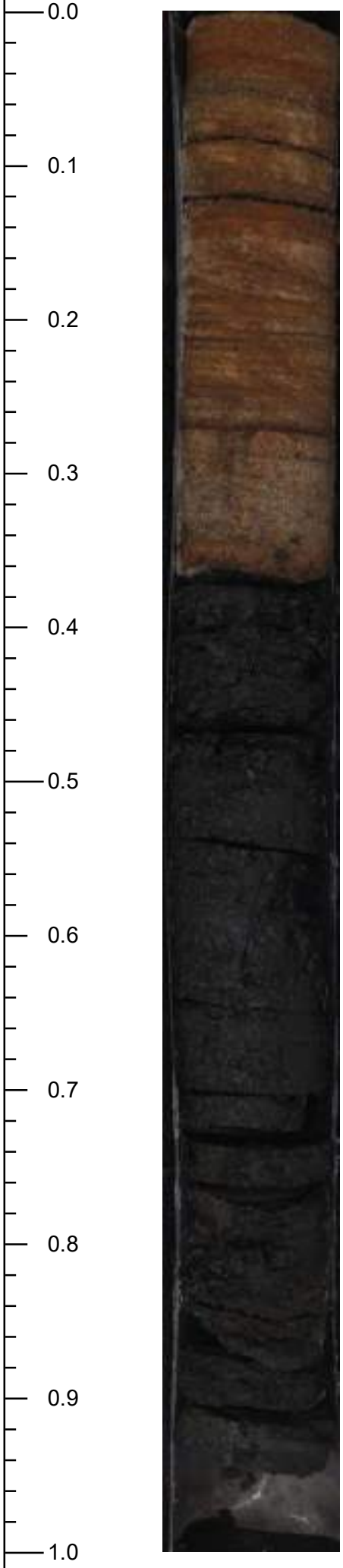
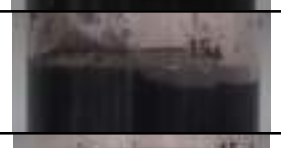
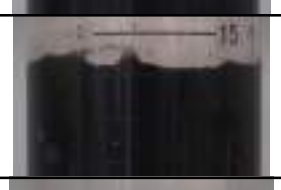
Comments:

Compounds above LOD = Toluene, m/p-xylene, o-xylene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene

CE Geotech, CEG Laboratories, Matlock Road, S45 0DX, Tel. 01629 584 416

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	5–6 m

Core Photography	Sampling: Depth (mbgl)	Sampling: Sudan IV staining	Depth (mbgl)	Stratum Description
	5.00–5.12		5.00–5.38	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with very closely to closely spaced sub-horizontal fractures
	5.12–5.26			
	5.26–5.38			
	5.38–5.46		5.38–5.94	COAL with rare orange staining; very closely to closely spaced horizontal to sub-horizontal fractures
	5.46–5.54			
	5.54–5.64			
	5.64–5.70			
	5.70–5.78			
	5.78–5.88			
	5.88–5.94			
			5.94–6.00	AZCL 5.94–6.00

0.0 — 0.1 — 0.2 — 0.3 — 0.4 — 0.5 — 0.6 — 0.7 — 0.8 — 0.9 — 1.0

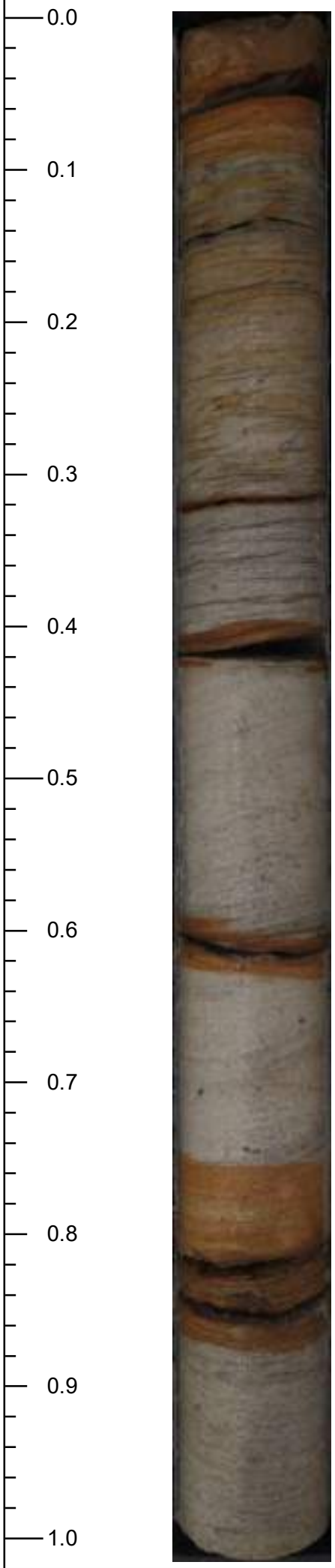
Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 92%. Rock Quality Designation = 39%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

CE Geochem, CEG Laboratories, Matlock Road, S45 0DX, Tel. 01629 584 416

Core Logging

CE Geochem — Cutting-Edge Geochemistry

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	7–8 m

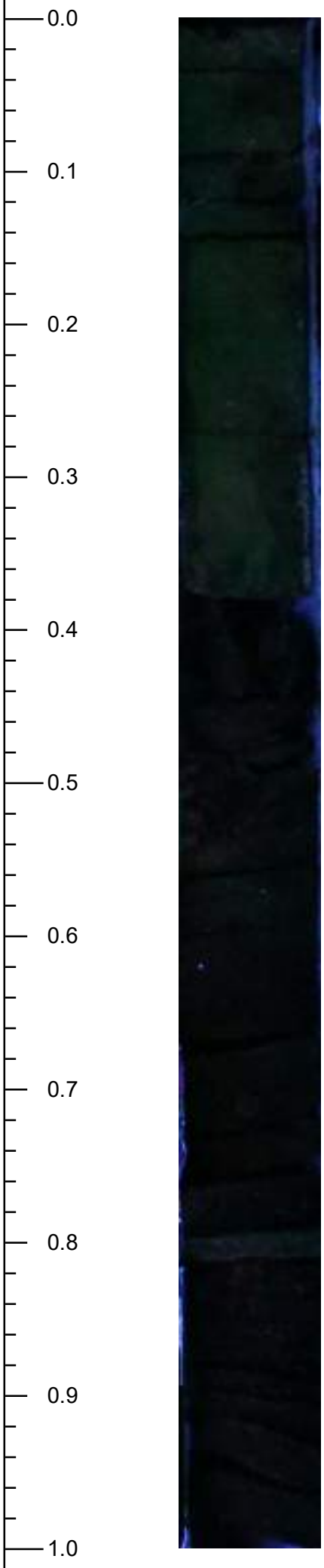
Core Photography	Sampling Depth (mbgl)	Sampling Results	Depth (mbgl)	Stratum Description
	7.00–7.12		7.00–7.30	Greyish white with dark orange becoming light orange staining fine grained SANDSTONE (THE ROUGH ROCK) with very closely spaced sub-horizontal dark grey laminations and closely to medium spaced sub-horizontal fractures
	7.12–7.22			
	7.22–7.32			
	7.32–7.42		7.30–7.42	Greyish white fine grained SANDSTONE (THE ROUGH ROCK) with very closely spaced sub-horizontal dark grey laminations and dark orange staining around closely spaced sub-horizontal fractures
	7.42–7.52		7.42–7.60	Greyish white fine grained SANDSTONE (THE ROUGH ROCK) with rare orange staining
	7.52–7.62			
	7.62–7.72		7.60–7.62	Orange stained fine grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal fracture
			7.62–7.74	Greyish white fine grained SANDSTONE (THE ROUGH ROCK), rarely mottled brown
	7.72–7.82		7.74–7.88	Orange stained fine grained SANDSTONE (THE ROUGH ROCK) with closely spaced sub-horizontal fractures
	7.82–7.90			
	7.90–8.00		7.88–8.00	Greyish white fine grained SANDSTONE (THE ROUGH ROCK)

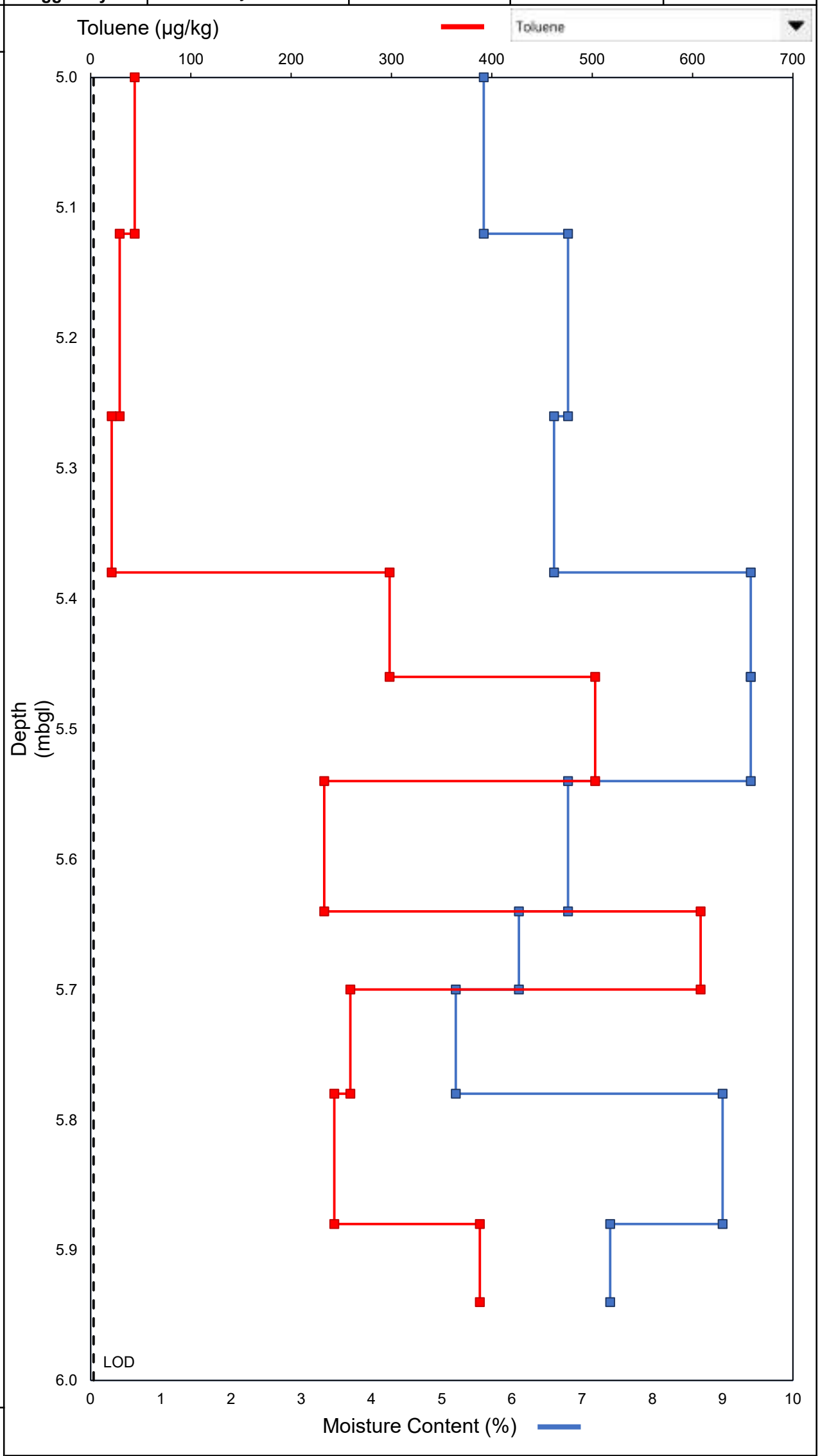
Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 68%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Depth Profiling

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	5–6 m

UV Fluorescence Imaging





Comments:

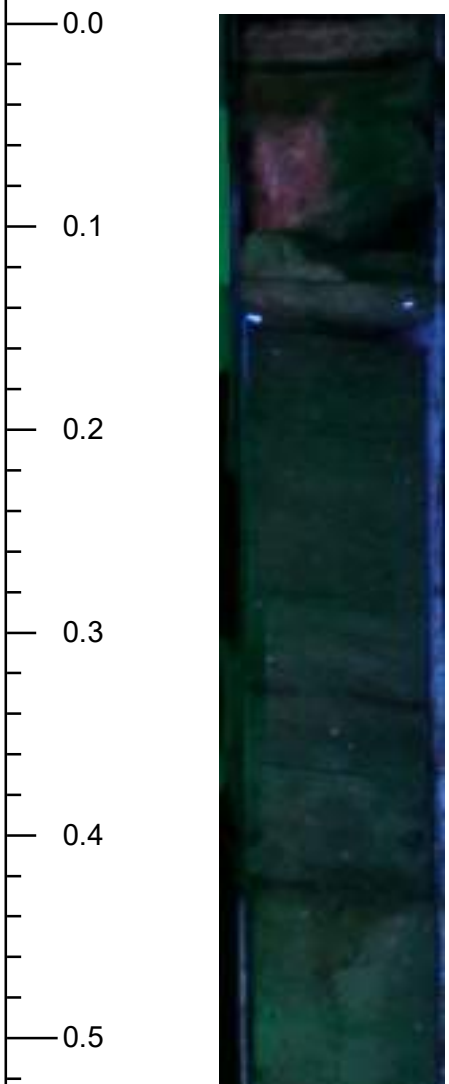
Compounds above LOD = Benzene, Toluene, ethylbenzene, m/p-xylene, o-xylene, Dichlorodifluoromethane, Chloromethane, Isopropylbenzene, Propylbenzene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene, Naphthalene.

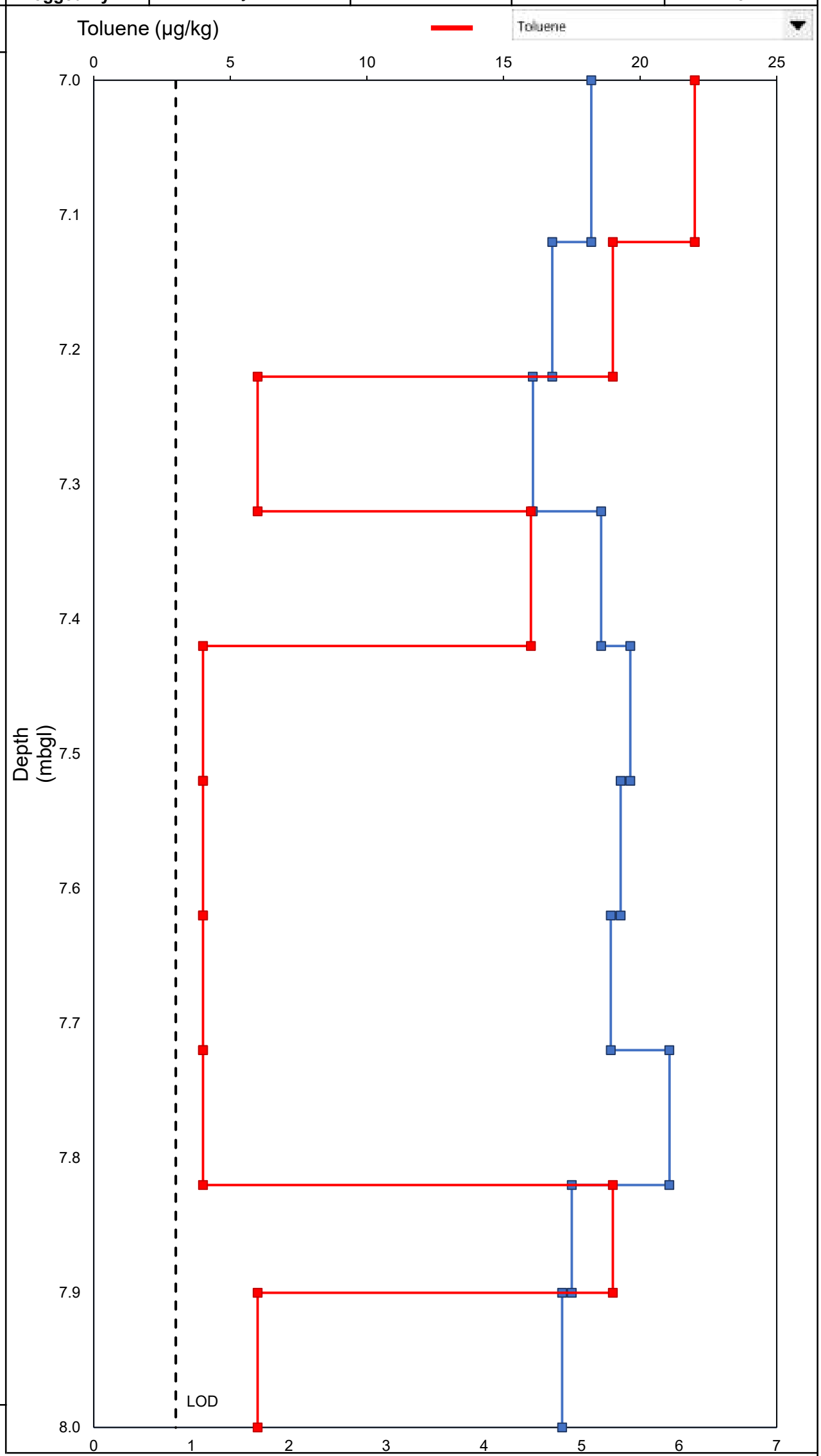
CE Geochem, CEG Laboratories, Matlock Road, S45 0DX, Tel. 01629 584 416

Depth Profiling

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	7–8 m

UV Fluorescence Imaging





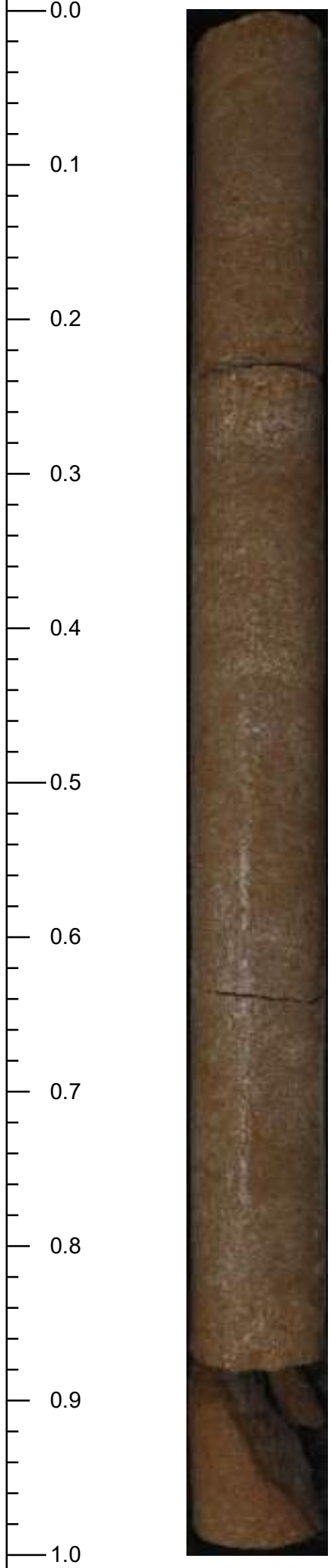
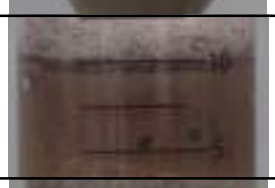
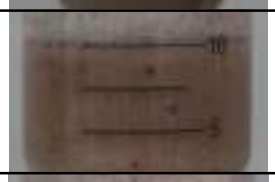
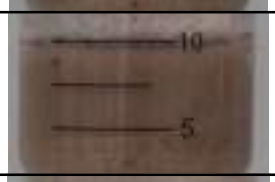
Comments:

Compounds above LOD = Toluene, Trichloroethene, cis-1-2-Dichloroethene, Dichlorodifluoromethane.

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Core Logging

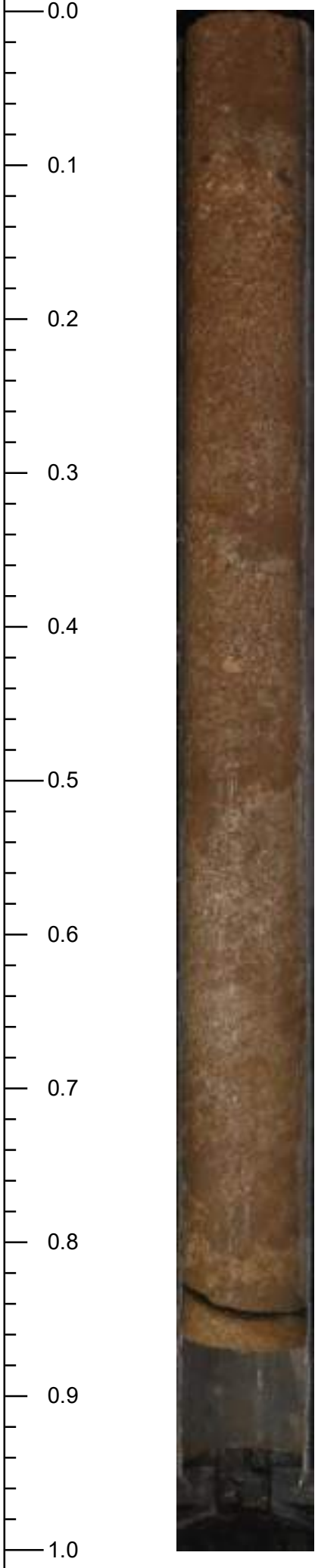
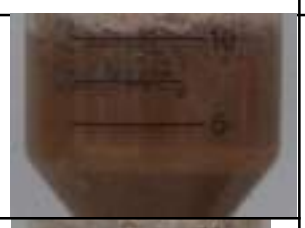
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	10–11 m

Core Photography	Sampling: Depth (mbgl)	Sampling: Sudan IV staining	Depth (mbgl)	Stratum Description
	10.00–10.10		10.00–10.88	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining; closely to medium spaced sub-horizontal fractures
	10.10–10.23			
	10.23–10.30			
	10.30–10.40			
	10.40–10.48			
	10.48–10.56			
	10.56–10.66			
	10.66–10.78			
	10.78–10.88			
	10.88–11.00		10.88–11.00	Partial recovery. Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 90%. Rock Quality Designation = 88%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	11–11.86 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Sudan IV staining		
	11.00–11.10		11.00–11.12	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with occasional black inclusions
	11.10–11.20		11.12–11.50	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK)
	11.20–11.30			
	11.30–11.40			
	11.40–11.50			
	11.50–11.60		11.50–11.86	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining
	11.60–11.70			
	11.70–11.86			

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 100%. Rock Quality Designation = 98%. TCR and RQD based upon 0.86 m section. Remainder of core section recovered as part of following run. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	11.86–12.06 m

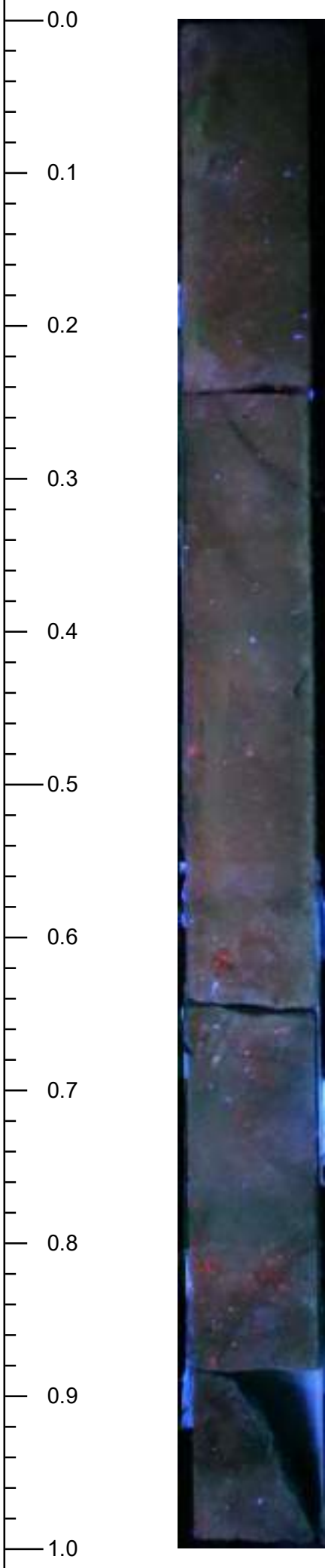
Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Sudan IV staining		
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0	11.86–11.96		11.86–12.06	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining
	11.96–12.06			

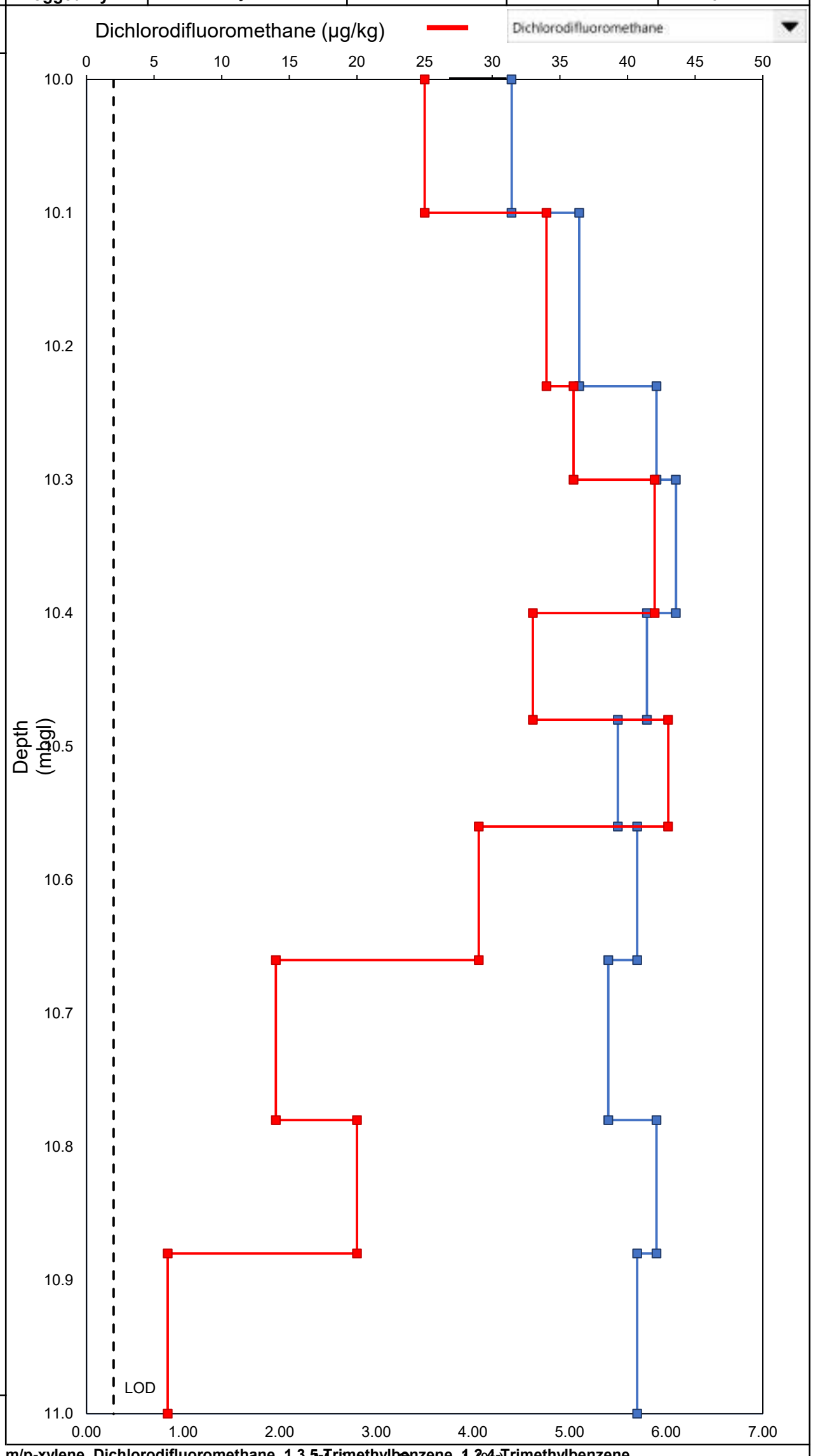
Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 100%. Rock Quality Designation = 100%. TCR and RQD based on 0.2 m section. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Depth Profiling

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	10–11 m

UV Fluorescence Imaging





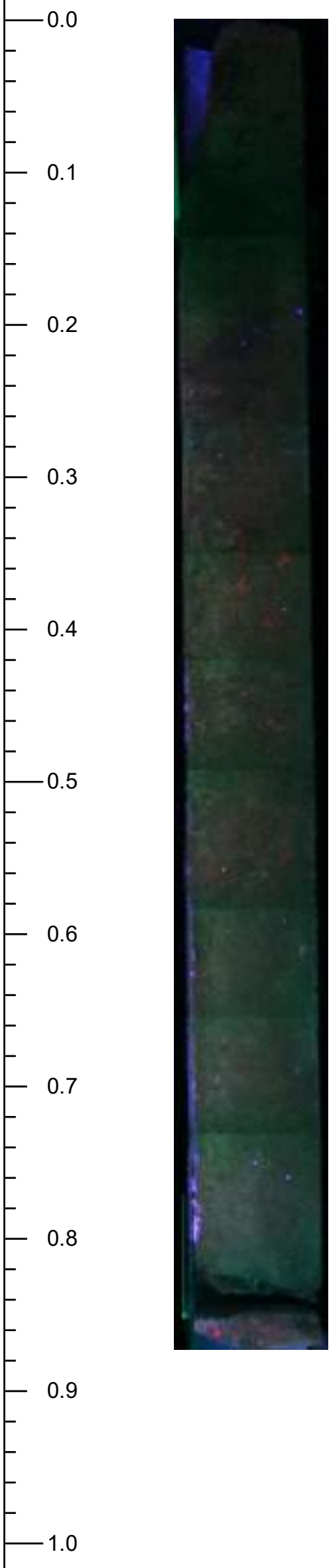
Comments:

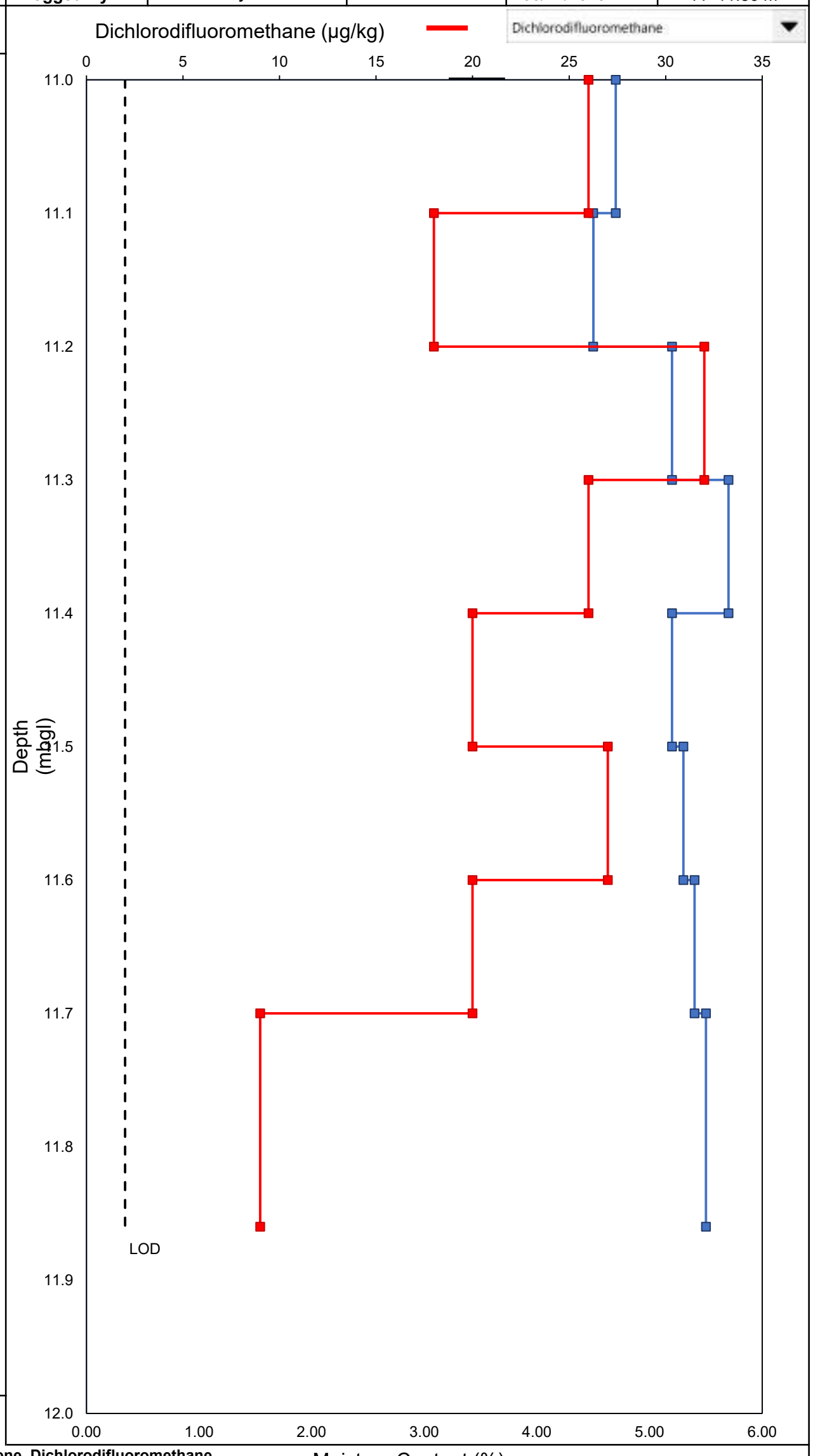
Compounds above LOD = Toluene, Ethylbenzene, m/p-xylene, Dichlorodifluoromethane, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene.

Depth Profiling

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	11–11.86 m

UV Fluorescence Imaging





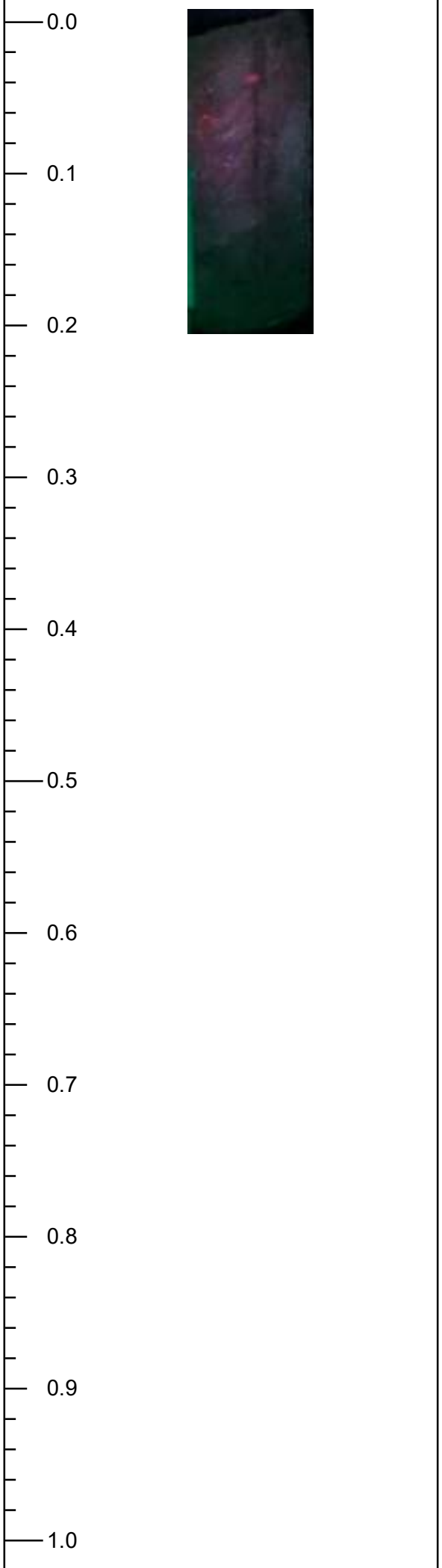
Comments:

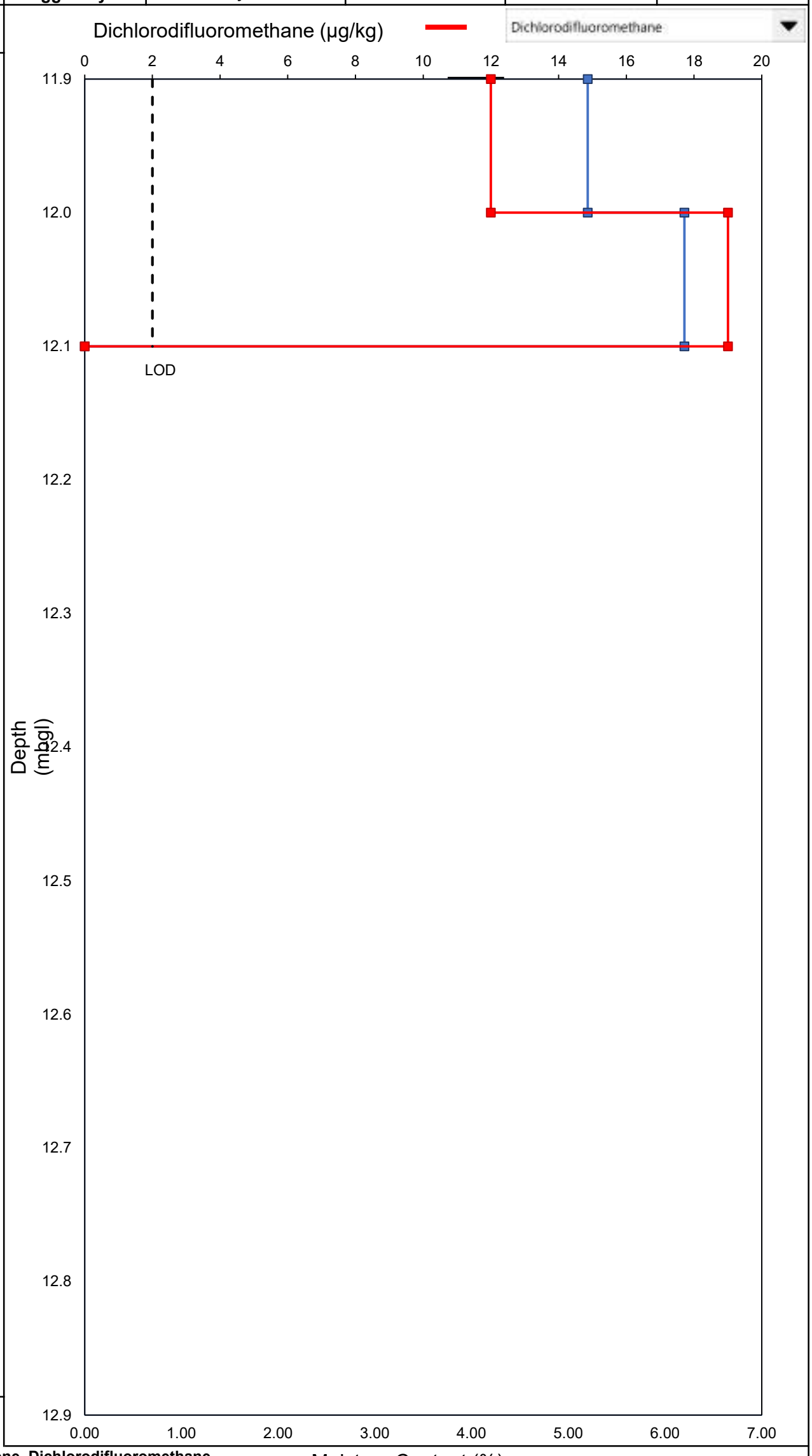
Compounds above LOD = Ethylbenzene, m/p-xylene, Dichlorodifluoromethane.

Depth Profiling

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	11–11.86 m

UV Fluorescence Imaging





Comments:

Compounds above LOD = Ethylbenzene, m/p-xylene, Dichlorodifluoromethane.

CE Geotech, CEG Laboratories, Matlock Road, S45 0DX, Tel. 01629 584 416

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CE Geochem Laboratories
The Carpenters Shop
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Matlock
Derbyshire
United Kingdom
DE4 5EW

Attention :	Thomas Mullan
Date :	23rd January, 2024
Your reference :	A231001B
Our reference :	Test Report 24/897 Batch 1
Location :	-
Date samples received :	19th January, 2024
Status :	Final Report
Issue :	202401231245

Two samples were received for analysis on 19th January, 2024 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 1.014 kg of CO2

Scope 1&2&3 emissions - 2.395 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: -
Contact: Thomas Mullan
EMT Job No: 24/897

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1	2										
Sample ID	COAL	CLAY										
Depth												
COC No / misc												
Containers	J	J										
Sample Date	17/01/2024	17/01/2024										
Sample Type	Solid	Solid										
Batch Number	1	1										
Date of Receipt	19/01/2024	19/01/2024										

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Natural Moisture Content	<0.1	5.9									<0.1	%	PM4/PM0

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: -
Contact: Thomas Mullan
EMT Job No: 24/897

VOC Report : **Solid**

EMT Sample No.	1	2									LOD/LOR	Units	Method No.
Sample ID	COAL	CLAY											
Depth													
COC No / misc													
Containers	J	J											
Sample Date	17/01/2024	17/01/2024											
Sample Type	Solid	Solid											
Batch Number	1	1											
Date of Receipt	19/01/2024	19/01/2024											
VOC MS													
Dichlorodifluoromethane	6 SV	18									<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether	<2 SV	<2									<2	ug/kg	TM15/PM10
Chloromethane	8 SV	<3									<3	ug/kg	TM15/PM10
Vinyl Chloride	<2 SV	<2									<2	ug/kg	TM15_A/PM10
Bromomethane	<1 SV	<1									<1	ug/kg	TM15/PM10
Chloroethane	6 SV	<2									<2	ug/kg	TM15/PM10
Trichlorofluoromethane	<2 SV	<2									<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<6 SV	<6									<6	ug/kg	TM15/PM10
Dichloromethane (DCM)	52 SV	23									<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene	<3 SV	<3									<3	ug/kg	TM15/PM10
1,1-Dichloroethane	<3 SV	<3									<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene	4 SV	<3									<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4 SV	<4									<4	ug/kg	TM15/PM10
Bromochloromethane	<3 SV	<3									<3	ug/kg	TM15/PM10
Chloroform	<3 SV	<3									<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane	<3 SV	<3									<3	ug/kg	TM15/PM10
1,1-Dichloropropene	<3 SV	<3									<3	ug/kg	TM15/PM10
Carbon tetrachloride	<4 SV	<4									<4	ug/kg	TM15/PM10
1,2-Dichloroethane	<4 SV	<4									<4	ug/kg	TM15/PM10
Benzene	<3 SV	<3									<3	ug/kg	TM15/PM10
Trichloroethene (TCE)	6 SV	6									<3	ug/kg	TM15/PM10
1,2-Dichloropropane	<6 SV	<6									<6	ug/kg	TM15/PM10
Dibromomethane	<3 SV	<3									<3	ug/kg	TM15/PM10
Bromodichloromethane	<3 SV	<3									<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4 SV	<4									<4	ug/kg	TM15/PM10
Toluene	9 SV	22									<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3 SV	<3									<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane	<3 SV	<3									<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE)	<3 SV	<3									<3	ug/kg	TM15/PM10
1,3-Dichloropropane	<3 SV	<3									<3	ug/kg	TM15/PM10
Dibromochloromethane	<3 SV	<3									<3	ug/kg	TM15/PM10
1,2-Dibromoethane	<3 SV	<3									<3	ug/kg	TM15/PM10
Chlorobenzene	<3 SV	<3									<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane	<3 SV	<3									<3	ug/kg	TM15/PM10
Ethylbenzene	<3 SV	8									<3	ug/kg	TM15/PM10
m/p-Xylene	11 SV	30									<5	ug/kg	TM15/PM10
o-Xylene	<3 SV	7									<3	ug/kg	TM15/PM10
Styrene	<3 SV	<3									<3	ug/kg	TM15_A/PM10
Bromoform	<3 SV	<3									<3	ug/kg	TM15/PM10
Isopropylbenzene	<3 SV	<3									<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane	<3 SV	<3									<3	ug/kg	TM15/PM10
Bromobenzene	<2 SV	<2									<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane	<4 SV	<4									<4	ug/kg	TM15/PM10
Propylbenzene	<4 SV	<4									<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3 SV	<3									<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene	<3 SV	<3									<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3 SV	<3									<3	ug/kg	TM15/PM10
tert-Butylbenzene	<5 SV	<5									<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene	<6 SV	10									<6	ug/kg	TM15/PM10
sec-Butylbenzene	<4 SV	<4									<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4 SV	<4									<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene	<4 SV	<4									<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene	<4 SV	<4									<4	ug/kg	TM15/PM10
n-Butylbenzene	<4 SV	<4									<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene	<4 SV	<4									<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4 SV	<4									<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7 SV	<7									<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4 SV	<4									<4	ug/kg	TM15/PM10
Naphthalene	<27 SV	<27									<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7 SV	<7									<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	18 SV	70									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	2 SV	59									<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Notification of Deviating Samples

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: -
Contact: Thomas Mullan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/897						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/897

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 24/897

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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DE4 5EW

Attention :	Thomas Mullan
Date :	23rd January, 2024
Your reference :	A231001B
Our reference :	Test Report 24/901 Batch 1
Location :	-
Date samples received :	19th January, 2024
Status :	Final Report
Issue :	202401231040

Sixteen samples were received for analysis on 19th January, 2024 of which sixteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 3.91 kg of CO2

Scope 1&2&3 emissions - 9.239 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

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Client Name: CE Geochem Laboratories
Reference: A231001B
Location: -
Contact: Thomas Mullan
EMT Job No: 24/901

VOC Report : **Liquid**

EMT Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	COAL-1 S	COAL-2 S	COAL-3 S	COAL-4 S	COAL-5 S	COAL-6 S	COAL-7 S	COAL-8 S	CLAY-1 S	CLAY-2 S			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	17/01/2024	17/01/2024	17/01/2024	17/01/2024	17/01/2024	17/01/2024	17/01/2024	17/01/2024	17/01/2024	17/01/2024			
Sample Type	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	19/01/2024	19/01/2024	19/01/2024	19/01/2024	19/01/2024	19/01/2024	19/01/2024	19/01/2024	19/01/2024	19/01/2024			
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	>>13759.4	>>9816.4	>>5638.4	>>4002.8	>>2187.3	570.4	110.4	<0.1	>>2728.8	>>1290.4	<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Chloroethane	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Dichloromethane (DCM)	19	12	7	5	4	<3	<3	<3	4	<3	<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene	47	23	18	11	3	<3	<3	<3	15	8	<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	>>4772	>>2741	>>1815	>>1181	388	120	19	<3	>>1496	758	<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chloroform	4	4	3	3	4	3	2	3	6	6	<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Benzene	>>5319.9	>>3098.2	>>2233.2	>>1430.5	582.2	139.6	21.9	<0.5	>>1516.9	790.8	<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	>>2807	>>1157	>>1062	594	127	49	7	<3	>>1027	528	<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromomethane	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Bromodichloromethane	3	3	3	2	3	2	<2	<2	4	4	<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Toluene	>>3896	>>1811	>>1583	910	275	74	11	<5	>>1422	739	<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	>>1505	555	563	288	67	21	<3	<3	482	269	<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Ethylbenzene	>>2360	920	959	517	108	37	4	<1	>>1040	562	<1	ug/l	TM15/PM10
m/p-Xylene	>>4022	1612	1691	921	208	68	8	<2	1952	1081	<2	ug/l	TM15/PM10
o-Xylene	>>2813	>>1189	>>1157	640	193	47	5	<1	>>1279	688	<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Bromoform	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Isopropylbenzene	6	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/l	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Propylbenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	101	109	96	94	82	103	100	99	104	105	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	97	97	94	80	109	106	104	107	110	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: -
Contact: Thomas Mullan
EMT Job No: 24/901

VOC Report : **Liquid**

EMT Sample No.	11	12	13	14	15	16						
Sample ID	CLAY-3 S	CLAY-4 S	CLAY-5 S	CLAY-6 S	CLAY-7 S	CLAY-8 S						
Depth												
COC No / misc												
Containers	V	V	V	V	V	V						
Sample Date	17/01/2024	17/01/2024	17/01/2024	17/01/2024	17/01/2024	17/01/2024						
Sample Type	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid						
Batch Number	1	1	1	1	1	1						
Date of Receipt	19/01/2024	19/01/2024	19/01/2024	19/01/2024	19/01/2024	19/01/2024						
VOC MS												
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2					<2	ug/l
Methyl Tertiary Butyl Ether	>>1283.8	882.0	419.9	118.5	28.0	<0.1					<0.1	ug/l
Chloromethane	<3	<3	<3	<3	<3	<3					<3	ug/l
Vinyl Chloride	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	ug/l
Bromomethane	<1	<1	<1	<1	<1	<1					<1	ug/l
Chloroethane	<3	<3	<3	<3	<3	<3					<3	ug/l
Trichlorofluoromethane	<3	<3	<3	<3	<3	<3					<3	ug/l
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3	<3	<3	<3					<3	ug/l
Dichloromethane (DCM)	<3	<3	<3	<3	<3	<3					<3	ug/l
trans-1-2-Dichloroethene	8	7	<3	<3	<3	<3					<3	ug/l
1,1-Dichloroethane	<3	<3	<3	<3	<3	<3					<3	ug/l
cis-1-2-Dichloroethene	765	615	271	81	14	<3					<3	ug/l
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1					<1	ug/l
Bromochloromethane	<2	<2	<2	<2	<2	<2					<2	ug/l
Chloroform	7	6	6	6	6	4					<2	ug/l
1,1,1-Trichloroethane	<2	<2	<2	<2	<2	<2					<2	ug/l
1,1-Dichloropropene	<3	<3	<3	<3	<3	<3					<3	ug/l
Carbon tetrachloride	<2	<2	<2	<2	<2	<2					<2	ug/l
1,2-Dichloroethane	<2	<2	<2	<2	<2	<2					<2	ug/l
Benzene	795.4	705.7	315.5	99.5	14.2	<0.5					<0.5	ug/l
Trichloroethene (TCE)	503	436	178	57	8	<3					<3	ug/l
1,2-Dichloropropane	<2	<2	<2	<2	<2	<2					<2	ug/l
Dibromomethane	<3	<3	<3	<3	<3	<3					<3	ug/l
Bromodichloromethane	4	4	4	4	4	2					<2	ug/l
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2					<2	ug/l
Toluene	712	623	255	86	9	<5					<5	ug/l
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2					<2	ug/l
1,1,2-Trichloroethane	<2	<2	<2	<2	<2	<2					<2	ug/l
Tetrachloroethene (PCE)	247	233	81	28	4	<3					<3	ug/l
1,3-Dichloropropane	<2	<2	<2	<2	<2	<2					<2	ug/l
Dibromochloromethane	<2	<2	<2	<2	<2	<2					<2	ug/l
1,2-Dibromoethane	<2	<2	<2	<2	<2	<2					<2	ug/l
Chlorobenzene	<2	<2	<2	<2	<2	<2					<2	ug/l
1,1,1,2-Tetrachloroethane	<2	<2	<2	<2	<2	<2					<2	ug/l
Ethylbenzene	523	437	157	44	3	<1					<1	ug/l
m/p-Xylene	994	846	301	97	12	<2					<2	ug/l
o-Xylene	648	542	205	66	9	<1					<1	ug/l
Styrene	<2	<2	<2	<2	<2	<2					<2	ug/l
Bromoform	<2	<2	<2	<2	<2	<2					<2	ug/l
Isopropylbenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4					<4	ug/l
Bromobenzene	<2	<2	<2	<2	<2	<2					<2	ug/l
1,2,3-Trichloropropane	<3	<3	<3	<3	<3	<3					<3	ug/l
Propylbenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
2-Chlorotoluene	<3	<3	<3	<3	<3	<3					<3	ug/l
1,3,5-Trimethylbenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
4-Chlorotoluene	<3	<3	<3	<3	<3	<3					<3	ug/l
tert-Butylbenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
1,2,4-Trimethylbenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
sec-Butylbenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
4-Isopropyltoluene	<3	<3	<3	<3	<3	<3					<3	ug/l
1,3-Dichlorobenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
1,4-Dichlorobenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
n-Butylbenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
1,2-Dichlorobenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2					<2	ug/l
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3					<3	ug/l
Naphthalene	<2	<2	<2	<2	<2	<2					<2	ug/l
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3					<3	ug/l
Surrogate Recovery Toluene D8	109	137	98	104	103	111					<0	%
Surrogate Recovery 4-Bromofluorobenzene	110	142	99	102	100	108					<0	%

Please see attached notes for all abbreviations and acronyms

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: -
Contact: Thomas Mullan
EMT Job No: 24/901

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	8												
Sample ID	COAL-8 S												
Depth													
COC No / misc													
Containers	V												
Sample Date	17/01/2024												
Sample Type	Liquid												
Batch Number	1												
Date of Receipt	19/01/2024												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Surrogate Recovery Toluene D8	102										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	105										<0	%	TM15/PM10

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Element Materials Technology

Notification of Deviating Samples

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: -
Contact: Thomas Mullan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/901						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/901

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 24/901

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				

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CE Geochem Laboratories
The Carpenters Shop
Lumsdale Road
Matlock
Derbyshire
United Kingdom
DE4 5EW

Attention :	Thomas Mullan
Date :	7th February, 2024
Your reference :	A231001B
Our reference :	Test Report 24/1960 Batch 1
Location :	N/A
Date samples received :	6th February, 2024
Status :	Final Report
Issue :	202402071424

Twelve samples were received for analysis on 6th February, 2024 of which twelve were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 5.213 kg of CO2

Scope 1&2&3 emissions - 12.319 kg of CO2

Authorised By:

Simon Gomery BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1960

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	606-8-4	606-8-6	606-8.5-1	606-8.5-2	606-8.5-3	606-8.5-4	606-8.5-5	606-8.5-6	606-8.5-7	606-8.5-8			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024			
Natural Moisture Content	1.9	3.2	4.6	6.1	3.4	2.5	5.3	1.7	9.0	11.5	<0.1	%	PM4/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1960

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	11	12											
Sample ID	606-8.5-9	606-8.5-10											
Depth													
COC No / misc													
Containers	V	V											
Sample Date	02/02/2024	02/02/2024											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	06/02/2024	06/02/2024											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Natural Moisture Content	6.3	8.1									<0.1	%	PM4/PM0

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1960

VOC Report : **Solid**

EMT Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	606-8-4	606-8-6	606-8.5-1	606-8.5-2	606-8.5-3	606-8.5-4	606-8.5-5	606-8.5-6	606-8.5-7	606-8.5-8			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024			
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2 SV	<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2 SV	<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2 SV	<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1 SV	<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2 SV	<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2 SV	<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6 SV	<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7 SV	<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6 SV	<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
Toluene #	5	3	4	12	4	7	20	12	168	157 SV	<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	20	<3 SV	<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5	117	12 SV	<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3	<3	<3	<3	53	16 SV	<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	5	<3 SV	<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2 SV	<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	5	<4 SV	<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	9	<3 SV	<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 SV	<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	<6	<6	<6	<6	86	29 SV	<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
n-Butylbenzene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7 SV	<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4 SV	<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27	<27	<27	<27	39	<27 SV	<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7 SV	<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	95	100	97	96	109	98	96	97	58 SV	55 SV	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	93	97	95	89	106	93	91	91	45 SV	46 SV	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1960

VOC Report : **Solid**

EMT Sample No.	11	12									LOD/LOR	Units	Method No.
Sample ID	606-8.5-9	606-8.5-10											
Depth													
COC No / misc													
Containers	V	V											
Sample Date	02/02/2024	02/02/2024											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	06/02/2024	06/02/2024											
VOC MS													
Dichlorodifluoromethane	<2 SV	8 SV									<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2 SV	<2 SV									<2	ug/kg	TM15/PM10
Chloromethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Vinyl Chloride	<2 SV	<2 SV									<2	ug/kg	TM15_A/PM10
Bromomethane	<1 SV	<1 SV									<1	ug/kg	TM15/PM10
Chloroethane #	<2 SV	<2 SV									<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2 SV	<2 SV									<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6 SV	<6 SV									<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<7 SV	<7 SV									<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
Bromochloromethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Chloroform #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
Benzene #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6 SV	<6 SV									<6	ug/kg	TM15/PM10
Dibromomethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
Toluene #	152 SV	196 SV									<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Chlorobenzene #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Ethylbenzene #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
m/p-Xylene #	54 SV	57 SV									<5	ug/kg	TM15/PM10
o-Xylene #	46 SV	44 SV									<3	ug/kg	TM15/PM10
Styrene	<3 SV	<3 SV									<3	ug/kg	TM15_A/PM10
Bromoform	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Isopropylbenzene #	7 SV	8 SV									<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
Bromobenzene	<2 SV	<2 SV									<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
Propylbenzene #	4 SV	4 SV									<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	13 SV	15 SV									<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3 SV	<3 SV									<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5 SV	<5 SV									<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	103 SV	123 SV									<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
n-Butylbenzene	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7 SV	<7 SV									<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4 SV	<4 SV									<4	ug/kg	TM15/PM10
Naphthalene	<27 SV	<27 SV									<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7 SV	<7 SV									<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	62 SV	60 SV									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	46 SV	45 SV									<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/1960						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

Please include all sections of this report if it is reproduced

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/1960

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 24/1960

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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CE Geochem Laboratories
The Carpenters Shop
Lumsdale Road
Matlock
Derbyshire
United Kingdom
DE4 5EW

Attention :	Thomas Mullan
Date :	8th February, 2024
Your reference :	A231001B
Our reference :	Test Report 24/1962 Batch 1
Location :	N/A
Date samples received :	6th February, 2024
Status :	Final Report
Issue :	202402081321

Twenty samples were received for analysis on 6th February, 2024 of which twenty were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 8.688 kg of CO2

Scope 1&2&3 emissions - 20.532 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1962

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	610-5-1	610-5-2	610-5-3	610-5-4	610-5-5	610-5-6	610-5-7	610-5-8	610-5-9	610-5-10			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024			
Natural Moisture Content	5.6	6.8	6.6	9.4	9.4	6.8	6.1	5.2	9.0	7.4	<0.1	%	PM4/PM0

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1962

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	11	12	13	14	15	16	17	18	19	20	LOD/LOR	Units	Method No.
Sample ID	610-7-1	610-7-2	610-7-3	610-7-4	610-7-5	610-7-6	610-7-7	610-7-8	610-7-9	610-7-10			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024			
Natural Moisture Content	5.1	5.2	4.7	4.5	5.5	5.4	5.9	5.3	4.9	4.8	<0.1	%	PM4/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1962

VOC Report : **Solid**

EMT Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	610-5-1	610-5-2	610-5-3	610-5-4	610-5-5	610-5-6	610-5-7	610-5-8	610-5-9	610-5-10			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024			
VOC MS													
Dichlorodifluoromethane	2	<2	<2	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	4 SV	3 SV	<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1 SV	<1 SV	<1 SV	<1 SV	<1 SV	<1 SV	<1 SV	<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6 SV	<6 SV	<6 SV	<6 SV	<6 SV	<6 SV	<6 SV	<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<7	<7	<7	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	13 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6 SV	<6 SV	<6 SV	<6 SV	<6 SV	<6 SV	<6 SV	<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
Toluene #	44	29	21	298 SV	503 SV	233 SV	608 SV	259 SV	243 SV	388 SV	<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	25 SV	22 SV	<3 SV	18 SV	17 SV	11 SV	9 SV	<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5	243 SV	201 SV	67 SV	95 SV	98 SV	64 SV	35 SV	<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	105 SV	104 SV	50 SV	59 SV	69 SV	39 SV	21 SV	<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	10 SV	12 SV	7 SV	10 SV	12 SV	8 SV	4 SV	<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2 SV	<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	12 SV	12 SV	6 SV	7 SV	8 SV	7 SV	<4 SV	<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	27 SV	24 SV	14 SV	18 SV	20 SV	15 SV	11 SV	<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3 SV	<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5 SV	<5 SV	<5 SV	<5 SV	<5 SV	<5 SV	<5 SV	<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	199 SV	212 SV	113 SV	146 SV	168 SV	116 SV	63 SV	<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
n-Butylbenzene	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7	<7	<7	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4 SV	<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	42 SV	43 SV	<27 SV	<27 SV	34 SV	<27 SV	<27 SV	<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7	<7	<7	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7 SV	<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	98	95	118	64 SV	66 SV	64 SV	60 SV	59 SV	61 SV	58 SV	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	91	80	110	47 SV	50 SV	47 SV	47 SV	46 SV	47 SV	47 SV	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1962

VOC Report : **Solid**

EMT Sample No.	11	12	13	14	15	16	17	18	19	20	LOD/LOR	Units	Method No.
Sample ID	610-7-1	610-7-2	610-7-3	610-7-4	610-7-5	610-7-6	610-7-7	610-7-8	610-7-9	610-7-10			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024			
VOC MS													
Dichlorodifluoromethane	56	94	79	47	22	21	5	14	95	44	<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	4	<3	<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3	<3	3	17	<3	<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Toluene #	22	16	19	6	4	4	4	4	19	6	<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
n-Butylbenzene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	101	97	100	102	100	97	103	103	98	104	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	99	95	99	102	101	98	103	103	91	105	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/1962						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

Please include all sections of this report if it is reproduced

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/1962

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 24/1962

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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CE Geochem Laboratories
The Carpenters Shop
Lumsdale Road
Matlock
Derbyshire
United Kingdom
DE4 5EW

Attention :	Thomas Mullan
Date :	7th February, 2024
Your reference :	A231001B
Our reference :	Test Report 24/1967 Batch 1
Location :	N/A
Date samples received :	6th February, 2024
Status :	Final Report
Issue :	202402071425

Twenty samples were received for analysis on 6th February, 2024 of which twenty were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 8.688 kg of CO2

Scope 1&2&3 emissions - 20.532 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1967

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	615-10-1	615-10-2	615-10-3	615-10-4	615-10-5	615-10-6	615-10-7	615-10-8	615-10-9	615-10-10			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024			
Natural Moisture Content	4.4	5.1	5.9	6.1	5.8	5.5	5.7	5.4	5.9	5.7	<0.1	%	PM4/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1967

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	11	12	13	14	15	16	17	18	19	20			
Sample ID	615-11-1	615-11-2	615-11-3	615-11-4	615-11-5	615-11-6	615-11-7	615-11-8	615-11-9	615-11-10			
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	LOD/LOR	Units	Method No.
Natural Moisture Content	4.7	4.5	5.2	5.7	5.2	5.3	5.4	5.5	5.2	6.2	<0.1	%	PM4/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1967

VOC Report : **Solid**

EMT Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	615-10-1	615-10-2	615-10-3	615-10-4	615-10-5	615-10-6	615-10-7	615-10-8	615-10-9	615-10-10			
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024			
VOC MS													
Dichlorodifluoromethane	25	34	36	42	33	43	29	14	20	6	<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Toluene #	<3	4	<3	<3	<3	<3	<3	<3	<3	6	<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	6	<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	44	<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	4	<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	<6	<6	<6	<6	<6	17	<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
n-Butylbenzene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	99	99	102	99	102	99	103	103	104	108	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	94	92	97	94	97	92	96	98	97	103	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/1967

VOC Report : **Solid**

EMT Sample No.	11	12	13	14	15	16	17	18	19	20			
Sample ID	615-11-1	615-11-2	615-11-3	615-11-4	615-11-5	615-11-6	615-11-7	615-11-8	615-11-9	615-11-10			
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V	V	V	V	V	V	V	V	V	V			
Sample Date	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024	02/02/2024			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	06/02/2024	LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	26	18	32	26	20	27	20	9	12	19	<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3	8	<3	<3	<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
n-Butylbenzene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	106	96	99	96	96	97	98	100	99	98	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	105	94	97	92	93	94	94	98	96	94	<0	%	TM15/PM10

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/1967						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

Please include all sections of this report if it is reproduced

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/1967

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 24/1967

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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W: www.element.com

CE Geochem Laboratories
The Carpenters Shop
Lumsdale Road
Matlock
Derbyshire
United Kingdom
DE4 5EW

Attention :	Thomas Mullan
Date :	9th February, 2024
Your reference :	A231001B
Our reference :	Test Report 24/2014 Batch 1
Location :	N/A
Date samples received :	7th February, 2024
Status :	Final Report
Issue :	202402091037

Eight samples were received for analysis on 7th February, 2024 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 3.475 kg of CO2

Scope 1&2&3 emissions - 8.213 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/2014

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1	2	3	4	5	6	7	8			LOD/LOR	Units	Method No.
Sample ID	606-10-1	606-10-2	606-10-3	606-10-4	606-10-5	606-10-6	606-10-7	606-10-8					
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V					
Sample Date	05/02/2024	05/02/2024	05/02/2024	05/02/2024	05/02/2024	05/02/2024	05/02/2024	05/02/2024					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	07/02/2024	07/02/2024	07/02/2024	07/02/2024	07/02/2024	07/02/2024	07/02/2024	07/02/2024					
Natural Moisture Content	4.6	7.6	4.0	3.6	3.5	4.6	3.3	9.0			<0.1	%	PM4/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan
EMT Job No: 24/2014

VOC Report : **Solid**

EMT Sample No.	1	2	3	4	5	6	7	8					
Sample ID	606-10-1	606-10-2	606-10-3	606-10-4	606-10-5	606-10-6	606-10-7	606-10-8					
Depth													
COC No / misc													
Containers	V	V	V	V	V	V	V	V					
Sample Date	05/02/2024	05/02/2024	05/02/2024	05/02/2024	05/02/2024	05/02/2024	05/02/2024	05/02/2024					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	07/02/2024	07/02/2024	07/02/2024	07/02/2024	07/02/2024	07/02/2024	07/02/2024	07/02/2024					
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1			<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6	<6	<6	<6			<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<7	<7	<7	<7	<7	<7	<7	<7			<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6	<6	<6	<6	<6			<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
Toluene #	46	185	42	62	72	41	49	52			<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	10	7	9	5	6	5	<5			<5	ug/kg	TM15/PM10
o-Xylene #	<3	6	5	7	4	4	4	<3			<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	3	4	5	3	<3	3	<3			<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	9	17	18	23	11	12	11	8			<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
n-Butylbenzene	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7			<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27	<27	<27	<27			<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7			<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	94	92	92	74	100	99	97	101			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	77	69	70	51	75	78	78	90			<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Notification of Deviating Samples

Client Name: CE Geochem Laboratories
Reference: A231001B
Location: N/A
Contact: Thomas Mullan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/2014						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/2014

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

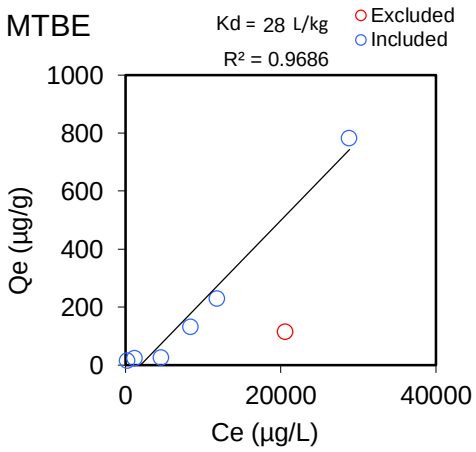
ABBREVIATIONS and ACRONYMS USED

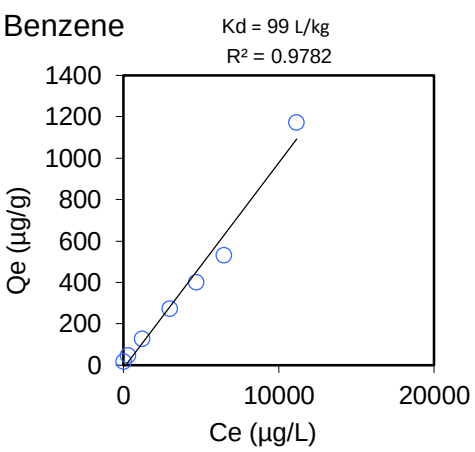
#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
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LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

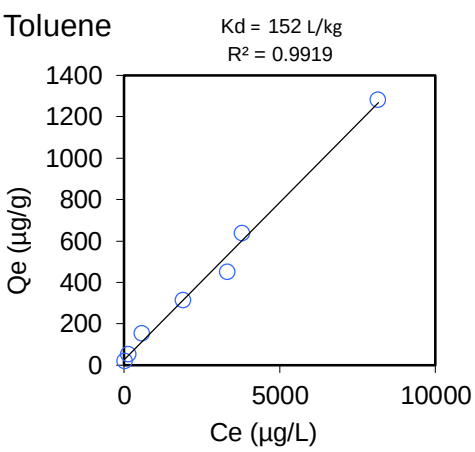
EMT Job No: 24/2014

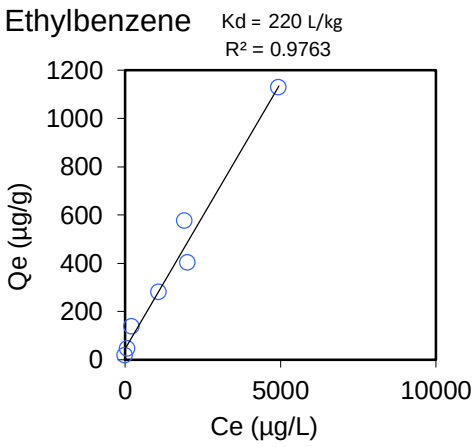
Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

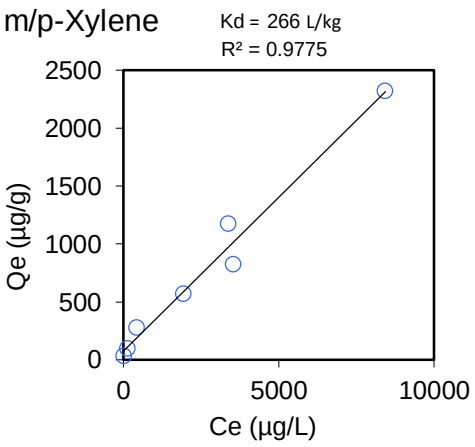
Geochem	**Sorption Isotherm Experiment Test Certificate**	**Client**	Barratt Homes
		Sample Received	06/12/2023
Project ID	A231001	**Testing Commenced**	15/01/2024
Project Name	Tetrosyl Advanced Characterisation and Sorption Studies	**Testing Completed**	17/01/2024
Sample Description	COAL sampled from the former Tetrosyl site, dried at 40 °C, and sieved to <2 mm.	**Test Method**	Sorption Isotherm
		Tested By	CE Geochem
Sample Preparation and Storage	Stored in glass vials with zero headspace at <5 °C.	**Analytical Reports**	EMT 24/901
		Date Issued	26/02/2024

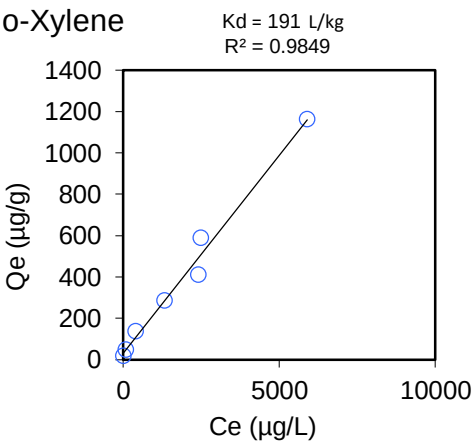


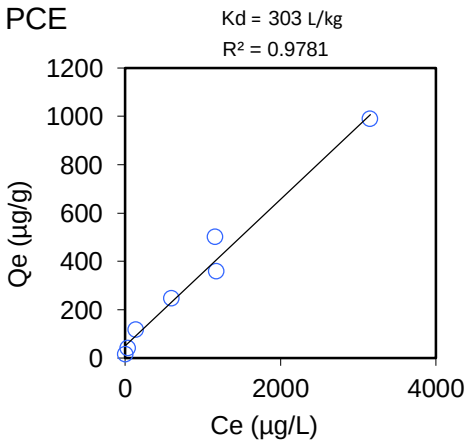


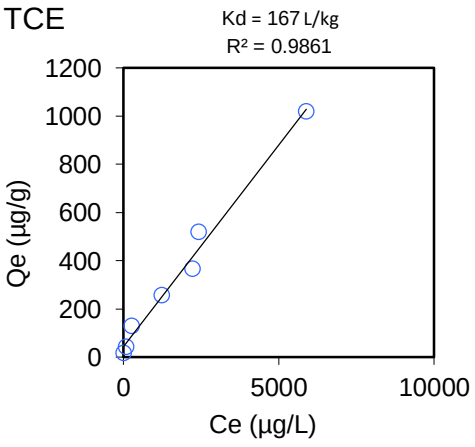


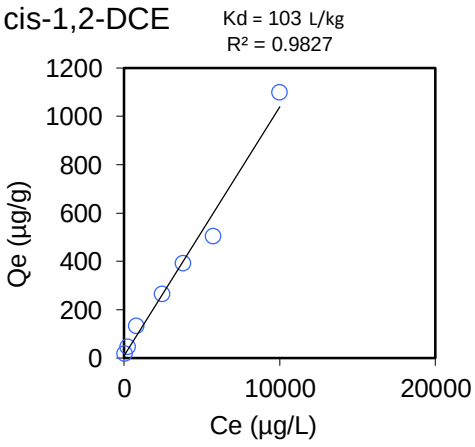












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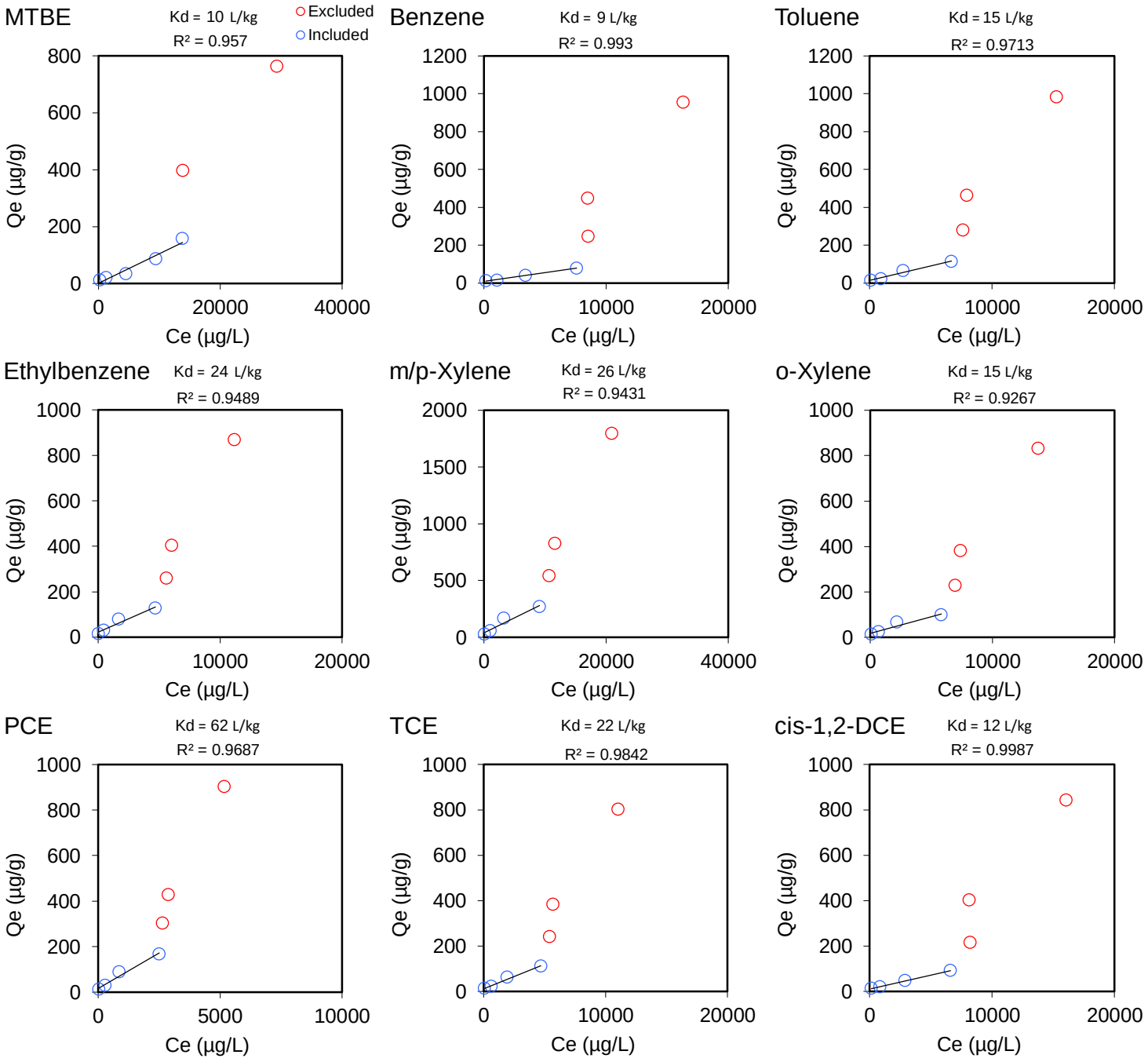
Remarks

1 g COAL mixed with 42 mL of MTBE–BTEX–PCE–TCE–cis-1,2-DCE solution at concentrations ranging from 1 to 40 mg/L.

Approved by:

Thomas Mullan - Environmental Geochemist

Geochem	**Sorption Isotherm Experiment Test Certificate**	**Client**	Barratt Homes
		Sample Received	11/12/2023
Project ID	A231001	**Testing Commenced**	15/01/2024
Project Name	Tetrosyl Advanced Characterisation and Sorption Studies	**Testing Completed**	17/01/2024
Sample Description	Seat earth CLAY sampled from the former Tetrosyl site, dried at 40 °C, and sieved to <2 mm.	**Test Method**	Sorption Isotherm
		Tested By	CE Geochem
Sample Preparation and Storage	Stored in glass vials with zero headspace at <5 °C.	**Analytical Reports**	EMT 24/901
		Date Issued	26/02/2024



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Remarks

1 g seat earth CLAY mixed with 42 mL of MTBE–BTEX–PCE–TCE–cis-1,2-DCE solution at concentrations ranging from 1 to 40 mg/L.

Approved by:

Thomas Mullan - Environmental Geochemist

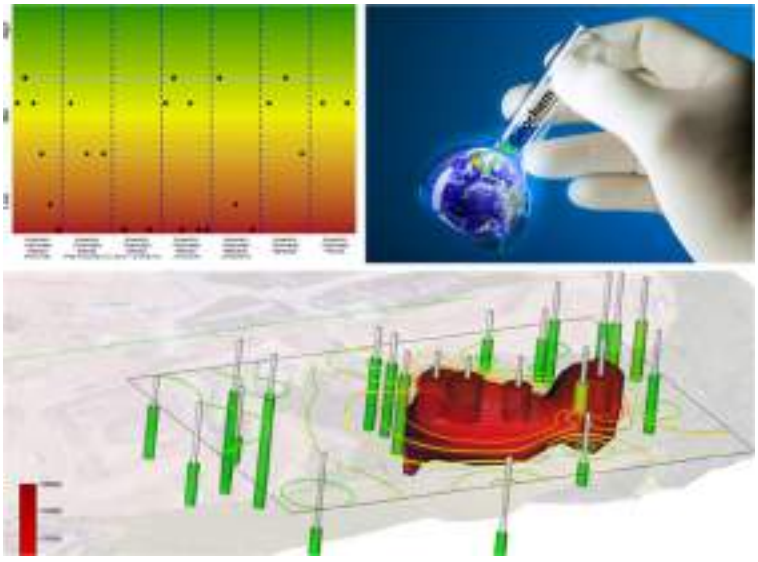
APPENDIX C.2

Tetrosyl Plume Visualisation and Microbial Profiling Study Investigation of Potential Source Term Mass Depletion by Processes of Natural Attenuation Report A231001C, rev. 03, dated 08/2024

Tetrosyl Plume Visualisation and Microbial Profiling Study

Investigation of Potential Source Term Mass Depletion by Processes of Natural Attenuation

Report A231001C



Prepared for

BARRATT HOMES

A231001C Plume Visualisation and Microbial Profiling Study

Revision Schedule

Report
August 2024

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	05/2024	Draft	**Dr Thomas Mullan**	**Dr Jamie Cutting**	
02	06/2024	Draft	**Dr Thomas Mullan**		
03	08/2024	Draft	**Dr Thomas Mullan**	**Dr Jamie Cutting**	

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The interpretations and recommendations contained in this Report are based upon information generated from samples provided by others. For all intents and purposes, samples are assumed to be representative. CE Geochem have tested samples as instructed, without influence or prejudice on samples selection.

The methodology adopted, and the sources of information used by CE Geochem in providing its services are outlined in the original Proposal [P231001C]. The description of work packages described in this Proposal are based on the information available during the offer period. The scope of the original Proposal and offered services are accordingly factually limited by the availability of factual data and clarifications provided by the client to CE Geochem during the Proposal process.

Where assessments of works or costs identified in this Report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available during the performance of scheduled tasks.

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1 Executive Summary

CE Geochem were commissioned by Barratt Homes to provide biogeochemical input into a Detailed Quantitative Risk Assessment (DQRA) being prepared by others, for the former Tetrosyl site located within Bevis Green Works in Bury, UK. Scope of works has included 3D visualisation of contaminant plume geometry, plume volume, and contaminant mass with quantification of contaminant biodegradation half-lives. Additional lines of evidence supporting the validity of natural attenuation processes are presented from a microbial profiling study of site groundwater.

In Project Memorandum A231001/PMI a preliminary visualisation of benzene, toluene, ethylbenzene, and xylene plumes was presented. This report presents the results of additional work packages to further develop the original plume model by incorporating chlorinated ethenes (tetrachloroethylene, trichloroethylene, cis-1,2-dichloroethylene, and vinyl chloride) and visualising changes in plume geometry, volume, and contaminant mass between 2021 and 2024 groundwater monitoring rounds. The modelled plume geometry has then been used to calculate changes in plume mass over time, which indicates that the size of the plume has decreased over time with contaminant half-lives on the order of 1–5 years. Previous work presented in Project Memorandum A231001/PMII indicted that a seam of COAL running through the site may also have a role in attenuating the vertical component of contaminant flux through geochemical retardation. The incorporation of the COAL seam into the contaminant plume model would appear to support this feature providing a natural geochemical retardation barrier preventing contaminant migration into deeper groundwater bodies.

This report also presents the results of a microbial profiling study conducted on groundwater sampled from the core and fringes of the contaminant plume. Genetic sequencing of samples retrieved from the plume core and fringe indicates that a wide array functional genes and microbial species, responsible for both aerobic and anaerobic degradation of contaminants of concern, are present within site groundwaters.

This report provides primary, secondary, and tertiary lines of evidence that indicate processes of natural attenuation are occurring at the former Tetrosyl site. Site derived degradation rates, however, suggest natural attenuation is occurring at a relatively slow rate. Enhanced Monitored Natural Attenuation (EMNA) may be worthy of further consideration as the preferred groundwater remediation strategy for the site.

2 Introduction

2.1 Project Appreciation

2.1.1 CE Geochem have been commissioned by Barratt Homes to support the development of a remediation strategy for the former Tetrosyl site located within Bevis Green Works in Bury, UK.

2.1.2 The site was previously operated as an automotive products manufacturing plant by Tetrosyl Limited between the mid-1960s and early 2000s. These activities have left a legacy of contamination on the site, predominantly BTEX compounds (benzene, toluene, ethylbenzene, m-, p-, and o-xylene) but with chlorinated ethenes (tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride (VC)) also considered to be contaminants of concern.

2.1.3 The site is currently undergoing remedial works to develop the site for residential end-use, with remediation of the Phase 1 area complete. Current remedial efforts are focused on the Phase 2B area of the site, which corresponds to the former solvent recovery area.

2.1.4 We understand that the Monitored Natural Attenuation (MNA) is the preferred remedial approach, with a Detailed Quantitative Risk Assessment (DQRA) currently under preparation by Smith Grant LLP to demonstrate this approach meets regulatory requirements.

2.1.5 Justification of MNA as a remedial approach should demonstrate that (a) relevant biological processes are occurring on site and (b) there is a clear and consistent reduction in source term mass over time and (c) biodegradation is proceeding at an acceptable rate to achieve the desired compliance target end point. CE Geochem have designed and executed a suite of modelling and test work packages in order to provide primary, secondary and tertiary lines of evidence in general accordance with recently published best practice; ‘Guidance on the Assessment and Monitoring of Natural Attenuation of Contaminants in Groundwater’ produced by CL:AIRE (April, 2024).

2.2 Nominated Third-Party Analytical Laboratory Accreditation

2.2.1 Microbial Insights, Inc. is accredited to the ISO/IEC 17025 International Standard *General Requirements for the Competence of Testing and Calibration Laboratories* (Certification # 7157.01) for qPCR analysis.

3 Plume Visualisation Modelling

3.1 Computational Methodology

3.1.1 Contaminant plumes for BTEX compounds, PCE, TCE, cis-1,2-DCE, and VC were visualised over time using the 3-Dimensional visualisation software Voxler® Version 4 (Golden Software).

3.1.2 Groundwater concentrations for contaminants of concern (CoCs) measured at borehole locations (shown in Figure 3.1) between 2021 and 2024 were used alongside geospatial lithological data and hydrogeological data as basis sets for modelling plume geometry. Voxler® creates complex hulls through 3D interpolation methods to construct isosurfaces for quantifying the vertical and lateral extents of subsurface contaminant distribution.

3.1.3 Groundwater elevations and geological information from borehole logs were used to refine the kriging model and select appropriate search radii and power functions for inverse distance squared search patterns to define gridding frequencies.

3.1.4 An evaluation of plume stability over time (stable, shrinking or growing), was based on the published methodology described by Ricker.[1]

3.1.5 Groundwater chemistry datasets were initially normalised to annual average concentrations for each borehole location to eliminate seasonal variations and inconsistencies introduced by variable sampling intervals and incomplete sampling rounds for different borehole locations.

3.1.6 Volumetric quantification of contaminant plumes was undertaken for discrete concentration bands to enable total contaminant mass to be calculated by the summation of finite difference across all bands.

3.1.7 The contaminant mass within a discrete concentration band was calculated using Equation 1:

$$m = VC\eta \qquad \text{(Equation 1)}$$

Where m = contaminant mass (kg) within a discrete band, V = volume (m^3), C = concentration (kg/m^3), and η = effective porosity.

Allowing total contaminant mass within the plume (M) to be derived by summation:

$$M = \sum_{i=0}^{n} m \qquad \text{(Equation 2)}$$

Where n is the number of discrete bands for which isosurfaces were created.

3.1.8 A value of 0.1485 was used to represent effective porosity calculated from measurements performed by CE Geochem on samples of SANDSTONE taken from the boreholes RBH610 and RBH612. A value of 0.096 had been used to represent effective porosity in a

[1] Ricker, J.A. (2008), A Practical Method to Evaluate Ground Water Contaminant Plume Stability. Groundwater Monitoring & Remediation, 28: 85-94. https://doi.org/10.1111/j.1745-6592.2008.00215.x

previous DQRA;[2] note that using this value leads to lower estimates of plume mass but does not change estimates of contaminant degradation rates.

3.1.9 The grid used to calculate the plume mass within the modelling domain (as shown in Figure 3.1) covers a volume of 104,652 m^3. This modelling domain was selected to represent the best compromise between modelling domain size and groundwater data availability for monitoring wells across all four years of interest.

3.1.10 Plume visualisation and estimation of plume mass over time requires the use of a consistent modelling domain. Considering locations monitored across all four years from 2021–2024 (and assuming that RBH330/RBH614(S) and RBH324/RBH609(S) are representative of the same location) gives a limited area to model as indicated by the red outline in Figure 3.1, covering only the central part of Phase 2B.

3.1.11 Only considering data from 2021–2023 gives a more extensive area to model (shown by the blue outline in Figure 3.1), extending to the north of Phase 2B, the area to the south of Phase 2B, and into Phase 2A. This does not, however, allow the incorporation of 2024 groundwater monitoring data into estimates of plume mass. Therefore, a number of assumptions have been made to enable the grid (shown by the yellow outline in Figure 3.1) to be modelled. These assumptions are as follows:

- To constrain the southern boundary of the grid, the 2022 data from BH502 where all CoCs were below limits of detection (LOD, Table 3.1) has been assumed to be constant across 2021–2024. This is considered valid as the most recent data for other nearby locations (2023 for RBH315, 2024 for RBH608 and RBH613) has also recorded CoCs below LOD, with the exception of a low-level detection of vinyl chloride being measured in RBH608 in April 2024 (0.3 µg/L compared to a LOD of 0.1 µg/L).

- 2024 monitoring data from within the area of the former reservoir (Phase 2H in Figure 3.1) indicated that all CoCs in boreholes RBH601, RBH602, RBH604, RBH605 and RBH613 were all below LOD with the exception of VC detected at 0.3 µg/L in RBH605. This has been used to assume that the area below the former reservoir contains no dissolved phase contaminant mass between 2021–2023.

- Constraining the western and northern boundaries of the grid is more challenging, as average 2023 concentrations of BTEX compounds and vinyl chloride were close to or in excess of Remedial Target Values (RTVs, Table 3.1) in boreholes; RBH317R, RBH323R, RBH325, RBH326, and RBH329, and detectable concentrations of PCE, TCE, and cis-1,2-DCE were recorded in boreholes; RBH325, RBH326, and RBH329.

- Trend analysis at the aforementioned locations between 2021–2023 has been used to estimate data points for 2024 for the purpose of gridding the desired modelling domain:

    - If yearly average concentrations displayed a consistent downward trend, 2024 concentrations were estimated based on extrapolation by best fit using linear regression on the natural logarithm of concentration plotted against time.

[2] Groundtech Consulting Limited (2022) Hydrogeological Detailed Quantitative Risk Assessment, Ref. GRO-21459-3710

  - If yearly average concentrations fluctuated with no clear trend, the geometric mean concentration across 2021–2023 was used to estimate 2024 concentrations.
  - Where yearly average concentrations display an upward trend, but closer inspection of individual groundwater monitoring round datasets indicate significant fluctuations over time, 2024 datapoints are estimated as a geometric mean concentration across 2021–2023 monitoring period.
  - Extrapolation was performed using contaminant concentrations measured during individual groundwater monitoring rounds rather than annual mean concentrations.
  - Using this approach on the locations where monitoring data exists from 2021–2024 (RBH320 and RBH321) was generally able to satisfactorily estimate 2024 concentrations within an order of magnitude (Table 3.2)

- Note that for borehole RBH325, the February 2022 data for ethylbenzene and xylenes were removed from the dataset. CE Geochem consider these datapoints to be erroneous when taken in the context of the full dataset, showing an increase of two orders of magnitude when compared with previous and subsequent groundwater monitoring rounds. This trend was not observed for any other CoCs.
- Data from RBH403 (sampled in 2022 only) was excluded from the model as it appeared to introduce anomalously low concentrations between boreholes RBH319 and RBH320, potentially as a result of RHB403 being sampled from below the COAL seam.
- For location RBH322R, the geometric mean of data recorded across 2021 and 2022 was used to estimate concentrations in 2023 and 2024.
- For locations RBH317R, RBH322R, RBH323R, 2021 data from the adjacent boreholes RBH317O, RB322O, and RBH323O, respectively, was used.
- Where CoCs are present at below the LOD they have conservatively been assumed to be present at a concentration equal to the LOD.

3.1.12 Note that due to inconsistencies in sampling locations and assumptions described above, the results presented below should be interpreted with caution as plume mass estimates may only have an order-of-magnitude precision.[3] Nevertheless, the use of a consistent modelling domain should provide a reasonable comparison of contaminant mass over time, used to assess MNA potential.[1,3]

3.1.13 In the sections below, contaminant masses for the purpose of half-life derivation have been calculated based on the modelled volume of contaminants present at above LOD. The contaminant plumes, however, have been visualised based on the RTVs as this delineates the areas which may require treatment.

[3] CL:AIRE (2024) Guidance on the Assessment and Monitoring of Natural Attenuation of Contaminants in Groundwater, ISBN: 978-1-905046-42-3.

Parameter	LOD (µg/L)	RTV (µg/L)
Benzene	0.5	53.3
Toluene	5	1340
Ethylbenzene	1	5520
Xylene (Total)	3	9320
Tetrachloroethylene (PCE)	3	129
Trichloroethylene (TCE)	3	55.8
cis-1,2-dichloroethylene	3	171
Vinyl chloride	0.1	1.02

Table 3.1 Limits of Detection (LOD) and Remedial Target Values (RTVs) for contaminants of concern considered in the plume visualisation study. LOD for xylene (total) is the summed LOD of m/p-xylene and o-xylene.



Figure 3.1 Overhead view of the former Tetrosyl site showing borehole locations and areas covered by 2021–2024 data (red), areas covered by 2021–2023 data (blue), and grid used to calculate plume mass (yellow). For clarity, not all boreholes are labelled.

Model Correlation			
Location	**Parameter**	**2024 Measured**	**2024 Calculated**
RBH320	Benzene	88	29 [a]
	Toluene	48000	24000 [a]
	Ethylbenzene	6400	5100 [a]
	Xylene (Total)	19000	21000 [a]
	PCE	11	18 [b]
	TCE	20	17 [b]
	Cis-1,2-DCE	56	34 [a]
	Vinyl chloride	3.6	2.8 [a]
RBH321	Benzene	24	26 [a]
	Toluene	26000	29000 [a]
	Ethylbenzene	3600	2600 [b]
	Xylene (Total)	16000	12000 [b]
	PCE	5.0	16 [b]
	TCE	7.5	10 [a]
	Cis-1,2-DCE	40	69 [b]
	Vinyl chloride	4.5	4.7 [b]

Table 3.2 Comparison of average measured concentrations in 2024 groundwater monitoring rounds against concentrations calculated using observed trends from 2021–2023, see main text for details. a = Decreasing trend - linear extrapolation of ln(Concentration); b = No trend – geometric mean assumed.

3.2 Plume stability

3.2.1 The stability of the toluene plume is shown in Figures 3.3 and 3.4 and the stability of the VC plume shown in Figures 3.5 and 3.6, with all CoCs displayed in Drawing Nos. 1–8 in Appendix A.

3.2.2 The modelled volume and mass of the contaminant plumes delineated by the RTV across the four years of monitoring is indicated in Tables 3.3 and 3.4.

Plume Volume (m^3)				
Parameter	**2021**	**2022**	**2023**	**2024**
Benzene	27510	18848	13324	3265
Toluene	28177	28995	36784	15433
Ethylbenzene	16348	11040	7196	3055
Xylene (Total)	20990	19131	19024	10960
Tetrachloroethylene (PCE)	0	0	0	0
Trichloroethylene (TCE)	11480	0	2925	0
cis-1,2-dichloroethylene	7611	5379	0	0
Vinyl chloride	33955	21805	25222	20281

Table 3.3 Modelled volume (m^3) of contaminant plumes with concentrations greater than the Remedial Target Value.

Plume Mass (kg)				
Parameter	**2021**	**2022**	**2023**	**2024**
Benzene	1.13	0.38	0.14	0.036
Toluene	356	215	151	61
Ethylbenzene	17	17	6.8	2.8
Xylene (Total)	52	57	38	20
Tetrachloroethylene (PCE)	0	0	0	0
Trichloroethylene (TCE)	0.13	0.00	0.035	0.00
cis-1,2-dichloroethylene	0.29	0.14	0	0
Vinyl chloride	0.024	0.015	0.012	0.007

Table 3.4 Modelled mass (kg) of contaminant plumes with concentrations greater than the Remedial Target Value.

3.2.3 Of the 8 No. CoCs investigated, strong evidence of a shrinking plume geometry was observed for benzene, toluene, ethylbenzene, xylene, TCE, and cis-1,2-DCE. PCE was below the RTV of 129 µg/L in all monitoring rounds, but the distribution of PCE above LOD appears to have remained fairly stable since 2021 (Drawing No. 5 in Appendix A). The plume geometry of VC changed the least between 2021 and 2024 but the plume volume still decreased by about 40% (Table 3.4).

3.2.4 It should be noted that the plume geometry in 2024 depends on the distribution of CoCs in the north of Phase 2B and along the Phase 2A/2B border. Concentrations in these regions have been extrapolated from 2021–2023 data and so must be interpretated with caution.

3.2.5 Inspecting concentrations measured at individual groundwater monitoring rounds indicates substantial fluctuations that makes estimating concentrations in 2024 challenging.

3.2.6 As an example, Figure 3.2 below shows concentrations recorded at RBH330 between 2021 and 2023 and RBH615 in 2024. Both locations are close to the boundary between Phase 2B and Phase 2A.

3.2.7 Concentrations of toluene, ethylbenzene, and total xylene were recorded at >1000 µg/L in January 2023 before decreasing to below LOD by October 2023. Concentrations of these CoCs measured in RBH615(S), sampled from a similar depth to RBH330 (3–5 mbgl in RBH615(S), 4–7 mbgl in RBH330), were all below LOD in both 2024 groundwater monitoring rounds. Based on these trends, it could be estimated that concentrations at RBH330 would be below LOD in 2024.

3.2.8 Conversely, concentrations of BTEX compounds had previously been at or close to LOD in early 2022 before increasing again. Furthermore, concentrations in the deeper sampling well at RBH615 increased between January and April 2024. Locations RBH317, RBH323, RBH326, and RBH329 all show similar trends to RBH330 between 2021 and 2023. Therefore, the approach as described in Section 3.1 of using the geometric mean has been used as representing a conservative but not overly cautious approach.

3.2.9 In contrast to BTEX compounds, the most recent available data for chlorinated ethenes in RBH326 and RBH329 recorded the highest levels of PCE, TCE, cis-1,2-DCE, and VC that had ever been measured at those locations, although only VC was above the RTV. VC

was, additionally, close to its RTV in the Phase 2A sample locations (RBH317 and RBH323). As shown in Figure 3.2d, VC concentrations in RBH330/RBH615 have remained reasonably consistent since 2021, so in the absence of any other data, it is plausible that other chlorinated ethenes have remained stable in the north of Phase 2B and along the Phase 2A boundary.

3.2.10 Despite uncertainties over the exact plume boundary to the north and west, calculations of plume mass according to the Ricker method indicate that the overall mass of each CoC within the modelling domain has decreased between 2021 and 2024 (Figure 3.7).

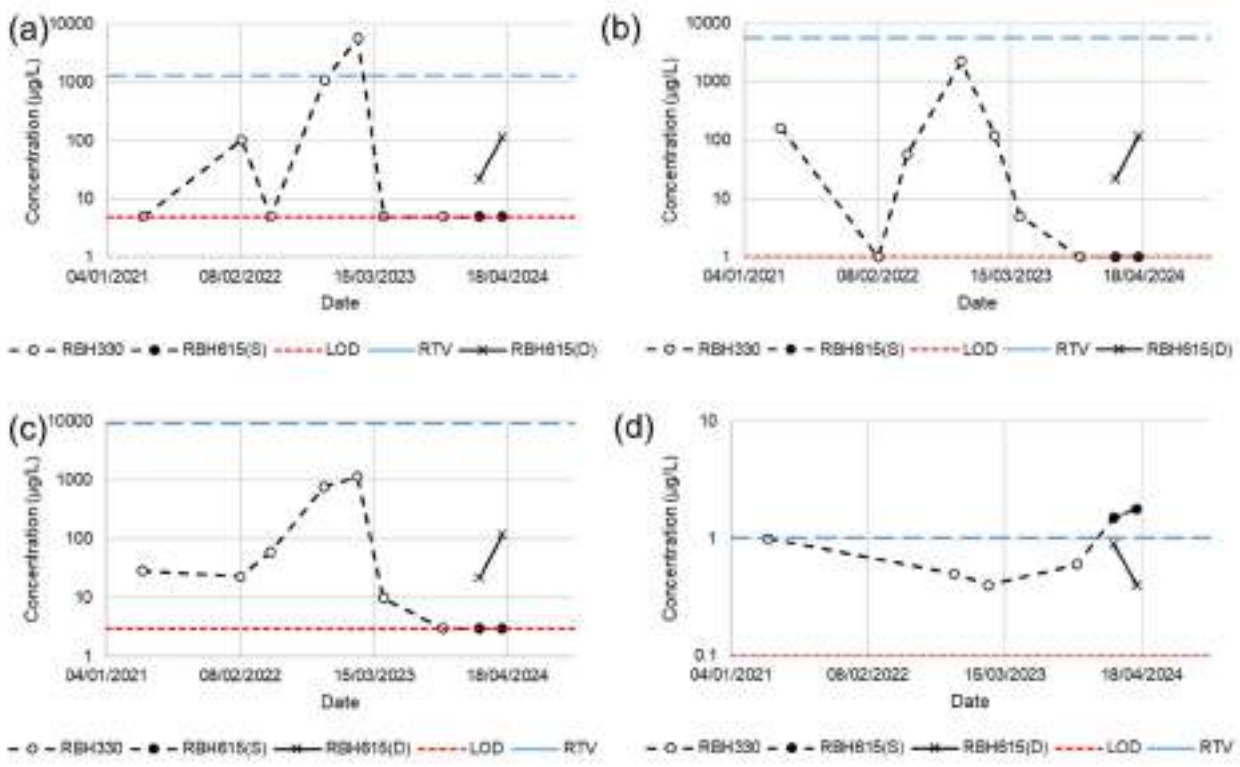


Figure 3.2 Concentrations of (a) toluene, (b) ethylbenzene, (c) total xylene, (d) vinyl chloride measured over time at boreholes RBH330 and RBH615. RTV = Remedial Target Value, LOD = Limit of Detection.

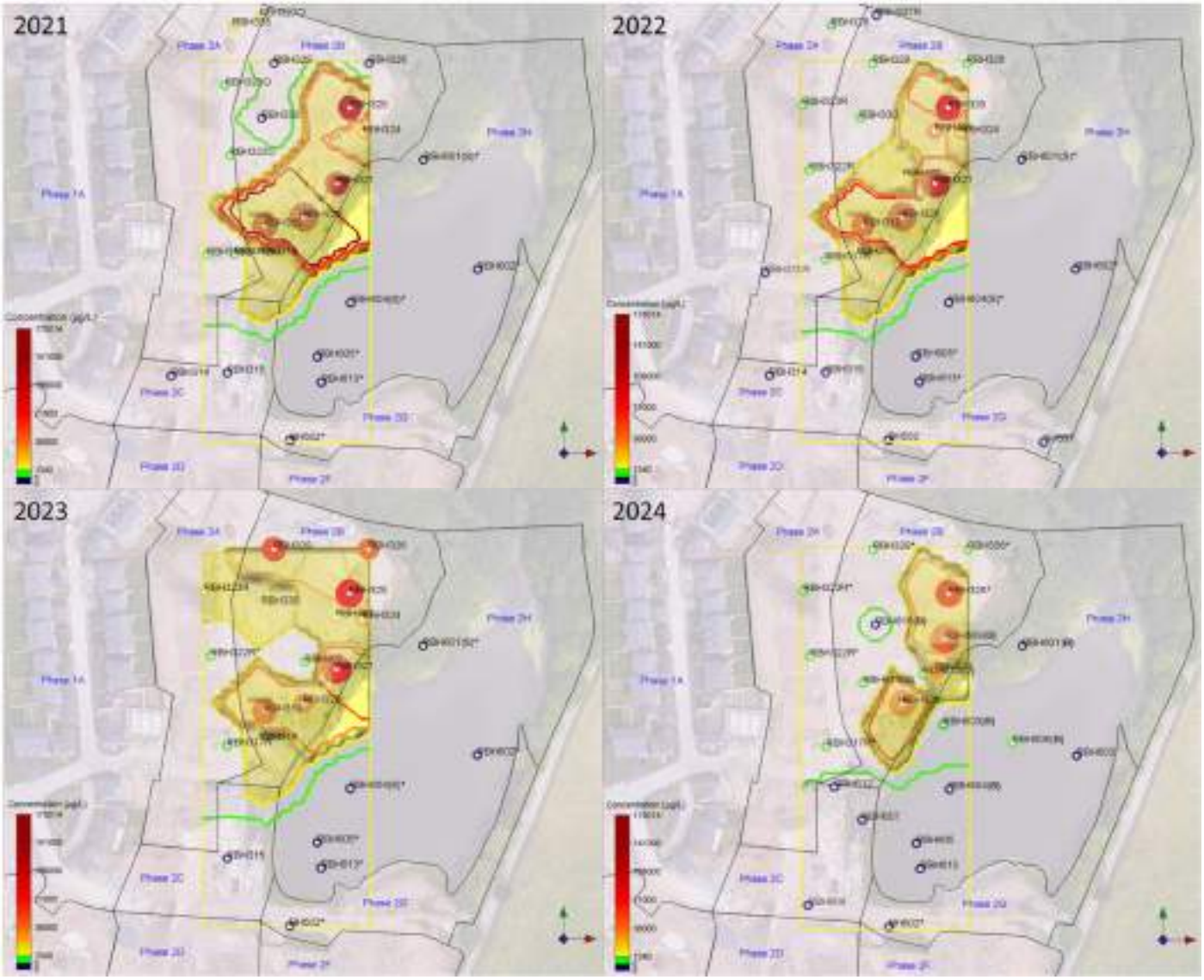


Figure 3.3 Modelled toluene plume over time (plan view). The plume boundary is defined by the remedial target value (RTV) of 1340 µg/L. Concentrations recorded at individual monitoring wells are represented by the coloured cylinders at each location, where blue = below limit of detection (LOD), green = below RTV, and concentrations above the RTV are represented by a yellow–red gradient. The width of the cylinders increases with increasing concentrations. Coloured contour lines delineate areas modelled as above the corresponding concentration value, i.e., the green contour line encloses areas where concentrations are above LOD, the yellow contour line encloses areas where concentrations are above the RTV. * indicates that groundwater concentrations were estimated rather than representing measured data (see main text for details).

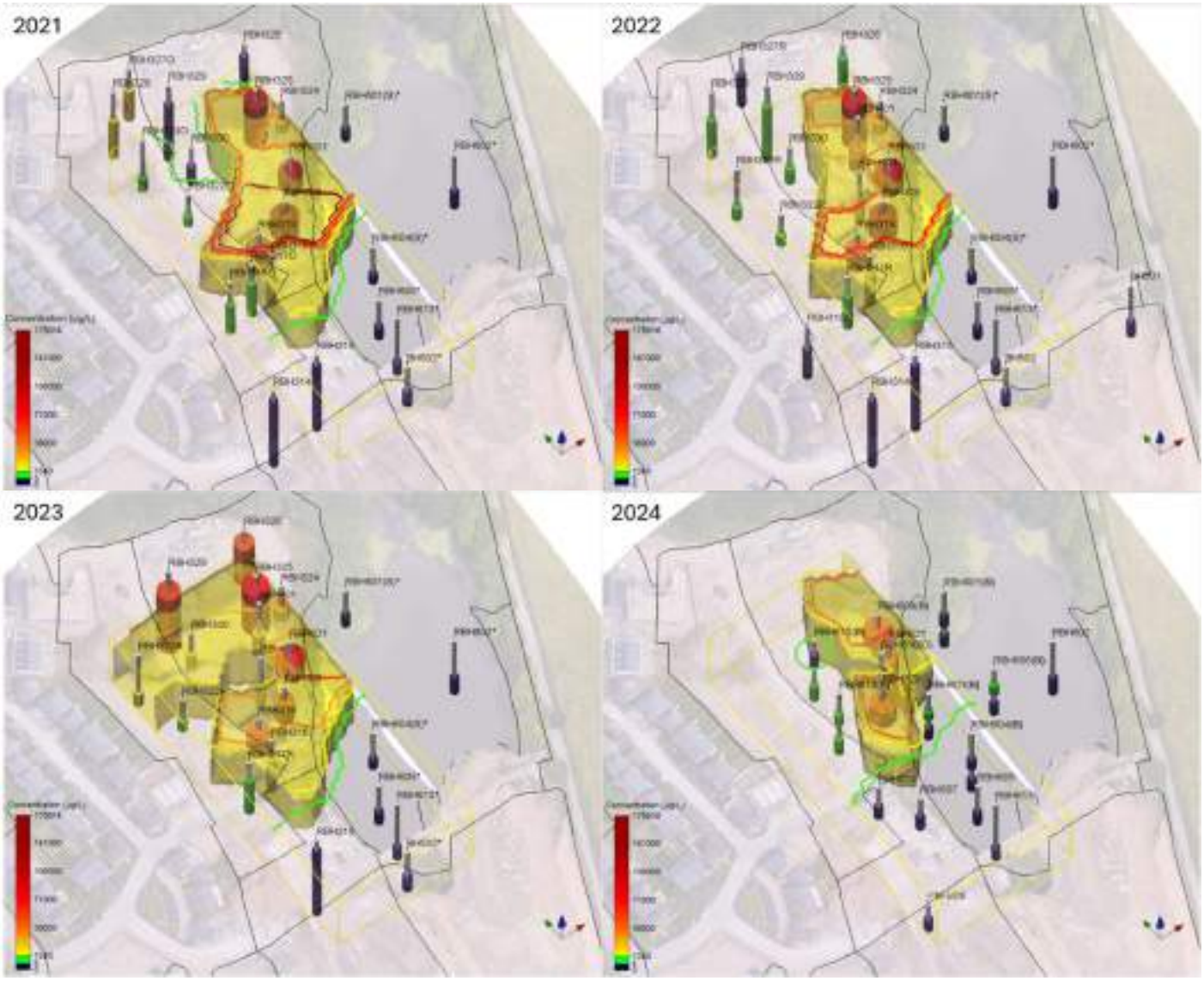


Figure 3.4 Modelled toluene plume over time (3D view). The plume boundary is defined by the remedial target value (RTV) of 1340 µg/L. Concentrations recorded at individual monitoring wells are represented by the coloured cylinders at each location, where blue = below limit of detection (LOD), green = below RTV, and concentrations above the RTV are represented by a yellow–red gradient. The width of the cylinders increases with increasing concentrations. The length of the coloured cylinders represents the depth of response zone used for groundwater sampling; the length of the grey cylinders represents the depth of the boreholes. Coloured contour lines delineate areas modelled as above the corresponding concentration value, i.e., the green contour line encloses areas where concentrations are above LOD, the yellow contour line encloses areas where concentrations are above the RTV. * indicates that groundwater concentrations were estimated rather than representing measured data (see main text for details).

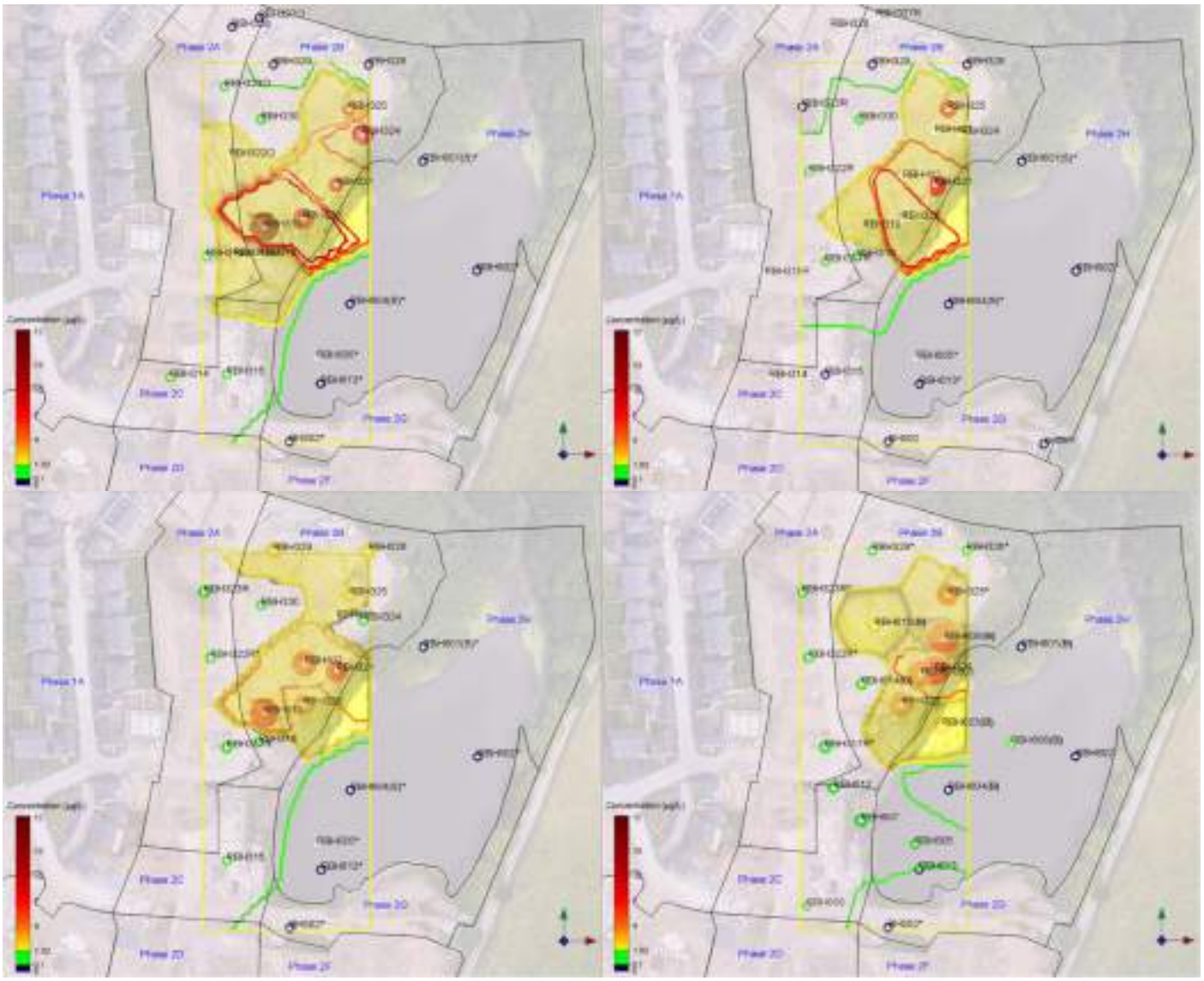


Figure 3.5 Modelled vinyl chloride plume over time (plan view). The plume boundary is defined by the remedial target value (RTV) of 1.02 µg/L. Concentrations recorded at individual monitoring wells are represented by the coloured cylinders at each location, where blue = below limit of detection (LOD), green = below RTV, and concentrations above the RTV are represented by a yellow–red gradient. The width of the cylinders increases with increasing concentrations. No colour indicates no data. Coloured contour lines delineate areas modelled as above the corresponding concentration value, i.e., the green contour line encloses areas where concentrations are above LOD, the yellow contour line encloses areas where concentrations are above the RTV. * indicates that groundwater concentrations were estimated rather than representing measured data (see main text for details).

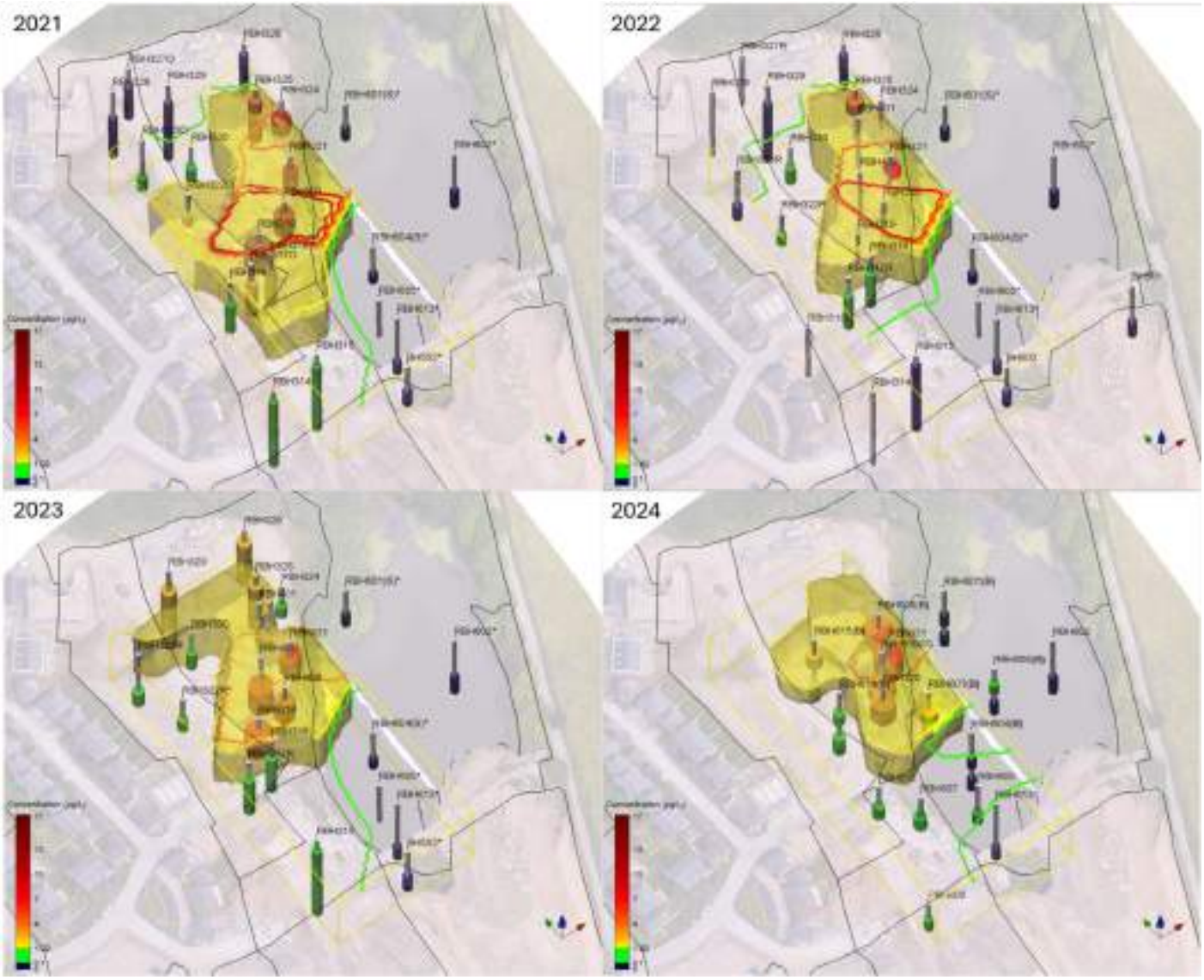


Figure 3.6 Modelled vinyl chloride plume over time (3D view). The plume boundary is defined by the remedial target value (RTV) of 1.02 µg/L. Concentrations recorded at individual monitoring wells are represented by the coloured cylinders at each location, where blue = below limit of detection (LOD), green = below RTV, and concentrations above the RTV are represented by a yellow–red gradient. The width of the cylinders increases with increasing concentrations. The length of the coloured cylinders represents the depth of response zone used for groundwater sampling; the length of the grey cylinders represents the depth of the boreholes. No colour indicates no data. Coloured contour lines delineate areas modelled as above the corresponding concentration value, i.e., the green contour line encloses areas where concentrations are above LOD, the yellow contour line encloses areas where concentrations are above the RTV. * indicates that groundwater concentrations were estimated rather than representing measured data (see main text for details).

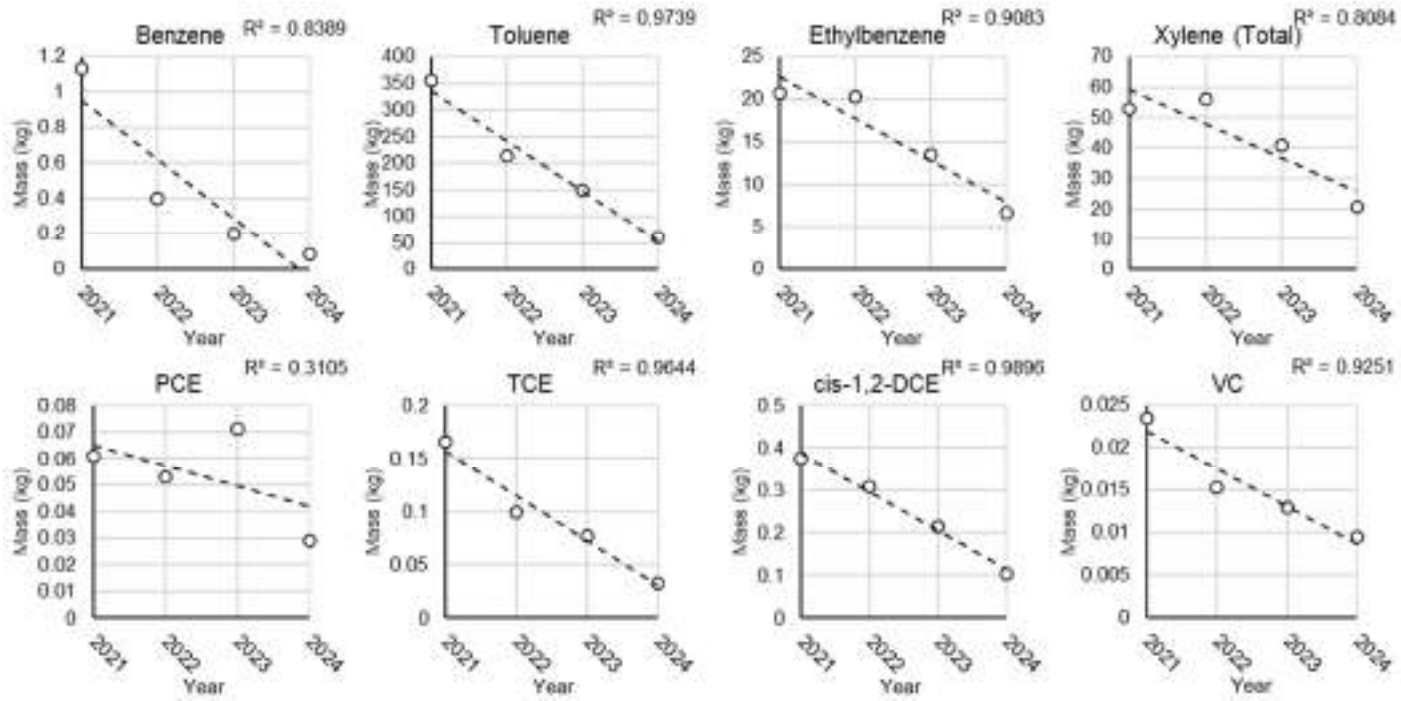


Figure 3.7 Modelled Contaminant Mass over time for benzene, toluene, ethylbenzene, xylene, tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride (VC).

3.2.11 Figure 3.7 shows the modelled changes in contaminant mass over time. All contaminants modelled, with the exception of PCE, show a clear decrease in mass over time (Figure 3.7), however, the linearity of the trend varies between different contaminants.

3.2.12 Toluene, ethylbenzene, TCE, cis-1,2-DCE, and VC all show a linear decrease in mass with Linear Regression statistics (R^2) of mass vs. time greater than 0.9. Benzene, xylene, had slightly lower R^2 values of greater than 0.8. Only PCE had a low R^2 value of 0.3, as a result of fluctuating concentrations recorded across 2022 and 2023.

3.2.13 The xylene plume mass remained stable between 2021 and 2022. This appears to relate to increase in xylene concentrations in RBH319, RBH315, RBH326, and RBH329 (Drawing No. 04 in Appendix A). A similar trend was observed for ethylbenzene.

3.2.14 The mass of PCE increased between 2021 and 2023 and only showed signs of declining mass between 2023 and 2024. This plume mass trend appeared to be related to fluctuating concentrations measured in boreholes RBH326, RBH329, RBH319, and RBH321. Groundwater concentrations of PCE, however, were below the RTV in all locations across all monitoring rounds.

3.2.15 It has not been possible to attribute the perturbations in contaminant concentrations in the north of Phase 2B to known events and it may be necessary to conduct treatment and perform further monitoring in the northern part of the site to ensure contaminant mass is under similar biogeochemical controls for MNA in this area.

3.2.16 Despite the variability described above, all CoCs display a downward trend in mass, allowing pseudo-first order degradation rates to be calculated.

3.2.17 Pseudo-first order degradation rates were calculated by plotting the natural logarithm of the average plume concentration against time (Figure 3.6).[3] A degradation rate constant, *k*, was derived from the negative of the slope to allow the half-life to be calculated using the standard equation $t_{1/2} = 0.693/k$. Values for *k* and $t_{1/2}$ are presented for each COC in Table 3.5.

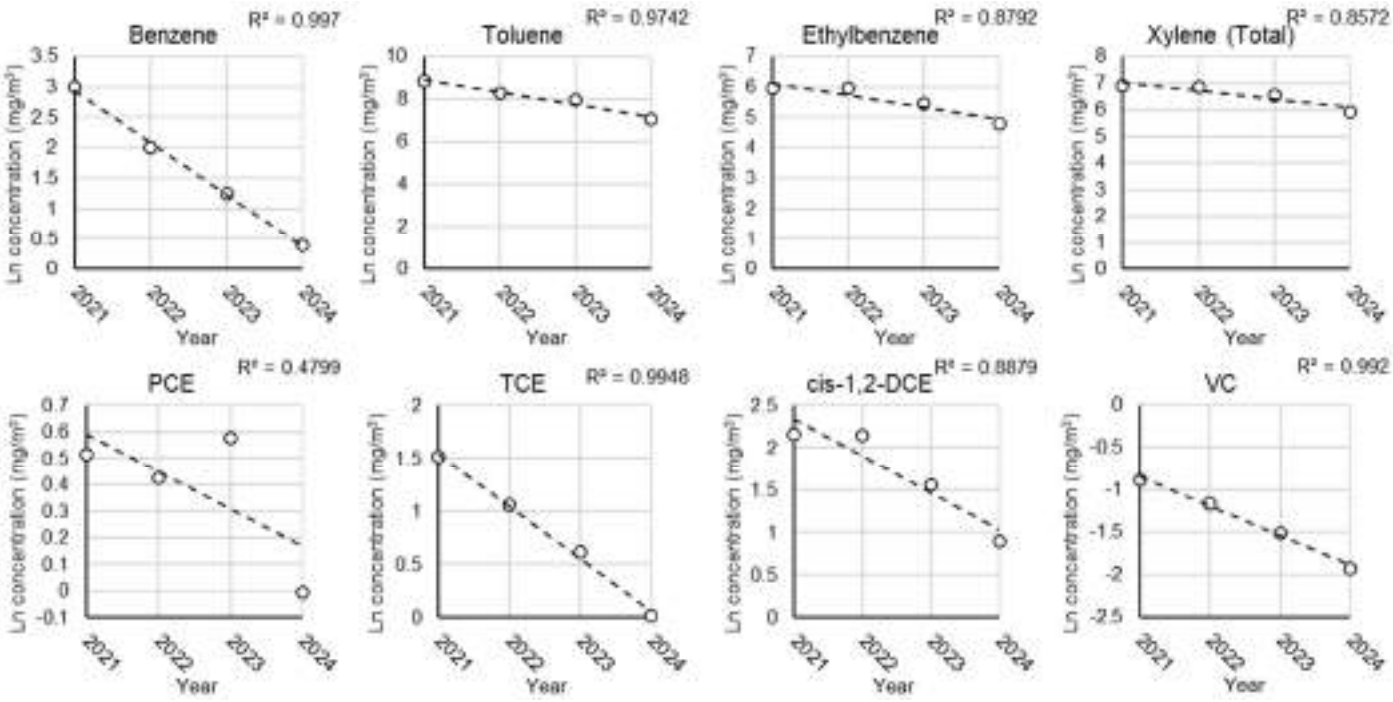


Figure 3.8 Ln concentration plotted over time for benzene, toluene, ethylbenzene, xylene, trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride (VC).

Compound	*k*	$t_{1/2}$ (days)
Benzene	0.0023	297
Toluene	0.0015	448
Ethylbenzene	0.0011	642
Xylene (Total)	0.00086	804
Tetrachloroethylene (PCE)	0.00039	1797
Trichloroethylene (TCE)	0.0014	511
cis-1,2-dichloroethylene (cis-1,2-DCE)	0.0012	577
Vinyl chloride (VC)	0.0009	730

Table 3.5 Degradation rate constants (*k*) and half-lives ($t_{1/2}$) for contaminants of concern.

3.2.18 The calculated half-lives presented in Table 3.5 are generally consistent with the observed changes in plume mass and associated change in plume area and volume.

3.2.19 The derived half-life values suggest that, although the source term mass of CoCs is decreasing, natural attenuation via biodegradation is proceeding at a relatively slow rate.

3.2.20 The reservoir has largely been excluded from the plume visualisation because of a lack of data prior to 2024. The southern region of the reservoir (RBH604, RBH605, RBH613) has

generally recorded CoCs at concentrations close to or below LOD. Inspecting the data for RBH603(S) and RBH606(S) indicates that concentrations of BTEX increased at both locations between January and April 2024. Drawing a transect through the boreholes RHB320–RBH603(S)–RBH606(S)–RBH602 allows CoC concentration to be plotted against distance from RBH320. As shown for toluene and vinyl chloride in Figure 3.9 below, this indicates that there may be contaminant migration into certain areas of the reservoir. Future monitoring works will be required to confirm contaminant flux through this area and, if necessary, assess requirements for remedial objectives.

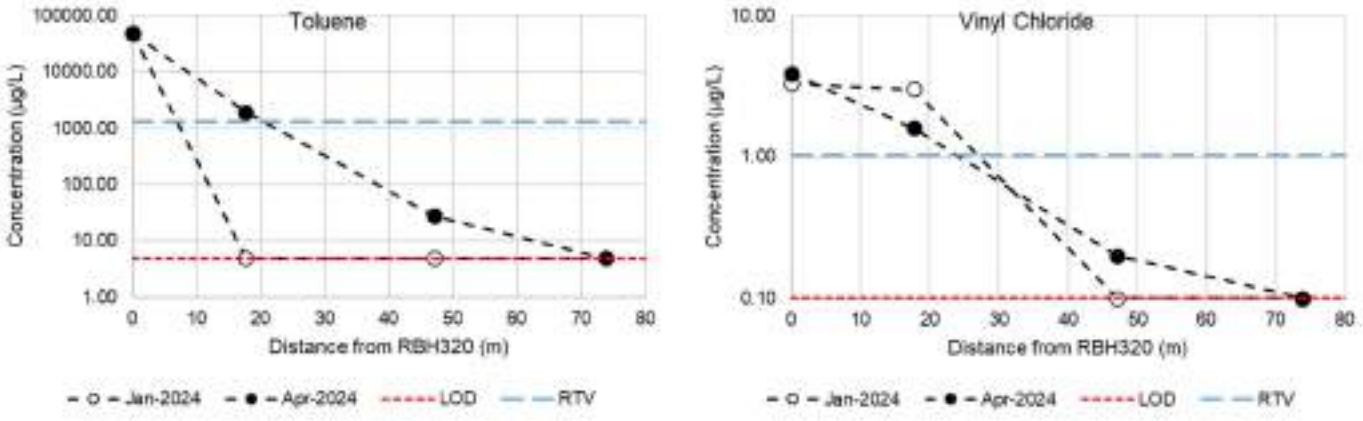


Figure 3.9 Concentrations of toluene and vinyl chloride plotted against distance from borehole RBH320.

3.3 Influence of the COAL Seam on Plume Migration

3.3.1 CE Geochem report A231001/PMII demonstrated that naturally occurring COAL sampled from the former Tetrosyl site has a relatively high capacity to retard contaminant flux for BTEX compounds and chlorinated ethenes by sorption (K_d values calculated in that report are reproduced in Table 3.6 below).

3.3.2 Report A231001/PMII also investigated the sorption capacity of seat earth CLAY sampled from the site, but its sorption capacity was determined to be relatively low and has not been considered further as providing substantial geochemical attenuation of CoCs.

Compound	K_d (L/kg)	Published K_{oc} (L/kg)
Benzene	99	31–100[4]
Toluene	152	94–247[4]
Ethylbenzene	220	165–255[4]
m/p-Xylene	266	m-xylene: 158–289[4] p-xylene: 260–347[4]
o-Xylene	191	222–258[4]
PCE	303	177–373[4]
TCE	167	57–150[4]
cis-1,2-DCE	103	49[5]
Vinyl Chloride	n.d.	56[6]

Table 3.6 Distribution coefficients (K_d) for contaminants of concern onto COAL. Reproduced from project memorandum A231001/PMII with published organic carbon adsorption coefficients (K_{oc}) for comparison. Note that for coal, K_d and K_{oc} are effectively equivalent. n.d. = not determined.

3.3.3 The installation of groundwater monitoring wells at multiple depths has allowed the groundwater contaminant distributions to be compared with lithogeochemical information from borehole logs. Figure 3.8 presents 2024 concentrations of toluene with respect to the location of the COAL seam. Comparable figures for other CoCs are presented in Appendix A.

3.3.4 The COAL seam has been modelled in Voxler® using depths and thickness of COAL layers recorded in borehole logs to represent the COAL seam as a curvilinear lattice. Note that the distribution of COAL is based on an interpolation between borehole locations so may not necessarily fully represent heterogeneities in COAL distribution or gaps in the seam.

3.3.5 The COAL seam is represented in Figure 3.10 by the dark grey surface. The coloured cylinders indicate response zone depths from which groundwater was sampled, with colour coding according to whether the sample recorded concentrations in excess of the RTV

[4] U.S. EPA (1995) Soil Screening Guidance Technical Background Document APPENDIX K Soil Organic Carbon (Koc) / Water (Kow) Partition Coefficients, Ref. EPA/540/R95/128
[5] U.S. EPA (2010) TOXICOLOGICAL REVIEW OF cis-1,2-DICHLOROETHYLENE and trans-1,2-DICHLOROETHYLENE, Ref. EPA/635/R-09/006F
[6] U.S. EPA Technical Factsheet on: VINYL CHLORIDE, https://semspub.epa.gov/work/05/437069.pdf

(yellow–red), LOD (green), or were below LOD (blue). This allows a visual comparison of groundwater sampling depth and COAL depth at a particular location.

3.3.6 Comparing the depth of the COAL layer to CoC concentrations in groundwater provides direct lines of evidence that the COAL is acting as a geochemical attenuation layer, effectively retarding the vertical migration of contaminant mass.

3.3.7 Note that data from dual level monitoring wells (RBH603, RBH609), or where shallow and deep wells have been installed adjacent to each other (RBH320 and RBH610(D)) and intersect the COAL seam, provides evidence for this attenuating layer providing 1–2 orders of magnitude reduction in contaminant concentrations (Table 3.7).

3.3.8 In contrast, for RBH614 and RBH615 where there is no COAL within response zones used for groundwater monitoring, concentrations of CoCs are generally elevated in the deeper observation wells relative to the shallower groundwater monitoring well.

3.3.9 Note also that observations on site indicate that the COAL seam outcrops to the south of Phase 2B, in the vicinity of RBH607/RBH612, but this has not been included in the visualisation due to not being included in borehole logs. The fact that contamination (aside from VC) has not been observed south of RBH607/RBH612 indicates that the COAL seam may be limiting the southward migration of BTEX contaminant plumes.

3.3.10 RBH607/RBH612 is also where a former subsurface wall had been located. This wall had been hypothesised to have a role in limiting contaminant mobility in groundwater.[7] Given that there is limited evidence of contamination (aside from VC) moving southward, it is possible that the COAL in this location has had a more important role in retarding contaminant mobility than the wall.

3.3.11 Despite the notable reduction in groundwater concentrations below the COAL seam, contaminant concentrations remain above the RTV for deep wells located within the plume for toluene and vinyl chloride.

3.3.12 Available datasets do not currently allow an empirical assessment of longer term / steady state retarded contaminant velocities through the COAL layer, however additional modelling studies may allow further insights into the magnitude of breakthrough over time.

[7] Smith Grant LLP (2023) Former Tetrosyl Bevis Green Works Walmersley Old Rd. Bury: Briefing Note for Prospective Groundwater Treatment Remediation Contractors, R2174

Borehole	Shallow/ Deep	Benzene	Toluene	Ethylbenzene	Xylene (Total)	PCE	TCE	cis-1,2-DCE	VC
RBH603	Shallow	2.6	960	85	350	<3.0	9.5	7.5	2.3
	Deep*	<0.50	<5.0	<1.0	<3.0	<3.0	<3.0	<3.0	<0.10
RBH606	Shallow	3.3	17	24	21	<3.0	<3.0	<3.0	0.2
	Deep*	<0.50	<5.0	1.5	3.5	<3.0	<3.0	<3.0	<0.10
RBH609	Shallow	46	54000	7110	33000	19	4.5	59	4.2
	Deep*	2.3	1410	120	730	<3.0	4.0	4.0	0.50
RBH320 / RBH610	Shallow	88	48000	6400	3700	11	20	56	3.6
	Deep*	1.2	32	4.0	13.5	<3.0	10	26	4.1
RBH614	Shallow*	6.2	25	77	120	<3.0	<3.0	<3.0	0.55
	Deep*	11	98	270	290	<3.0	<3.0	<3.0	0.75
RBH615	Shallow*	1.9	<5.0	<1.0	<3.0	<3.0	<3.0	<3.0	1.7
	Deep*	6.3	70	120	130	<3.0	<3.0	<3.0	0.65

Table 3.7 Comparison of average 2024 groundwater concentrations in dual-level monitoring wells (or adjacent shallow/deep wells for RBH320/RBH610) for benzene, toluene, ethylbenzene, xylene, tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride (VC). * = monitoring well below the layer of COAL and seat earth CLAY.

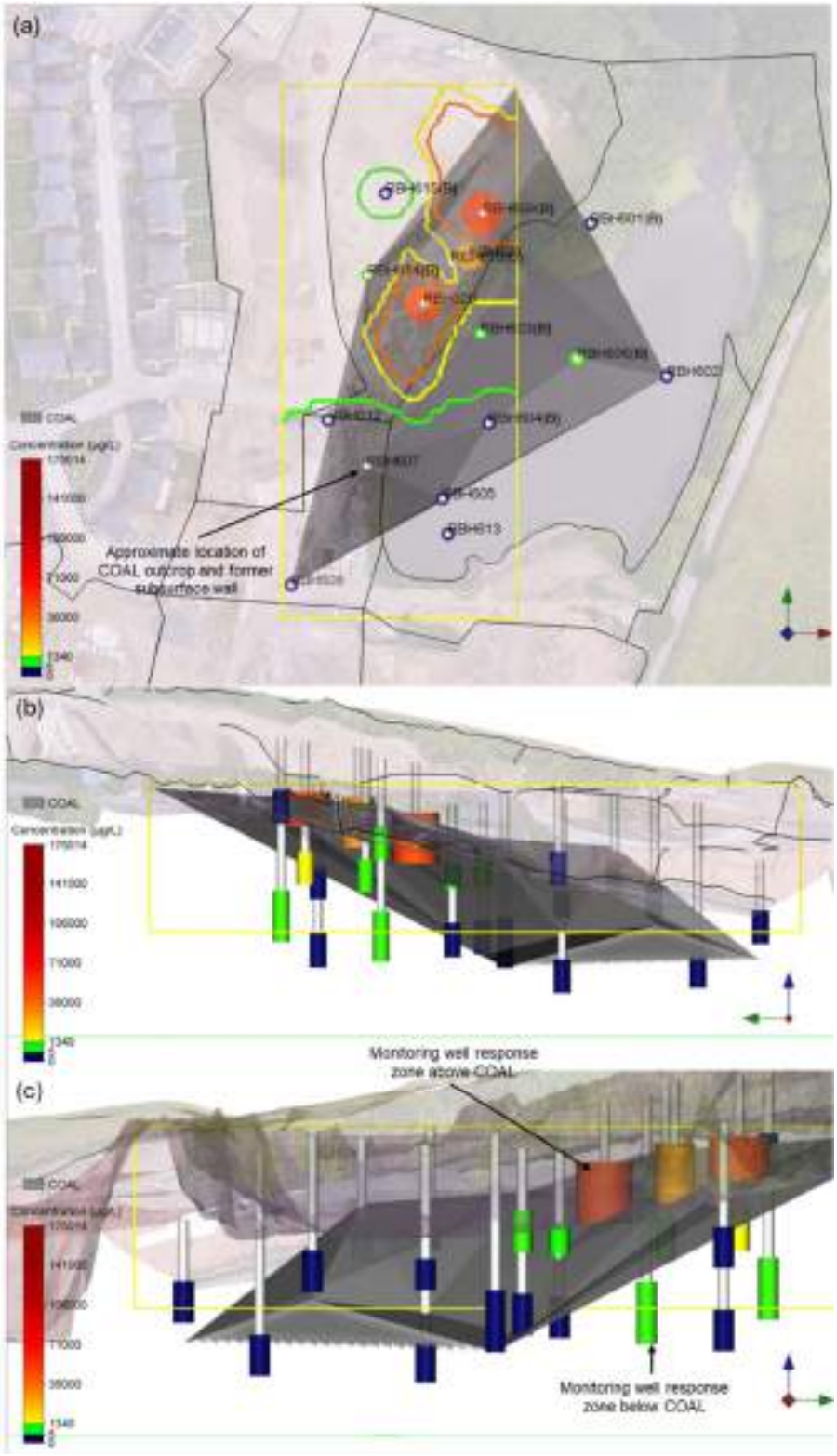


Figure 3.10 Visualisation of average 2024 toluene concentrations in each monitoring well compared against the COAL seam running below the site shown in (a) plan view and viewed from (b) the west and (c) the east. The top of the COAL seam is represented by the grey surface. Suspected COAL at 2.6 mbgl indicates the COAL seam may extend to RBH615 but this is not visualised in the model.

4 Microbial Profiling Study

4.1 Experimental Methodology

4.1.1 CE Geochem attended site during the April 2024 round of groundwater monitoring coordinated by Smith Grant LLP to prepare groundwater samples for microbial profiling investigations.

4.1.2 Groundwater sampled from selected boreholes were filtered on site under low flow conditions for the purpose of genetic sequencing analysis to quantify the presence of (a) bacteria involved in the biodegradation of petroleum products (including BTEX, MTBE, naphthalene, PAHs, alkanes/TPH) and (b) halorespiring bacteria with the potential for the reductive dechlorination of chlorinated solvents including PCE, TCE, cis-1,2-DCE, and VC. Certificates of Analysis for the microbial profiling are presented in Appendix B.

4.1.3 Figure 4.1 shows the locations of boreholes sampled during the January and April 2024 groundwater sampling rounds, with the locations sampled for microbial profiling highlighted in blue.



Figure 4.1 Locations of boreholes sampled during January and April 2024 groundwater monitoring rounds. Locations sampled for the microbial profiling study are highlighted in blue.

4.1.4 3 No. locations were selected for sampling, with 1 No. location representing the plume core and 2 No. locations representing plume fringes.

4.1.5 The plume core is demarcated by boreholes; RBH320, RBH321, RBH610, and RBH611. For the microbial profiling study, RBH320 was selected as the location best representing the biogeochemistry of the plume core as this monitoring well recorded the highest concentrations of toluene during the January 2024 groundwater monitoring round.

4.1.6 RBH614 and RBH605 were selected as locations representing the plume fringes. Groundwater was sampled from two depths at RBH614 with samples for the microbial profiling study retrieved from the shallower well (RBH614(S)).

4.1.7 RBH614 represents the boundary between Phase 2A and Phase 2B and hence this location was selected to assess whether natural attenuation processes are likely to be occurring within Phase 2A.

4.1.8 RBH605 was selected as representing the downgradient fringe to the east/southeast of the contaminant plume. This borehole represents an observation well in the direction of groundwater flow, with existing groundwater monitoring datasets potentially indicating some conservation of VC mass migrating downgradient. Reductive dechlorination of vinyl chloride is a critical stage within any MNA strategy for chlorinated solvents as accumulation of vinyl chloride mass may point to the successive dechlorination process stalling as the redox potential of groundwater recovers to more oxidising conditions.

4.1.9 In addition, selection of RBH614(S) and RBH605 represent different groundwater chemistries (Table 4.1), with RBH614(S) representing more strongly reducing conditions (oxidation-reduction potential (ORP) = -84.7 mV in April 2024) compared with RBH605 which represents more oxidising conditions (ORP = 25.4 mV).

4.1.10 All 3 No. boreholes show evidence of microbial activity; with iron and manganese both existing predominantly in their reduced +2 valence state indicative of reductive dissolution of iron(III) and Mn(IV) minerals. All 3 No. location also show elevated levels of dissolved CO_2^{3-} indicating microbial respiration of organic carbon.

4.1.11 Lower sulphate concentrations in RBH320 compared RBH614(S) are indicative of sulphate reducing conditions within the aquifer compartment, while the high levels of methane in RBH614(S) indicative methanogensis.[3] Nitrate was reported below LOD in both RBH320 and RBH614(S) suggesting biological denitrification processes are active at these localities with the absence of nitrate as a Terminal Electron Acceptor (TEA) potentially limiting biodegradation rates.[3]

Parameter	Unit	Location		
		RBH320	RBH614(S)	RBH605
pH	–	6.86	6.91	6.21
ORP	mV	-87	-85	25
Specific Conductivity	µS/cm	0.89	0.85	0.28
Total Alkalinity as $CaCO_3$	mg/L	306	270	64
Carbon Dioxide	µg/L	205067	189642	170075
Methane	µg/L	1668	7625	1483
Ethene	µg/L	4.0	3.0	<1.0
Iron(II)	mg/L	30	18	1.5
Iron(III)	mg/L	3.5	4.5	<1.0
Iron	mg/L	33	22	1.5
Manganese(II)	mg/L	1.9	2.2	3.8
Manganese	mg/L	2.4	2.4	3.8
Nitrate	mg/L	<0.2	<0.2	1.7
Nitrite	mg/L	<0.02	<0.02	<0.02
Sulphate (as S)	mg/L	5.6	16	16
Sulphide	mg/L	<0.01	<0.01	<0.01
Total Sulphur	mg/L	6.3	16	15
Potassium	mg/L	6.4	6.4	3
Sodium	mg/L	46	47	30
Dissolved Organic Carbon	mg/L	42	4.0	2
Total Organic Carbon	mg/L	86	11	2
Biochemical Oxygen Demand	mg/L	80	15	3
Chemical Oxygen Demand	mg/L	195	30	13
Dissolved Oxygen	mg/L	1.5	0.51	1.2

Table 4.1 Groundwater parameters of water sampled from the boreholes used for microbial profiling. Data represent averaged values for 2024 monitoring except pH and oxidation-reduction potential (ORP) which represent the April 2024 groundwater monitoring only. All concentrations represent dissolved concentrations. Total iron has been calculated from the sum of iron(II) and iron(III) results which includes total Fe for the calculation of iron(III).

4.2 BTEX Biodegradation Potential

4.2.1 The BTEX biodegradation potential of microbial communities sampled from boreholes at the former Tetrosyl site was evaluated using the QuantArray®-Petro approach. This array quantifies the specific functional genes responsible for the biodegradation of BTEX compounds, as well as MTBE, naphthalene, polycyclic aromatic hydrocarbons (PAHs), and a variety of short and long chain alkanes.

4.2.2 Results of the QuantArray®-Petro microbial profiling are summarised in Table 4.2 and Figures 4.2–4.4.

Parameter		Result (cells/mL)		
		RBH320	RBH614(S)	RBH605
Aerobic BTEX and MTBE				
Toluene/Benzene Dioxygenase	TOD	<2.50E-01	<2.50E-01	<7.80E-01
Phenol Hydroxylase	PHE	**5.00E+04**	**2.30E+04**	**3.80E+02**
Toluene 2 Monooxygenase/Phenol Hydroxylase	RDEG	**1.10E+04**	**7.30E+03**	**7.00E+02**
Toluene Ring Hydroxylating Monooxygenases	RMO	**8.80E+03**	**1.80E+04**	<7.80E-01
Xylene/Toluene Monooxygenase	TOL	**4.30E+02**	<2.50E-01	<7.80E-01
Ethylbenzene/Isopropylbenzene Dioxygenase	EDO	**9.20E+03**	<2.50E-01	**2.70E+02**
Biphenyl/Isopropylbenzene Dioxygenase	BPH4	**1.20E+03**	**4.70E+00**	<7.80E-01
Methylibium petroleiphilum PM1	PM1	<2.50E-01	<2.50E-01	<7.80E-01
TBA Monooxygenase	TBA	<2.50E-01	<2.50E-01	<7.80E-01
Aerobic PAHs and Alkanes				
Naphthalene Dioxygenase	NAH	<2.50E-01	<2.50E-01	<7.80E-01
Naphthalene-inducible Dioxygenase	NidA	<2.50E-01	**3.60E+01**	<7.80E-01
Phenanthrene Dioxygenase	PHNA	**2.10E+01**	**8.00E+01**	<7.80E-01
Alkane Monooxygenase	ALKB	**1.50E+03**	<2.50E-01	<7.80E-01
Alkane Monooxygenase	ALMA	<2.50E-01	<2.50E-01	<7.80E-01
Anaerobic BTEX				
Benzoyl Coenzyme A Reductase	BCR	**2.10E+02**	**4.30E+02**	**5.70E+01**
Benzylsuccinate Synthase	bssA	**1.70E+04**	**2.50E+02**	<7.80E-01
Benzene Carboxylase	abcA	<2.50E-01	<2.50E-01	<7.80E-01
Anaerobic PAHs and Alkanes				
Naphthylmethylsuccinate Synthase	mnssA	**1.80E+02**	<2.50E-01	<7.80E-01
Naphthalene Carboxylase	ANC	**6.90E+01**	<2.50E-01	<7.80E-01
Alkylsuccinate Synthase	assA	**2.90E+02**	<2.50E-01	<7.80E-01
Other				
Total Eubacteria	EBAC	**3.80E+06**	**2.20E+06**	**3.70E+04**
Sulphate Reducing Bacteria	APS	**1.30E+04**	**1.00E+04**	**1.30E+03**

Table 4.2 Summary of QuantArray®-Petro results. Results are presented as number of cells per millilitre of groundwater filtered. < = Result Not Detected.

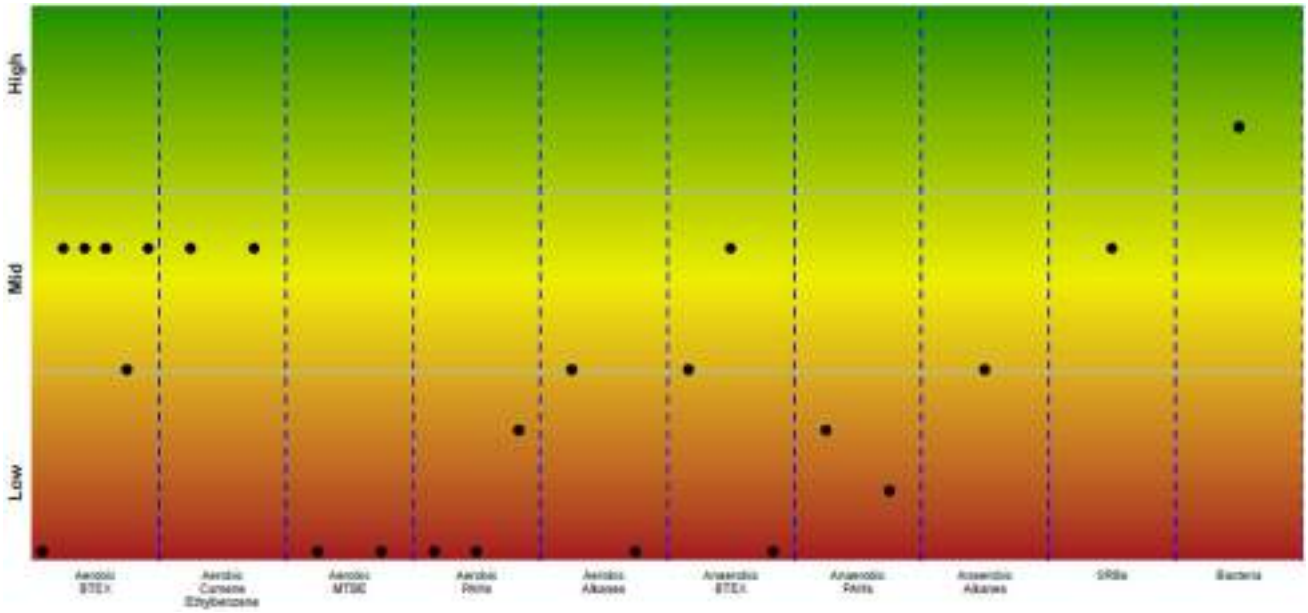


Figure 4.2 QuantArray®-Petro summary for RBH320. Data points (from left to right) correspond to TOD, PHE, RDEG, RMO, TOL, EDO, EDO, BPH4, PM1, TBA, NAH, NidA, PHN, ALK, ALMA, BCR, BSS, ABC, MNSSA, ANC, assA, APS, EBAC (abbreviations defined in Table 4.2).

4.2.3 RBH320 had the highest level of total bacteria (Table 4.2, Figure 4.2) with mid-high levels of genes expression associated with sulphate reducing bacteria (SRB) and both aerobic and anaerobic degraders of BTEX compounds.

4.2.4 Genes associated with the biodegradation of PAHs and alkanes were detected at low-mid levels, but genes involved with the biodegradation of MTBE and its intermediate degradation product *tert*-butyl alcohol (TBA) were non-detectable.

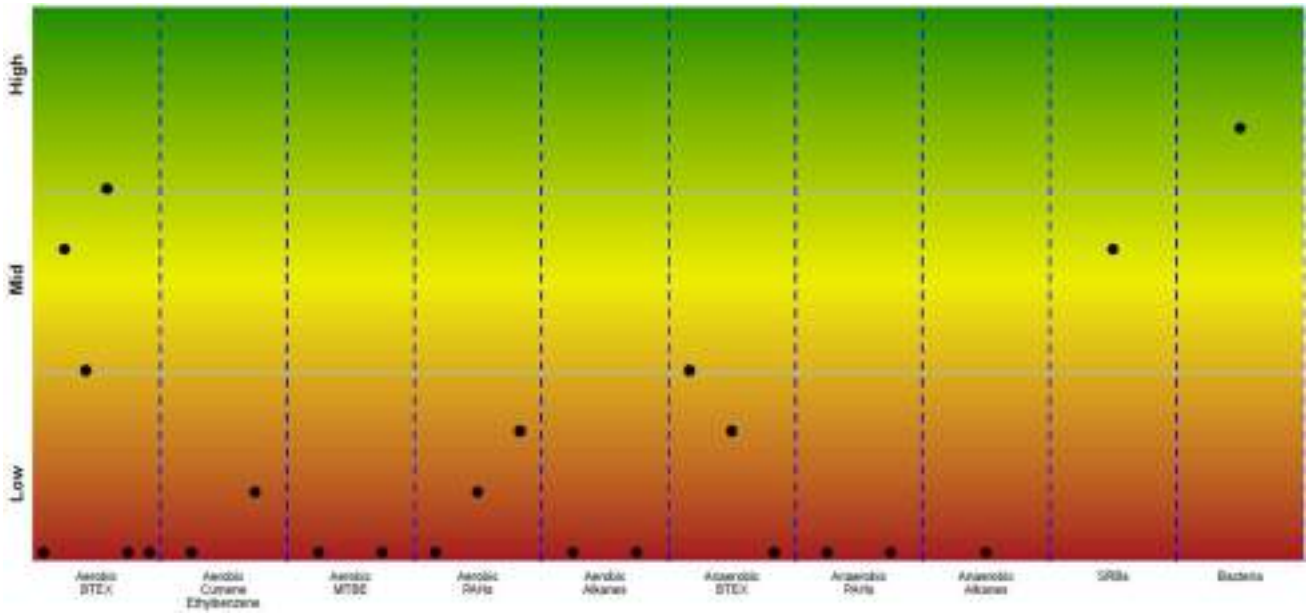


Figure 4.3 QuantArray®-Petro summary for RBH614(S). Data points (from left to right) correspond to TOD, PHE, RDEG, RMO, TOL, EDO, EDO, BPH4, PM1, TBA, NAH, NidA, PHN, ALK, ALMA, BCR, BSS, ABC, MNSSA, ANC, assA, APS, EBAC (abbreviations defined in Table 4.2).

4.2.5 RBH614(S), used to characterise biodegradation of contaminants at the plume fringe with a relatively low ORP, had a high level of total bacteria (Table 4.2, Figure 4.3) with mid-high levels of genes expression associated with sulphate reducing bacteria (SRB) and aerobic biodegradation of BTEX compounds.

4.2.6 Low-mid levels of genes involved in anaerobic BTEX biodegradation and aerobic PAH biodegradation were also detected, with gene expression involved with the biodegradation of MTBE, TBA, alkanes, and PAHs under anaerobic conditions all non-detectable.

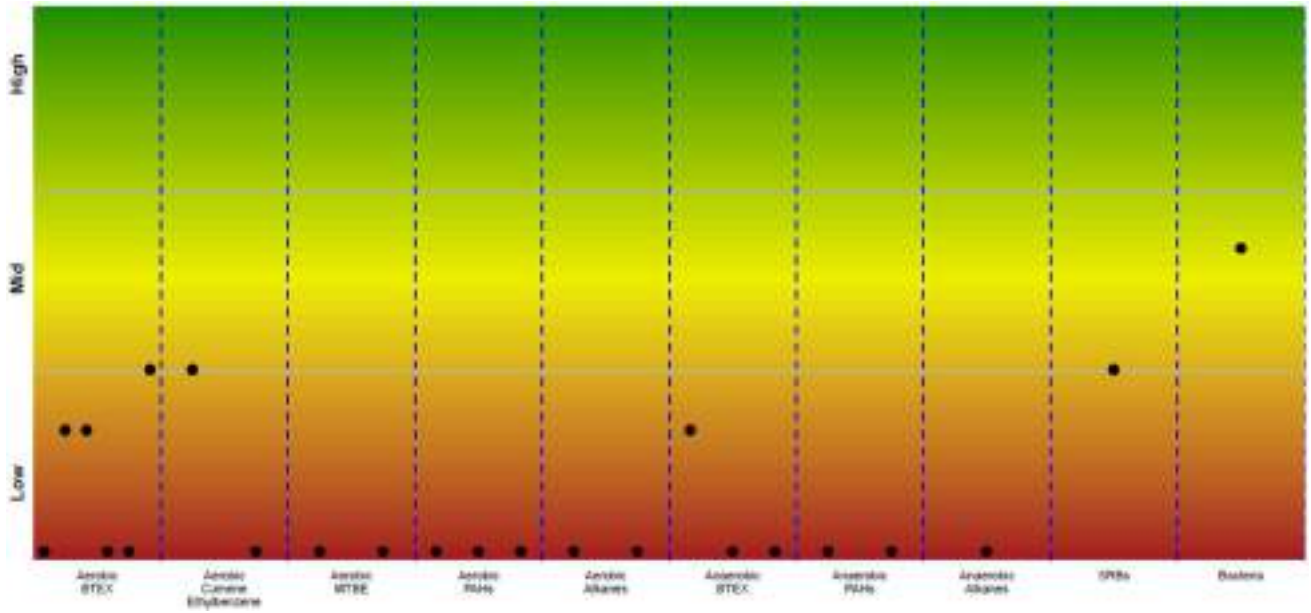


Figure 4.4 QuantArray®-Petro summary for RBH605. Data points (from left to right) correspond to TOD, PHE, RDEG, RMO, TOL, EDO, EDO, BPH4, PM1, TBA, NAH, NidA, PHN, ALK, ALMA, BCR, BSS, ABC, MNSSA, ANC, assA, APS, EBAC (abbreviations defined in Table 4.2).

4.2.7 RBH605, representing biodegradation at the fringe of the contaminant plume with a relatively high ORP, had the lowest level of total bacteria (Table 4.2, Figure 4.4). All detected genes were in the low-mid range with most genes apart from PHE, RDEG, EDO (involved in aerobic biodegradation of BTEX) and BCR (involved in anaerobic biodegradation of benzene) non-detectable.

4.2.8 Comparing the 3 No. sampling locations indicates that the prevalence of genes involved in BTEX biodegradation is correlated with the concentration of CoCs at that location, decreasing in the order RBH320 > RBH614(S) > RBH605.

4.2.9 RBH320 contained the broadest range of genes being expressed in groundwater, with 6 out of the 7 functional genes assayed for BTEX biodegradation detected. This provides evidence for microbial communities present within the plume core expressing genes with the capacity to degrade all BTEX compounds, and furthermore demonstrates these biological pathways are active within that groundwater compartment.

4.2.10 The presence of the genes RMO, REDG, and PHE indicate that the aerobic biodegradation of toluene, benzene, and xylenes follows the pathway illustrated in Figure 4.5, whereas the lack of any detectable TOD genes would tend to indicate that this pathway is not active.

4.2.11 The presence of EDO and BPH4 gene expression in RBH320 also provides a direct demonstration of the capacity of indigenous microbial communities at this location, and more generally within the plume core, to degrade ethylbenzene.

4.2.12 RBH614(S) had comparable levels of PHE and RMO to RBH320 and slightly lower levels of RDEG which indicates that benzene, toluene, and xylene biodegradation is likely to occur by the same aerobic pathway as described for RBH320 and shown in Figure 4.5.

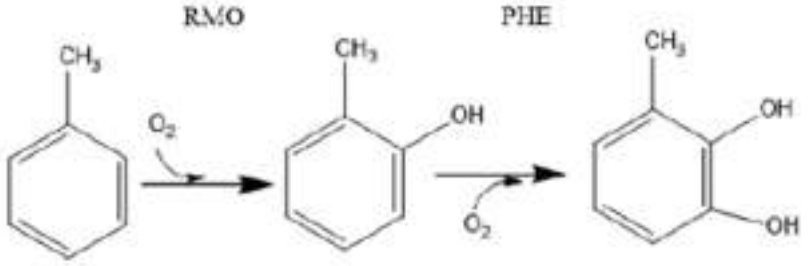


Figure 4.5 Aerobic biodegradation pathway for toluene which involves the sequential oxidation of toluene (molecule shown on the far left) by ring hydroxylating monoxygenases (RMO) and phenol hydroxylases (PHE).[8]

4.2.13 Low levels of gene expression for BPH4 were reported for RBH614(S) with TOL (involved in toluene and xylene biodegradation) and EDO reported as non-detectable. These results likely explain the presence of relatively high concentrations of ethylbenzene and xylenes at this location, compared to benzene and toluene (degraded by PHE, RMO, and RDEG).

4.2.14 Despite RBH320 and RBH614(S) having similar ORPs and concentrations of TEA's (iron(II) and manganese(II)), there is a significantly higher prevalence of anaerobic biodegradation genes detected at RBH320. This may correlate with the higher levels of dissolved organic carbon detected in RBH320 compared with RHB614(S) providing a greater pool of electron donor compounds to support microbial growth.

4.2.15 BTEX compounds were non-detectable in the January and April 2024 groundwater monitoring rounds at RBH605 but the detection of genes responsible for BTEX biodegradation provides supplementary lines of evidence that appropriate microbial communities exist downgradient of the plume core to attenuate BTEX contaminant mass should the plume migrate southwards.

4.2.16 Genes responsible for MTBE and TBA degradation were non-detectable which indicates a lack of biodegradation potential for MTBE at the 3 No. locations tested. The source term mass of MTBE has however decreased since 2021 which may be a result of volatilisation, dilution, and dispersion within the groundwater system. The intermediate degradation product of MTBE, TBA, was generally below laboratory detection limits during the April 2024 groundwater monitoring round but was detected in RBH320. This may indicate that biodegradation of MTBE has occurred previously at or near this location but microbial communities responsible for MTBE degradation have since diminished. TBA has only been analysed during 1 No. groundwater monitoring round and hence it is not possible to assess time variant trends or calculate biodegradation rates for this compound.

4.3 Chlorinated Solvents Biodegradation Potential

4.3.1 The biodegradation potential for chlorinated solvent compounds by microbial communities was evaluated using the QuantArray®-Chlor assay. This array quantifies important halorespiring bacteria and key functional genes responsible for the biodegradation of chlorinated ethenes (PCE, TCE, cis-1,2-DCE, and VC) by either anaerobic reductive

[8] Microbial Insights (2024) QuantArray®-Petro Study, 403EVD

dechlorination or aerobic cometabolism. Cometabolism is a process in which a microorganism produces an enzyme or cofactor for another intended purpose but, as a by-product, this enzyme/cofactor also has the capacity to degrade a contaminant.[3]

4.3.2 Results of the QuantArray®-Chlor microbial profiling are summarised in Table 4.3 and Figures 4.6–4.8.

Parameter		Result (cells/mL)		
		RBH320	RBH614(S)	RBH605
Reductive Dechlorination				
Dehalococcoides	DHC	**1.90E+03**	**3.70E+01**	**1.80E+00**
tceA Reductase	TCE	**5.90E+01**	**3.70E+00**	<7.80E-01
BAV1 Vinyl Chloride Reductase	BVC	**2.00E+02**	**1.00E+00**	<7.80E-01
Vinyl Chloride Reductase	VCR	**3.90E+02**	**6.50E+00**	<7.80E-01
Dehalobacter spp.	DHBt	**1.10E+05**	**4.10E+03**	<7.80E-01
Dehalobacter DCM	DCM	**9.80E+01**	<2.50E-01	<7.80E-01
Dehalogenimonas spp.	DHG	<2.50E-01	**4.40E+02**	<7.80E-01
cerA Reductase	CER	<2.50E-01	<2.50E-01	<7.80E-01
trans-1,2-DCE Reductase	TDR	<2.50E-01	<2.50E-01	<7.80E-01
Desulfitobacterium spp.	DSB	**9.90E+04**	**5.70E+03**	**2.60E+01**
Dehalobium chlorocoercia	DECO	**1.20E+03**	**9.50E+02**	<7.80E-01
Desulfuromonas spp.	DSM	**2.40E+03**	**4.50E+01**	<7.80E-01
PCE Reductase	PCE-1	**6.70E+01**	<2.50E-01	<7.80E-01
PCE Reductase	PCE-2	<2.50E-01	<2.50E-01	<7.80E-01
Chloroform Reductase	CFR	<2.50E-01	<2.50E-01	<7.80E-01
1,1 DCA Reductase	DCA	<2.50E-01	<2.50E-01	<7.80E-01
1,2 DCA Reductase	DCAR	<2.50E-01	<2.50E-01	<7.80E-01
Aerobic (Co)Metabolic				
Soluble Methane Monooxygenase	SMMO	<2.50E-01	<2.50E-01	<7.80E-01
Toluene Dioxygenase	TOD	<2.50E-01	<2.50E-01	<7.80E-01
Phenol Hydroxylase	PHE	**5.00E+04**	**2.30E+04**	**3.80E+02**
Trichlorobenzene Dioxygenase	TCBO	**6.10E+01**	<2.50E-01	<7.80E-01
Toluene Monooxygenase 2	RDEG	**1.10E+04**	**7.30E+03**	**7.00E+02**
Toluene Monooxygenase	RMO	**8.80E+03**	**1.80E+04**	<7.80E-01
Ethene Monooxygenase	EtnC	<2.50E-01	<2.50E-01	<7.80E-01
Epoxyalkane Transferase	EtnE	<2.50E-01	**1.50E+02**	<7.80E-01
Dichloromethane Dehalogenase	DCMA	<2.50E-01	<2.50E-01	<7.80E-01
Other				
Sulphate Reducing Bacteria	APS	**1.30E+04**	**1.00E+04**	**1.30E+03**
Total Eubacteria	EBAC	**3.80E+06**	**2.20E+06**	**3.70E+04**
Methanogens	MGN	**3.80E+02**	**9.10E+01**	**4.80E-01**

4.3.3 **Table 4.3** Summary of QuantArray®-Petro results. Results are presented as number of cells per millilitre of groundwater filtered. < = Result Not Detected.

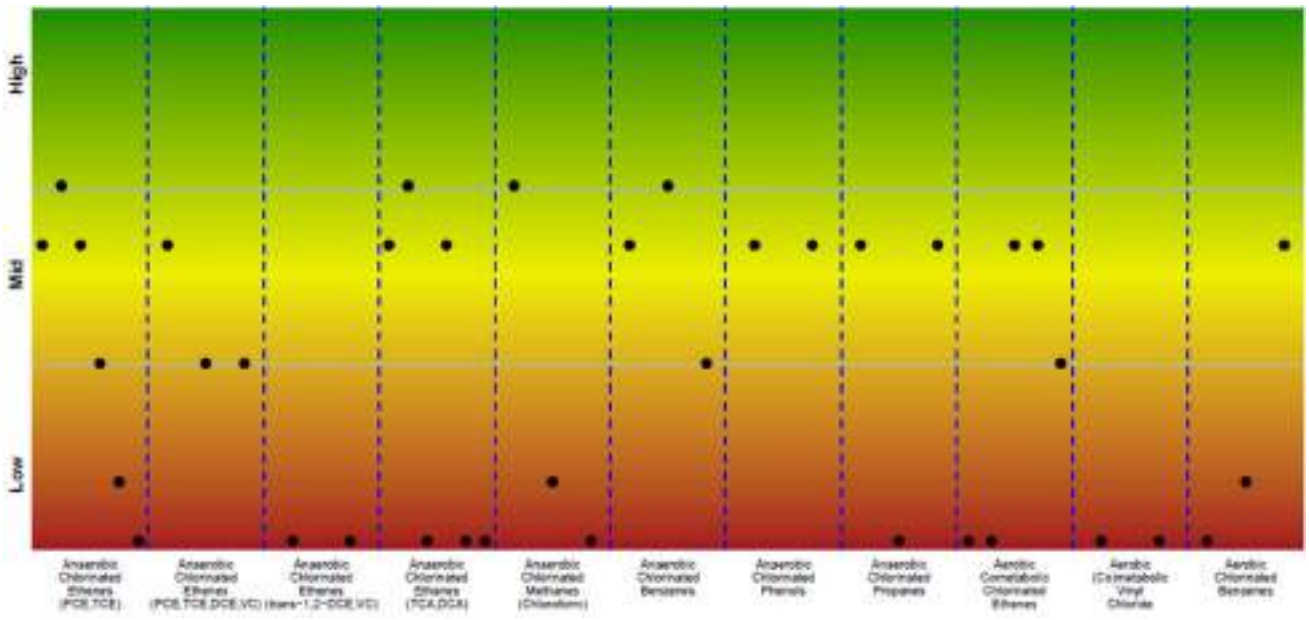


Figure 4.6 QuantArray®-Chlor summary for RBH320. Data points (from left to right) correspond to DHC, DHBt, DSB, DSM, PCE-1, PCE-2, DHC, BVC, VCR, TDR, CER, DHC, DHBt, DHG, DSB, DCA, DCAR, DHBt, DCM, CFR, DHC, DHBt, DECO, DHC, DSB, DHC, DHG, DSB, sMMO, TOD, PHE, RDEG, RMO, etnC, etnE, TOD, TCBO, and PHE (abbreviations defined in Table 4.3).

4.3.4 RBH320 had mid-high levels of microbial communities and genes responsible for anaerobic reductive dechlorination of PCE, TCE, cis-1,2-DCE, and VC and aerobic (co)metabolism of TCE, cis-1,2-DCE, and VC (Table 4.3, Figure 4.6).

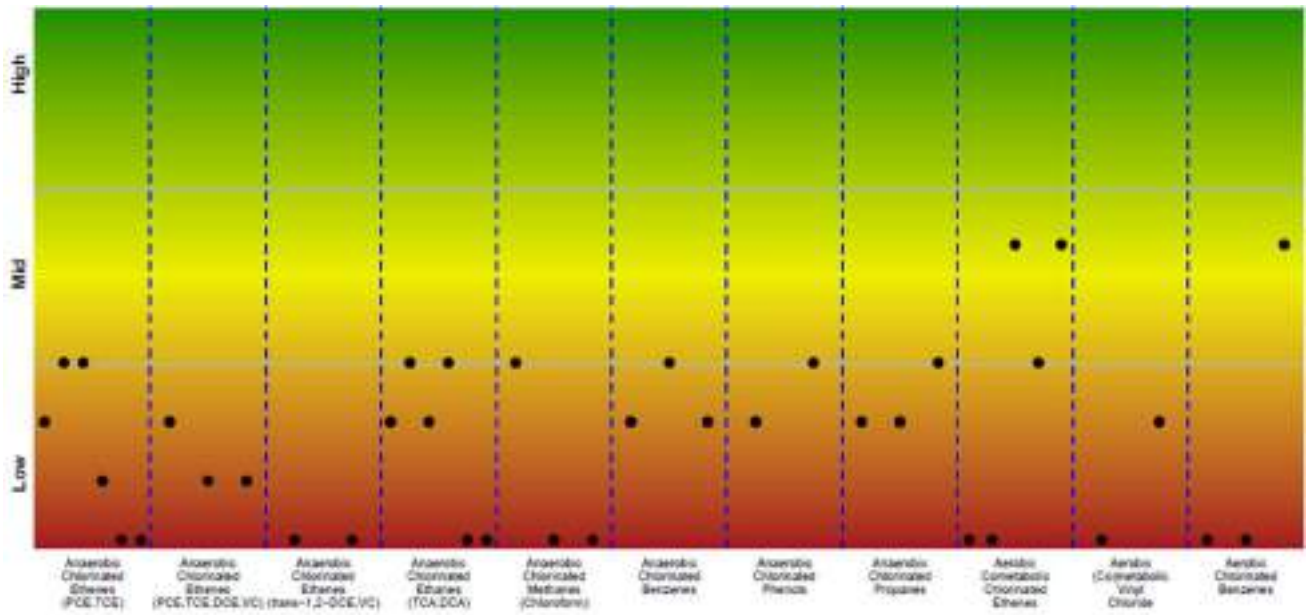
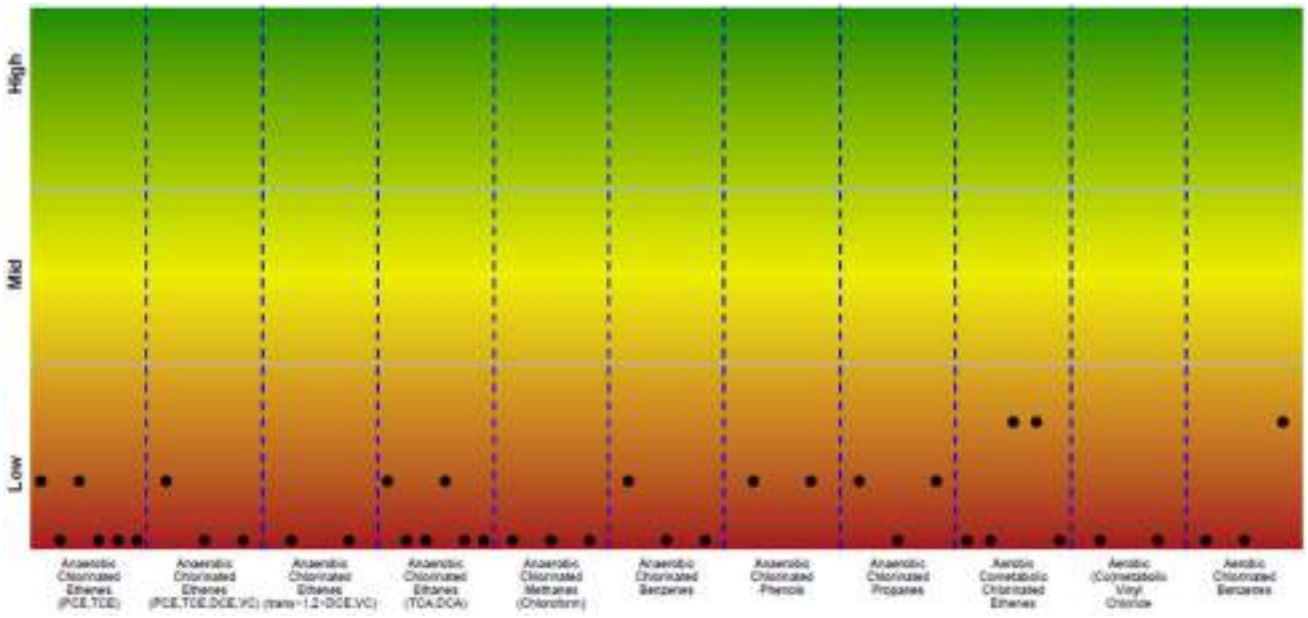


Figure 4.7 QuantArray®-Chlor summary for RBH614(S). Data points (from left to right) correspond to DHC, DHBt, DSB, DSM, PCE-1, PCE-2, DHC, BVC, VCR, TDR, CER, DHC, DHBt, DHG, DSB, DCA, DCAR, DHBt, DCM, CFR, DHC, DHBt, DECO, DHC, DSB, DHC, DHG, DSB, sMMO, TOD, PHE, RDEG, RMO, etnC, etnE, TOD, TCBO, and PHE (abbreviations defined in Table 4.3).

4.3.5 RBH614(S) displayed intermediate levels of gene expression responsible for the aerobic cometabolism of TCE, cis-1,2-DCE, and VC with lower levels of dehalogenating bacteria with associated gene expression involved in the reductive dechlorination of PCE, TCE, cis-1,2-DCE, and VC (Table 4.3, Figure 4.7).



4.3.6 **Figure 4.8** QuantArray®-Chlor summary for RBH605. Data points (from left to right) correspond to DHC, DHBt, DSB, DSM, PCE-1, PCE-2, DHC. BVC, VCR, TDR, CER, DHC, DHBt, DHG, DSB, DCA, DCAR, DHBt, DCM, CFR, DHC, DHBt, DECO, DHC, DSB, DHC, DHG, DSB, sMMO, TOD, PHE, RDEG, RMO, etnC, etnE, TOD, TCBO, and PHE (abbreviations defined in Table 4.3).

4.3.7 RBH605 reported low levels of bacteria and gene expression for genese involved in the biodegradation of chlorinated ethenes (Table 4.3, Figure 4.8), although *Dehalococcoides* and *Desulfitobacterium* spp. (involved in reductive dechlorination) and PHE and RDEG (aerobic cometabolism) were all detectable.

4.3.8 *Dehalococcoides* (DHC) are the only known group of bacteria capable of the complete reductive dechlorination of PCE to ethene[9] and were detected at all 3 No. sampling locations, albeit less than the 1 x 10^4 cells/mL screening criterion, typically used to identify sites where reductive dechlorination is likely to proceed at "generally useful" rates.[10,11]

4.3.9 Furthermore, microbial profiling for both RBH320 and RBH614(S) indicate the presence of other dechlorinating bacteria, including *Dehalobacter* spp., *Desulfitobacterium* spp., *Dehalobium chlorocoercia*, and *Defulfuromonas* spp. and the key functional genes (tceA reductase, BVC, and VCR) required for the complete reductive dechlorination of PCE.

4.3.10 Levels of gene expression responsible for the dechlorination of trans-1,2-DCE were non-detectable. This appears consistent with residual DCE at the former Tetrosyl site remaining

[9] Maymó-Gatell X, Anguish T, Zinder SH. Reductive dechlorination of chlorinated ethenes and 1, 2-dichloroethane by *"dehalococcoides ethenogenes"* 195. Applied and Environmental Microbiology. 1999;65:3108–13.

[10] Hendrickson ER, Payne JA, Young RM, Starr MG, Perry MP, Fahnestock S, et al. Molecular analysis of *dehalococcoides* 16S ribosomal dna from chloroethene-contaminated sites throughout north america and europe. Applied and Environmental Microbiology. 2002;68:485–95.

[11] Lu X, Wilson JT, Kampbell DH. Relationship between *dehalococcoides* dna in ground water and rates of reductive dechlorination at field scale. Water Research. 2006;40:3131–40.

within groundwater as cis-1,2-DCE. Results suggest that the cis-1,2-DCE detected in groundwater has been generated from the biological dechlorination of PCE and TCE.

4.3.11 Appreciable levels of PHE, RDEG, and RMO were also detected at RBH320 and RBH614(S). This is consistent with an assimilative capacity for aerobic biodegradation of chlorinated ethenes at these locations, involving the cometabolism or co-oxidation of these compounds by BTEX-utilising bacteria.[12]

4.3.12 As with the BTEX biodegradation profiles, RBH320 and RBH614(S) show comparable levels of gene expression involved in aerobic biodegradation however, RBH320 also reported a higher prevalence of bacteria/genes involved in anaerobic biodegradation.

4.3.13 Although groundwater from RBH320 generally contains higher levels of bacteria and gene expression signifying active biodegradation processes are occurring, RBH614(S) was the only location expressing detectable levels of genes specifically involved in the (co)metabolism of VC, with low levels of the etnE gene sequence detected.

4.4 Microbial Profiling Summary

4.4.1 The microbial profiling study conducted on groundwater samples retrieved from the Tetrosyl site has demonstrated that microbial communities associated with the biodegradation of both BTEX compounds and chlorinated ethenes are variably present at all 3 No. locations sampled and analysed, with higher concentrations of bacteria/key functional genes present within the plume core relative to the plume fringe locations (decreasing in the order RBH320 > RBH614(S) > RBH605). Table 4.4 groups the detected bacterial groups/functional genes according to aerobic/anaerobic environment and the target contaminant group they are involved in degrading (including those genes associated with both BTEX and chlorinated ethene biodegradation).

4.4.2 The presence of these bacterial consortia, with associated gene expression, may generally are categorised as low to intermediate. This categorisation would appear consistent with relatively low contaminant degradation rates calculated in Section 3 (especially for chlorinated ethenes). These results, whilst providing evidence for active biodegradation pathways operating within native groundwaters associated with the contaminant plume at the Tetrosyl site, would tend to suggest that Enhanced MNA (EMNA) should be considered further as a remedial solution. EMNA strategies may include biostimulation with TEA's and / or bioaugmentation of groundwater zones showing low biodegradation activity with groundwater donor zones showing higher levels of target gene expression.

4.4.3 The requirement for biostimulation stems from the fact that groundwater chemistry data indicate that TEAs such as nitrate have been consumed. The exhaustion of key nutrients provides a limiting constraint on further bacterial growth and, hence, a limiting constraint on biodegradation. Therefore, replenishing or introducing new nutrients provides the possibility of facilitating increased bacterial growth, thereby supporting increased rates of biodegradation.

[12] Field J, Sierra-Alvarez R. Biodegradability of chlorinated solvents and related chlorinated aliphatic compounds. Reviews in Environmental Science and Biotechnology. 2004;3:185–254.

4.4.4 It is notable that a mixture of aerobic and anaerobic metabolic pathways are simultaneously active within the impacted aquifer system, which would suggest that stimulation of either aerobic or anaerobic conditions could be considered under an EMNA strategy.

4.4.5 This study does not consider MTBE to be a key remedial driver as it is generally present within groundwater close to or below the EQS value of 15 µg/L. The corresponding lack of gene expression involved in TBA biodegradation however, combined with TBA detection in the April 2024 groundwater monitoring round (at 3 No. locations at concentrations 100–190 µg/L) indicates that TBA may require further attention, as this compound tends to be more persistent that its parent compound (MTBE).[13]

Environment	Target Contaminant Group	Functional genes/bacterial species		RBH320	RBH614(S)	RBH605
Aerobic	BTEX + Chlorinated ethenes	Phenol Hydroxylase	PHE	I	I	L
		Toluene 2 Monooxygenase / Phenol Hydroxylase	RDEG	I	I	L
		Toluene Ring Hydroxylating Monooxygenases	RMO	I	H	n.d.
	BTEX	Xylene/Toluene Monooxygenase	TOL	I	n.d.	n.d.
		Ethylbenzene/Isopropylbenzene Dioxygenase	EDO	I	n.d.	I
		Biphenyl/Isopropylbenzene Dioxygenase	BPH4	I	I	n.d.
		Methylibium petroleiphilum PM1	PM1	I	n.d.	n.d.
		TBA Monooxygenase	TBA	I	n.d.	n.d.
	Chlorinated ethenes	Epoxyalkane Transferase	EtnE	n.d.	L	n.d.
		Trichlorobenzene Dioxygenase	TCBO	L	n.d.	n.d.
Anaerobic	BTEX	Benzoyl Coenzyme A Reductase	BCR	I	I	L
		Benzylsuccinate Synthase	bssA	I	L	n.d.
	Chlorinated ethenes	*Dehalococcoides*	DHC	I	L	L
		tceA Reductase	TCE	I	L	n.d.
		BAV1 Vinyl Chloride Reductase	BVC	I	L	n.d.
		Vinyl Chloride Reductase	VCR	I	L	n.d.
		Dehalobacter spp.	DHBt	H	I	n.d.
		Dehalobacter DCM	DCM	L	n.d.	n.d.
		Dehalogenimonas spp.	DHG	n.d.	I	n.d.
		Desulfitobacterium spp.	DSB	I	L	L
		Dehalobium chlorocoercia	DECO	I	L	n.d.
		Desulfuromonas spp.	DSM	I	L	n.d.
		PCE Reductase	PCE-1	L	n.d.	n.d.

Table 4.4 Qualitative comparison of bacteria/genes associated with contaminant biodegradation. Colour coding indicates whether a bacteria species/gene is present at a level that is considered high (H), intermediate (I), or low (L) compared to a typical site. n.d. = not detected.

[13] U.S. EPA (2004) How To Evaluate Alternative Cleanup Technologies For Underground Storage Tank Sites: A Guide For Corrective Action Plan Reviewers.

5 Conclusions

5.1.1 CE Geochem were commissioned to undertake a plume visualisation and microbial profiling study to investigate whether natural attenuation processes are potentially leading to source term mass depletion at the former Tetrosyl site.

5.1.2 The 3D plume visualisation model indicated that the plume mass has decreased substantially since 2021. Calculated rate constants indicate that the source term mass of BTEX compounds and chlorinated ethenes are declining with half-lives in the order of 1–5 years.

5.1.3 Microbial profiling investigations have indicated that appropriate microbial communities are present in groundwater to support the biodegradation of all CoCs, however the levels of gene expression are generally considered moderate / intermediate and possibly require additional remedial intervention to accelerate biodegradation rates.

5.1.4 The relatively slow rates of source term degradation combined with moderate levels microbial communities associated with biodegradation suggest as potential role for Enhanced Monitored Natural Attenuation (EMNA) as a preferred remedial option.

5.1.5 Functional genes and microbial communities responsible for both aerobic and anaerobic biodegradation have been detected within plume core and fringe locations, therefore, the stimulation of either pathway may be viable.

5.1.6 The advantage of stimulating anaerobic conditions would encourage biodegradation of PCE which only occurs under anaerobic conditions, whilst aerobic degradation is not considered a primary degradation mechanism for TCE. This should however be assessed in the context of PCE and TCE as key risk drivers. Neither of these compounds were detected in excess of their respective RTVs in the 2024 groundwater monitoring rounds which suggests BTEX compounds and VC may constitute higher remedial priorities. In contrast, the most recent groundwater monitoring data from the north of Phase 2B suggests PCE/TCE may still be present in this part of the site, with PCE having the slowest half-life of any CoC assessed in this study.

5.1.7 Aerobic biodegradation is generally a more rapid process than anaerobic biodegradation for BTEX compound and, as the functional genes responsible for the aerobic biodegradation of BTEX compounds, TCE, cis-1,2-DCE, and VC have all been detected in groundwaters sampled from the former Tetrosyl site, stimulation of aerobic pathways may be more conducive to more rapidly achieving remedial objectives.

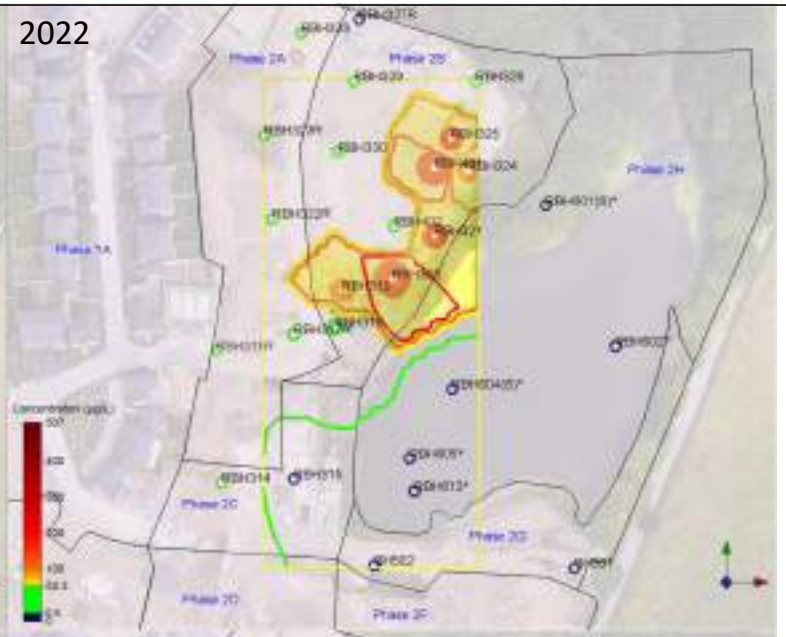
5.1.8 We recommend that treatability trials should be undertaken to compare aerobic and anaerobic EMNA to determine which is the most appropriate option to ensure all contaminants of concerns respond adequately and provide evidence that the required remedial objectives can be achieved.

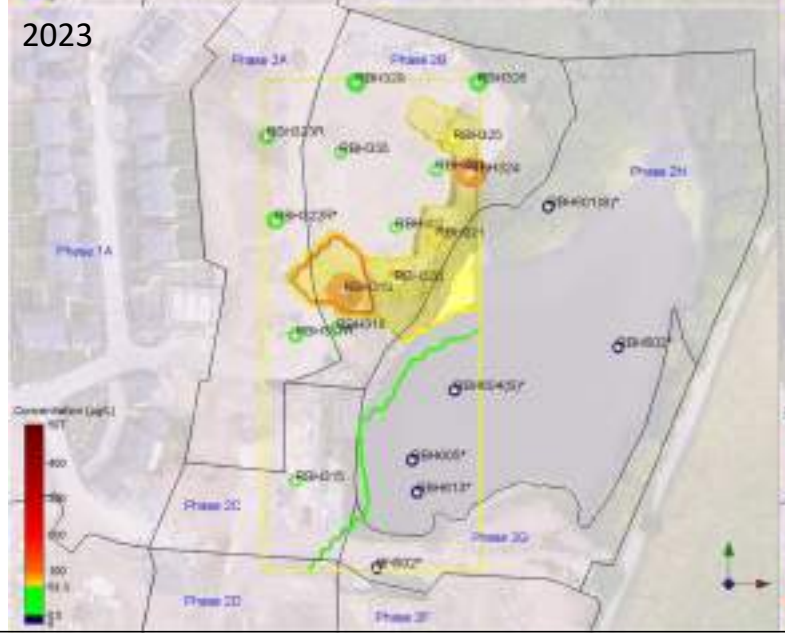
5.1.9 Consideration may also be given to the use of chemical treatment options (in situ chemical oxidation (ISCO) or in situ chemical reduction (ISCR)) to target more recalcitrant areas of contamination.

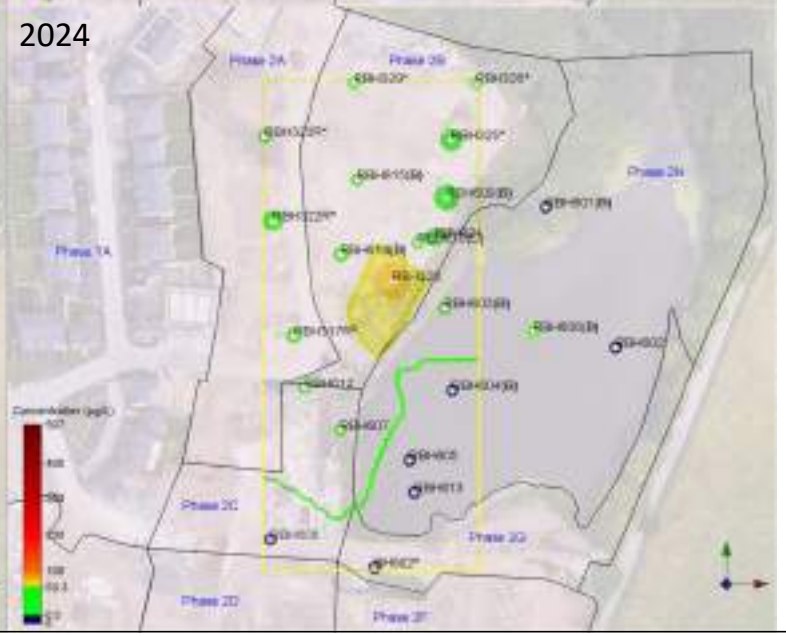
5.1.10 Although there is some residual uncertainty regarding contaminant distribution in the north of Phase 2B, 2A, and under the former reservoir, concentrations are generally considered low. It is recommended that all these areas are evaluated through a controlled waters detailed Quantitative Risk Assessment (DQRA) and Remediation Options Appraisal (ROA) to determine appropriate remediation objectives and compliance criteria, and provide demonstrable evidence to support the selection of appropriate remedial technologies.

Appendix A: Drawings









- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Toluene plume representing concentrations above Remedial Target Value = 53.3 µg/L
- Yellow grid shows modelling domain
- Contours indicate concentrations above LOD (green), above RTV (yellow), and gradient of increasing concentrations (orange–red)

Geochem
Cutting-Edge Geochemistry

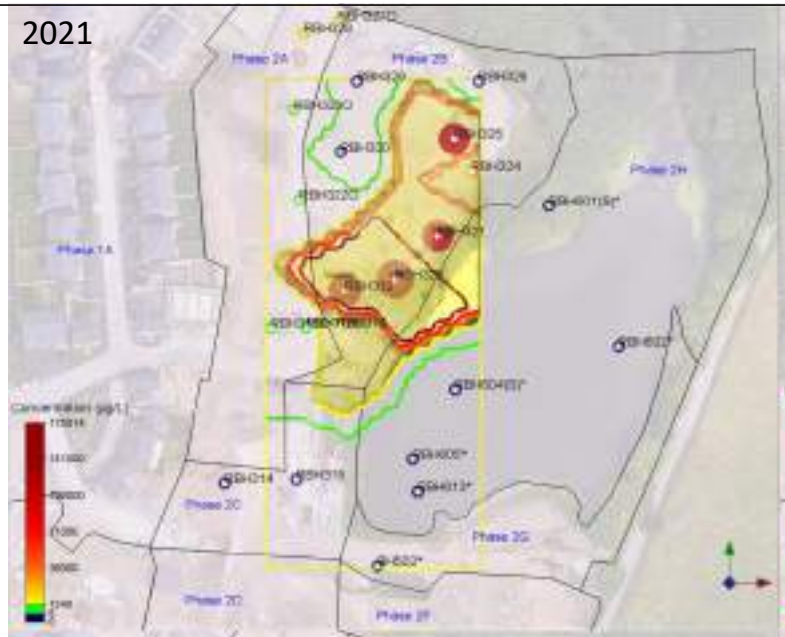
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

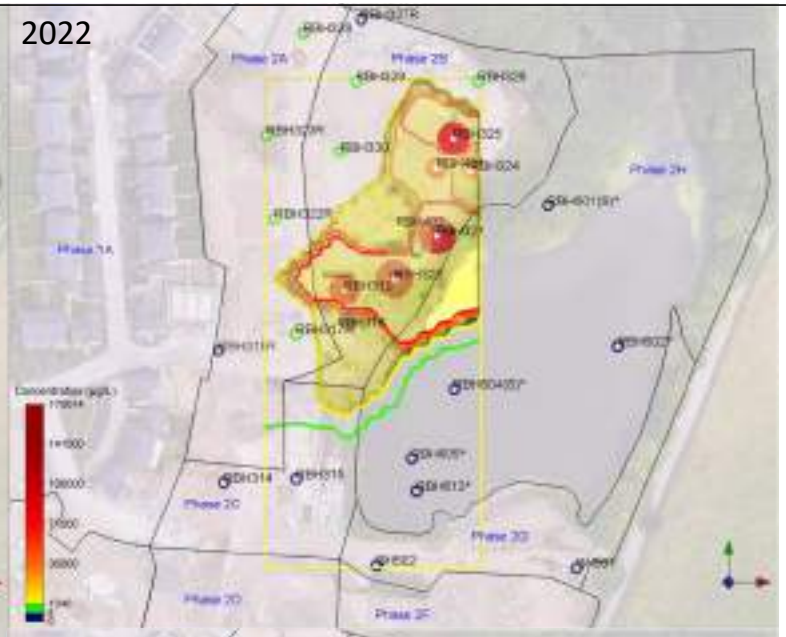
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Benzene Plume

Drawing No.
A231001/C/01

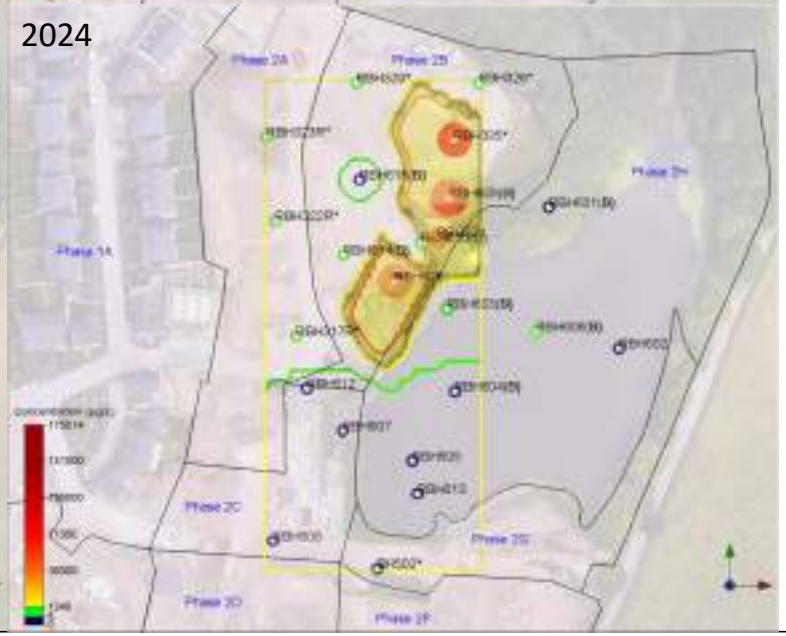
Client
BARRATT HOMES

Version
3









- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Toluene plume representing concentrations above Remedial Target Value = 1340 µg/L
- Yellow grid shows modelling domain
- Contours indicate concentrations above LOD (green), above RTV (yellow), and gradient of increasing concentrations (orange–red)

Geochem
Cutting-Edge Geochemistry

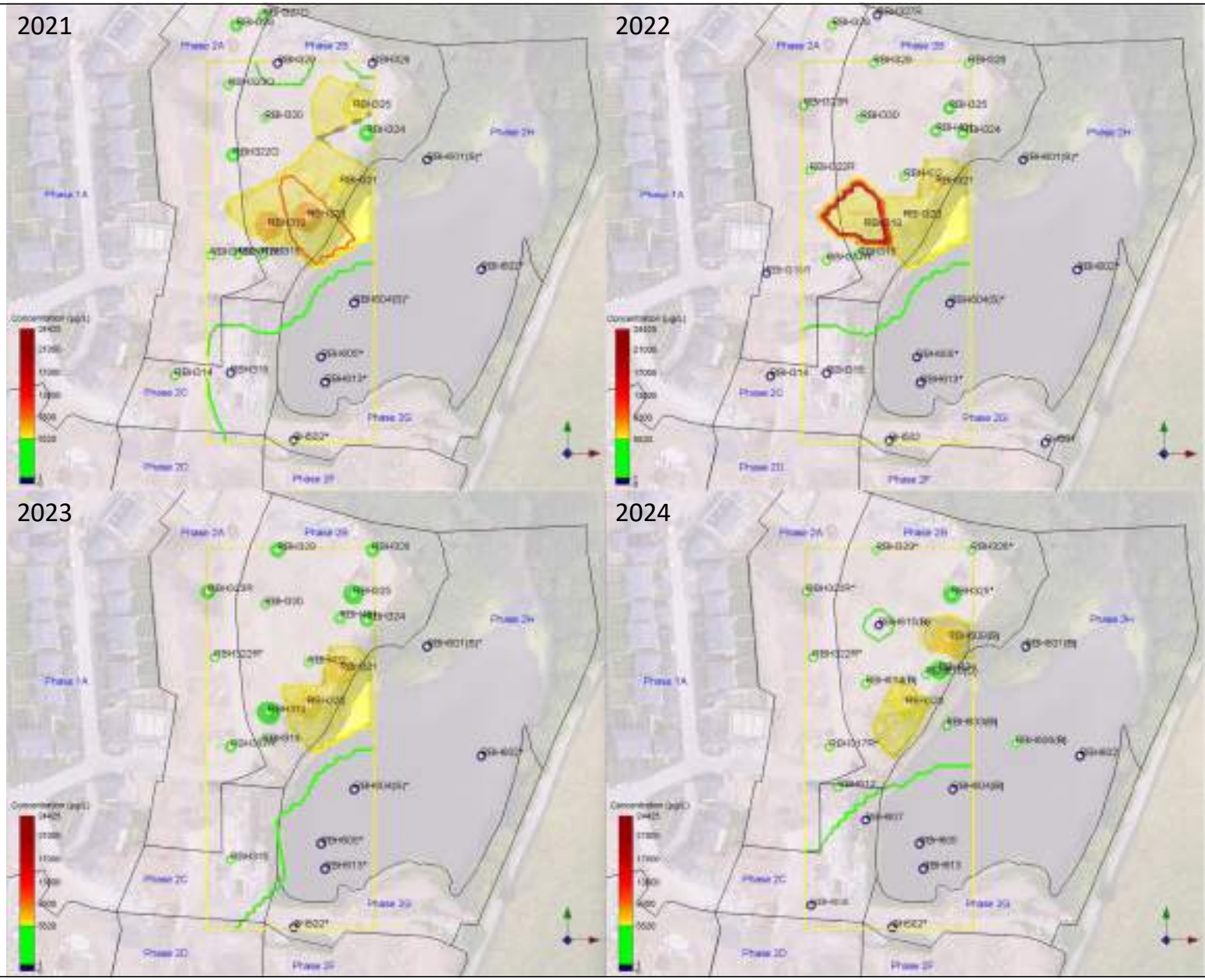
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Toluene Plume

Drawing No.
A231001/C/02

Client
BARRATT HOMES

Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Ethylbenzene plume representing concentrations above Remedial Target Value = 5520 µg/L
- Yellow grid shows modelling domain
- Contours indicate concentrations above LOD (green), above RTV (yellow), and gradient of increasing concentrations (orange–red)

Geochem
Cutting-Edge Geochemistry

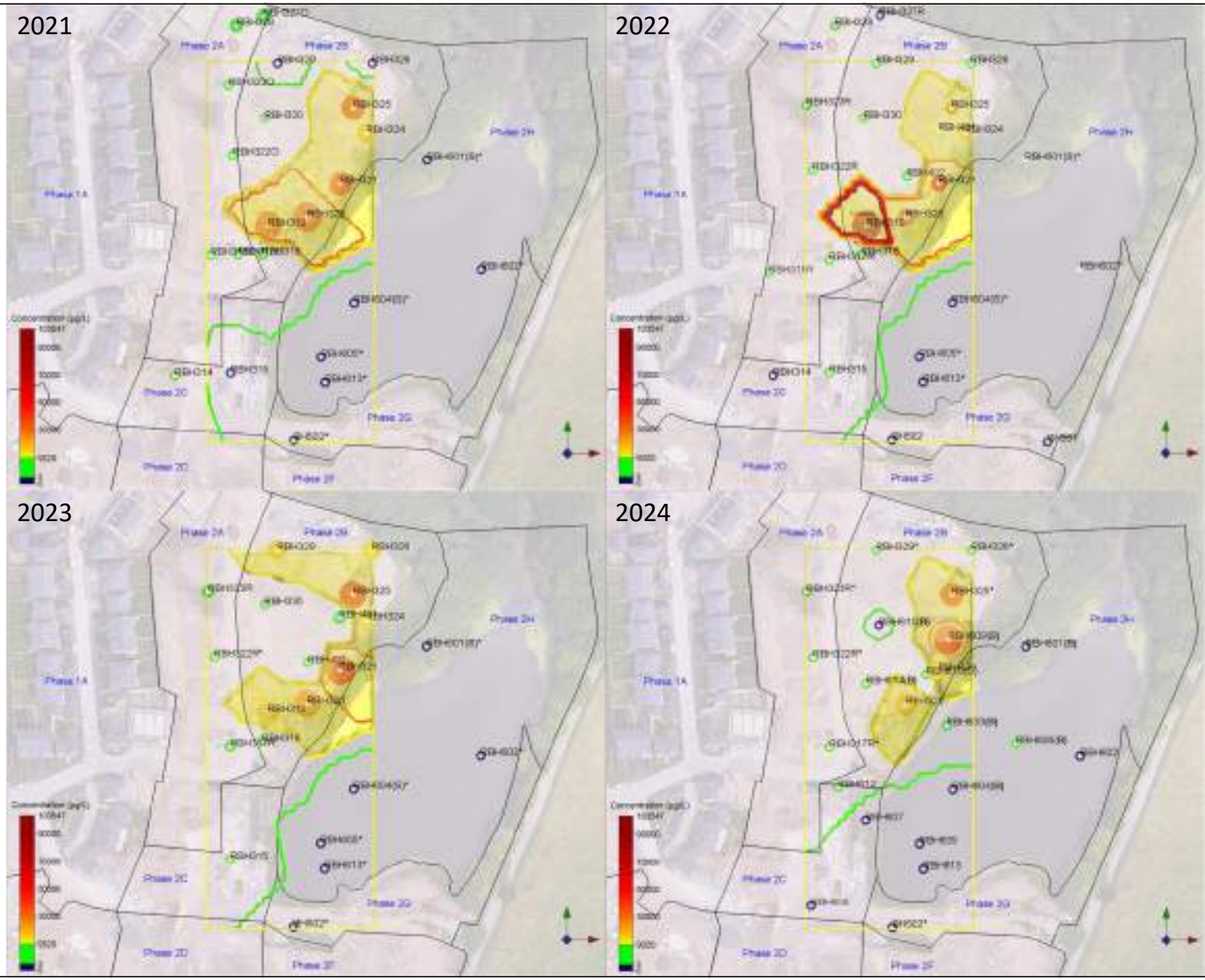
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Ethylbenzene Plume

Drawing No.
A231001/C/03

Client
BARRATT HOMES

Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Total xylene plume representing concentrations above Remedial Target Value for total xylene = 9320 µg/L
- Yellow grid shows modelling domain
- Contours indicate concentrations above LOD (green), above RTV (yellow), and gradient of increasing concentrations (orange–red)

Geochem
Cutting-Edge Geochemistry

Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Xylene Plume

Drawing No.
A231001/C/04

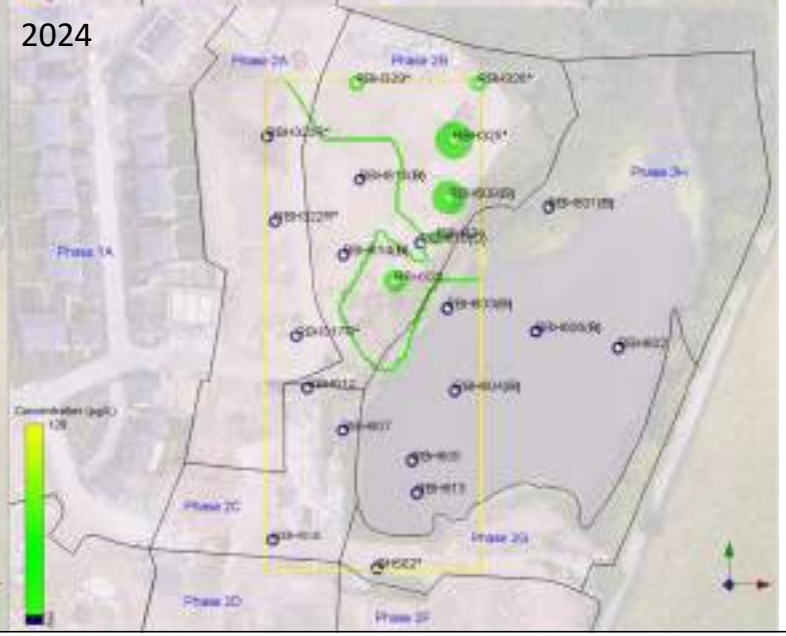
Client
BARRATT HOMES

Version
3









- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Tetrachloroethylene (PCE) distribution. No concentrations above Remedial Target Value = 129 µg/L
- Yellow grid shows modelling domain
- Contours indicate concentrations above LOD (green), above RTV (yellow), and gradient of increasing concentrations (orange–red)

Geochem
Cutting-Edge Geochemistry

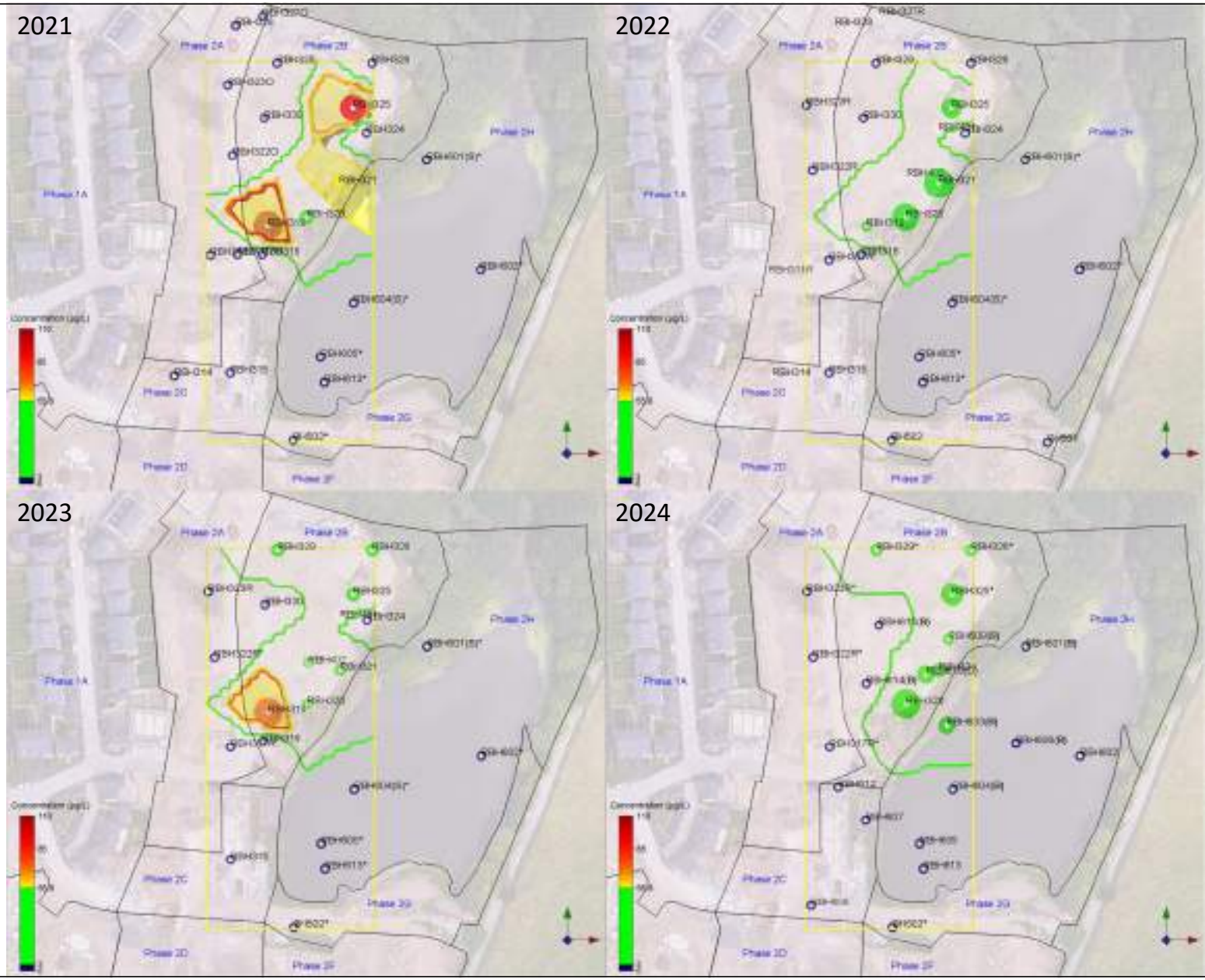
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
PCE Plume

Drawing No.
A231001/C/05

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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Trichloroethylene (TCE) plume representing concentrations above Remedial Target Value = 55.8 µg/L
- Yellow grid shows modelling domain
- Contours indicate concentrations above LOD (green), above RTV (yellow), and gradient of increasing concentrations (orange–red)

Geochem
Cutting-Edge Geochemistry

Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

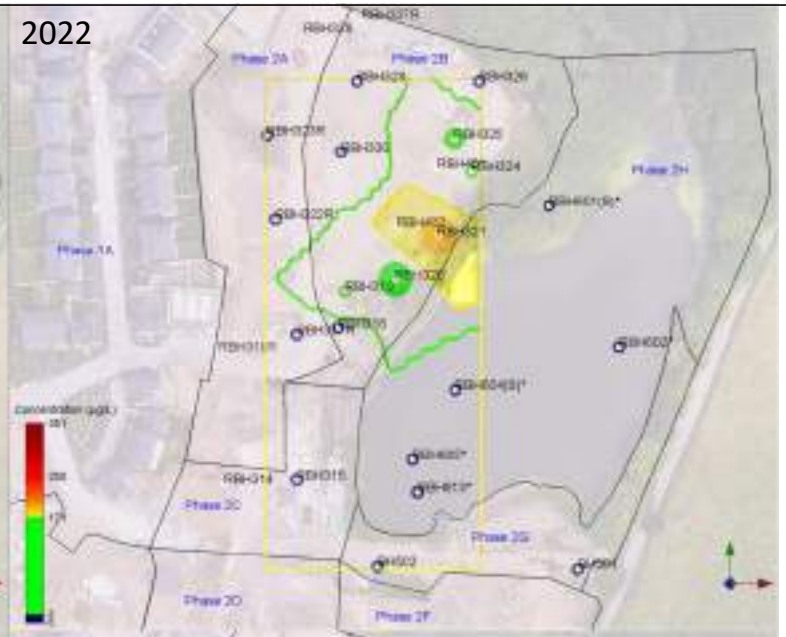
Drawing Title
TCE Plume

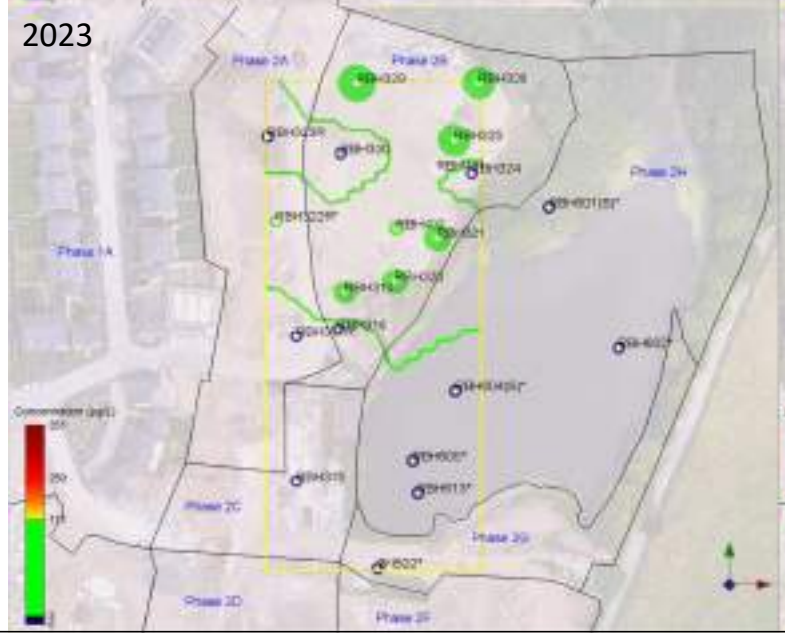
Drawing No.
A231001/C/06

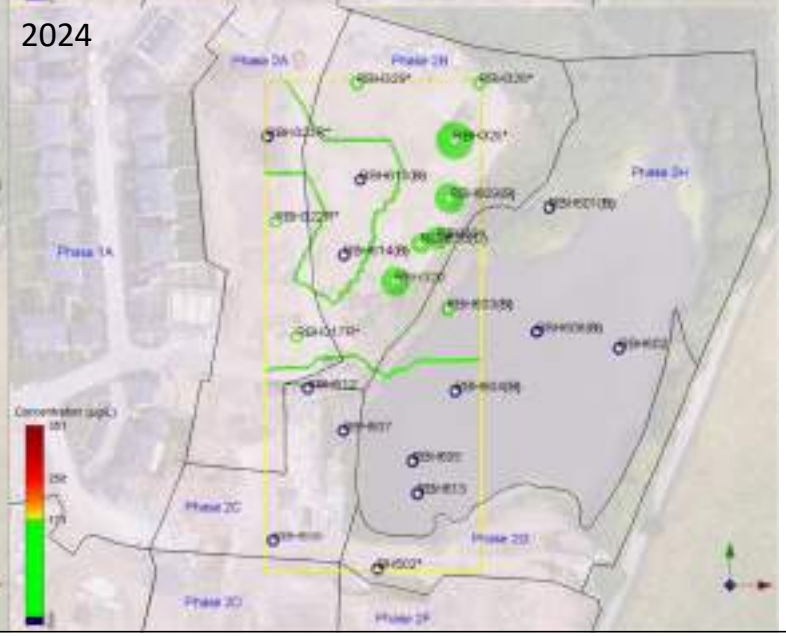
Client
BARRATT HOMES

Version
3









- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Cis-1,2-dichloroethylene (DCE) plume representing concentrations above Remedial Target Value = 171 µg/L
- Yellow grid shows modelling domain
- Contours indicate concentrations above LOD (green), above RTV (yellow), and gradient of increasing concentrations (orange–red)

Geochem
Cutting-Edge Geochemistry

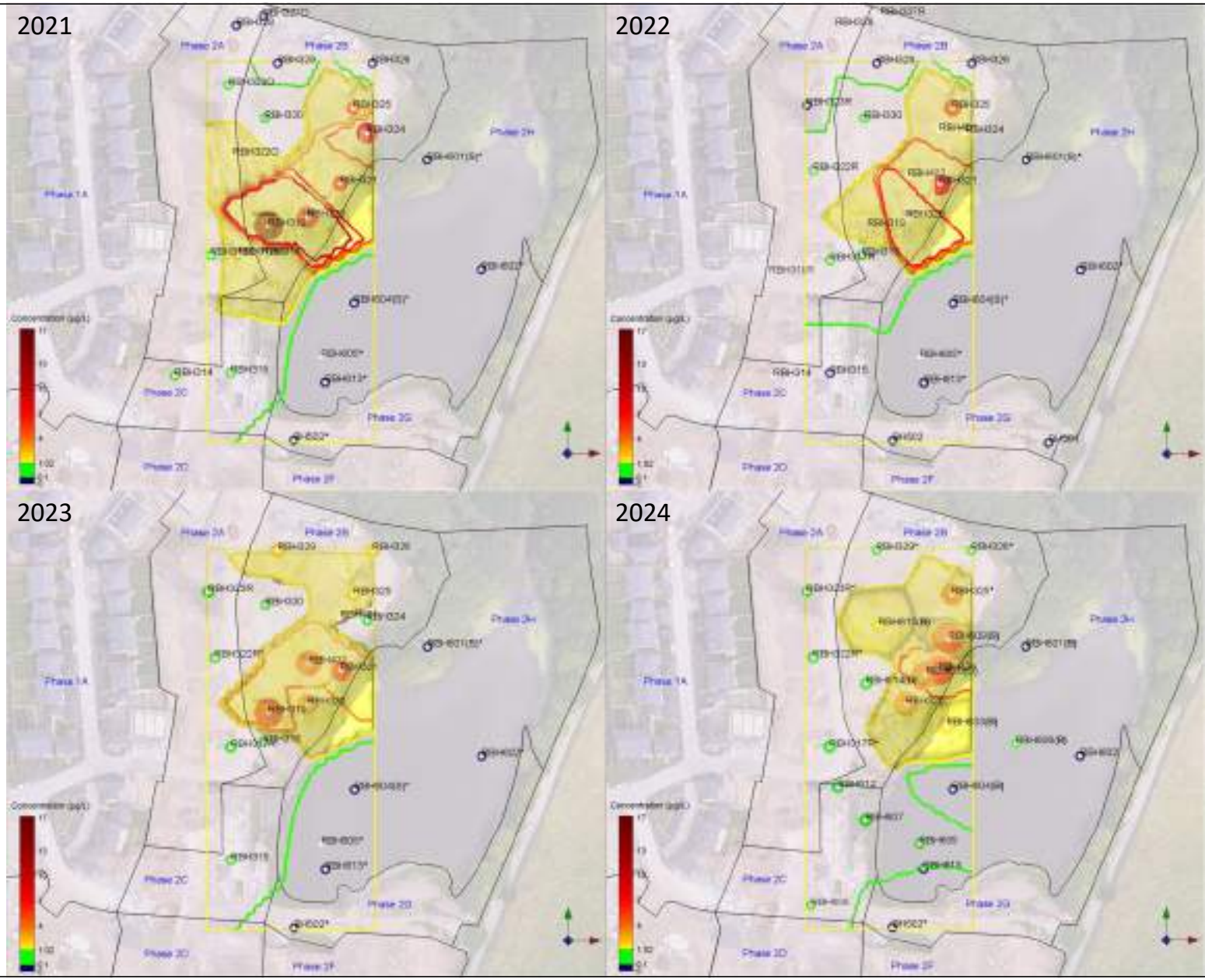
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Cis-1,2-DCE Plume

Drawing No.
A231001/C/07

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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Vinyl chloride (VC) plume representing concentrations above Remedial Target Value = 1.02 µg/L
- Yellow grid shows modelling domain
- Contours indicate concentrations above LOD (green), above RTV (yellow), and gradient of increasing concentrations (orange–red)

Geochem
Cutting-Edge Geochemistry

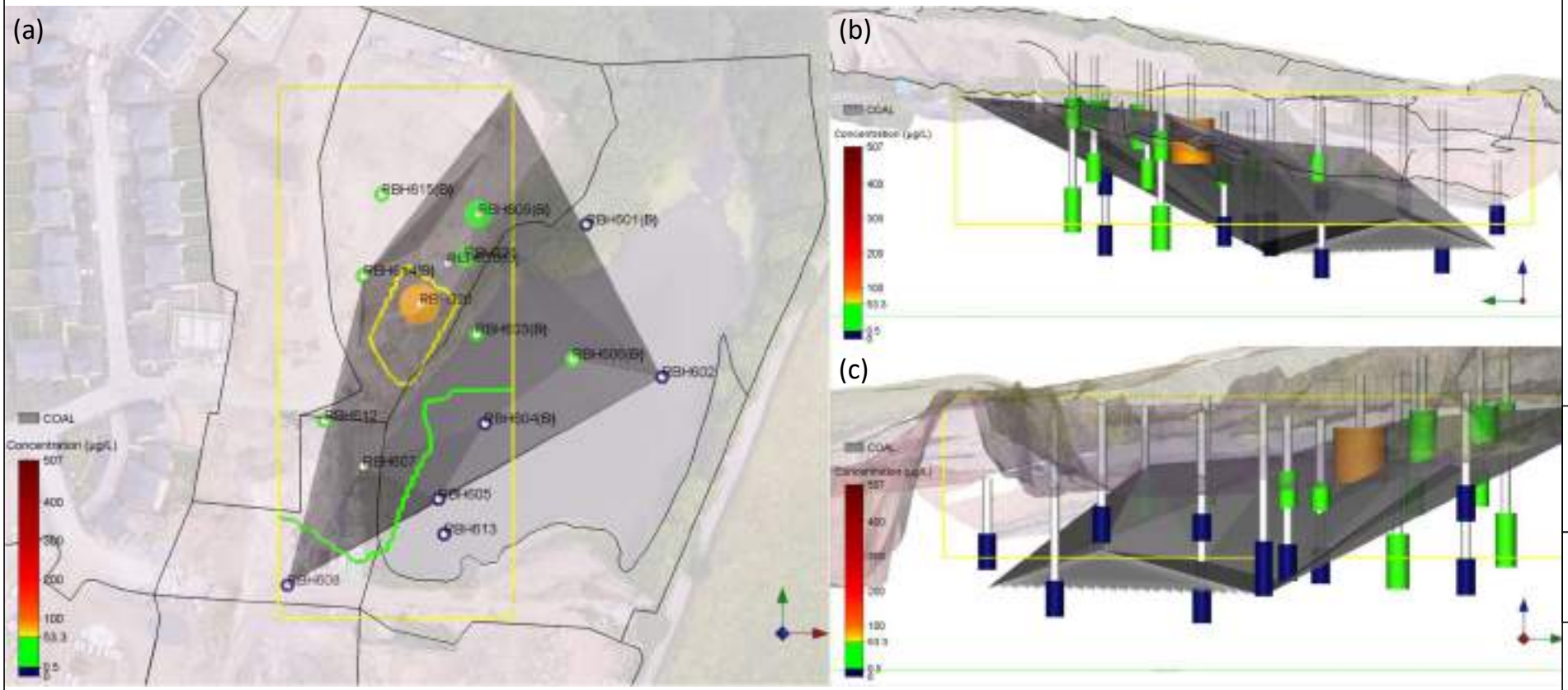
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
VC Plume

Drawing No.
A231001/C/08

Client
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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Visualisation of COAL seam and 2024 groundwater concentrations of benzene shown in (a) plan view and viewed from (b) the west and (c) the east

Geochem
Cutting-Edge Geochemistry

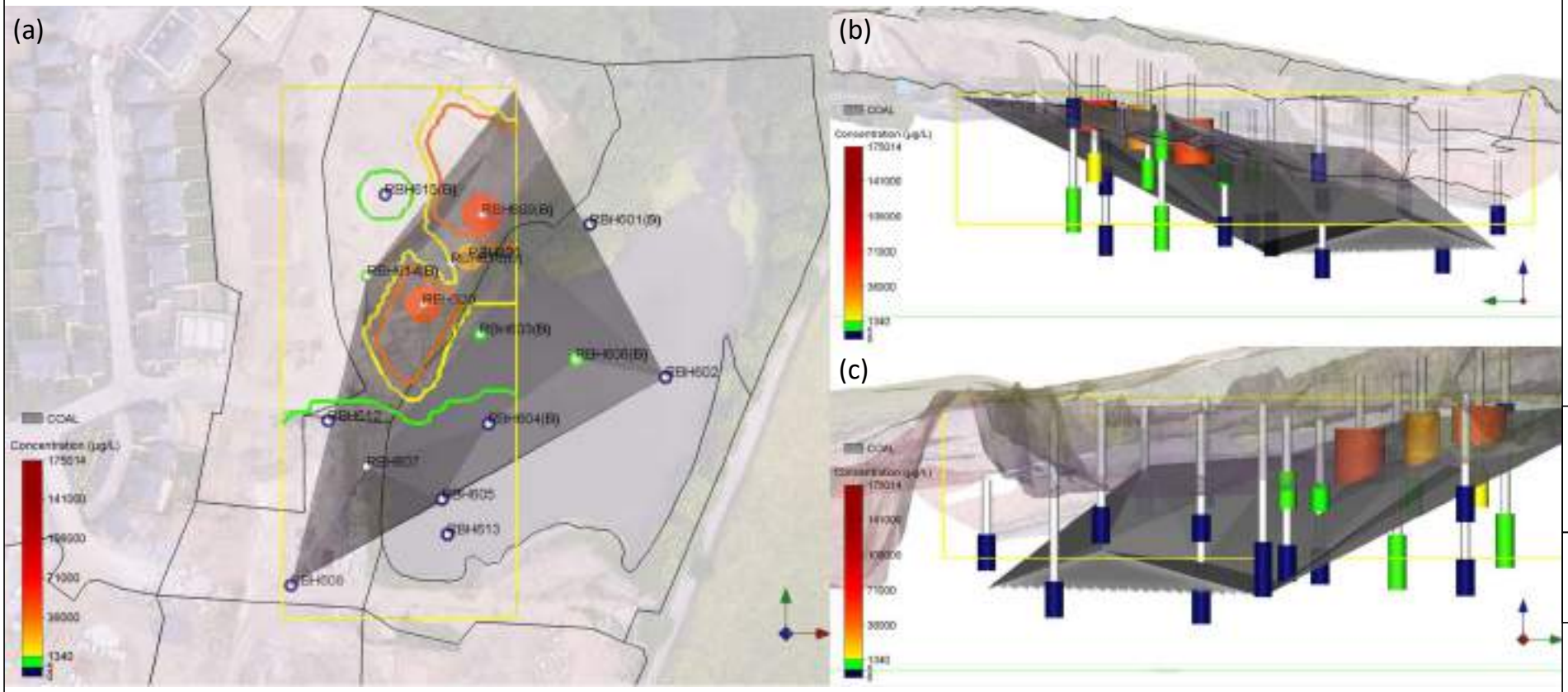
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Benzene + COAL

Drawing No.
A231001/C/09

Client
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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Visualisation of COAL seam and 2024 groundwater concentrations of toluene shown in (a) plan view and viewed from (b) the west and (c) the east

Geochem
Cutting-Edge Geochemistry

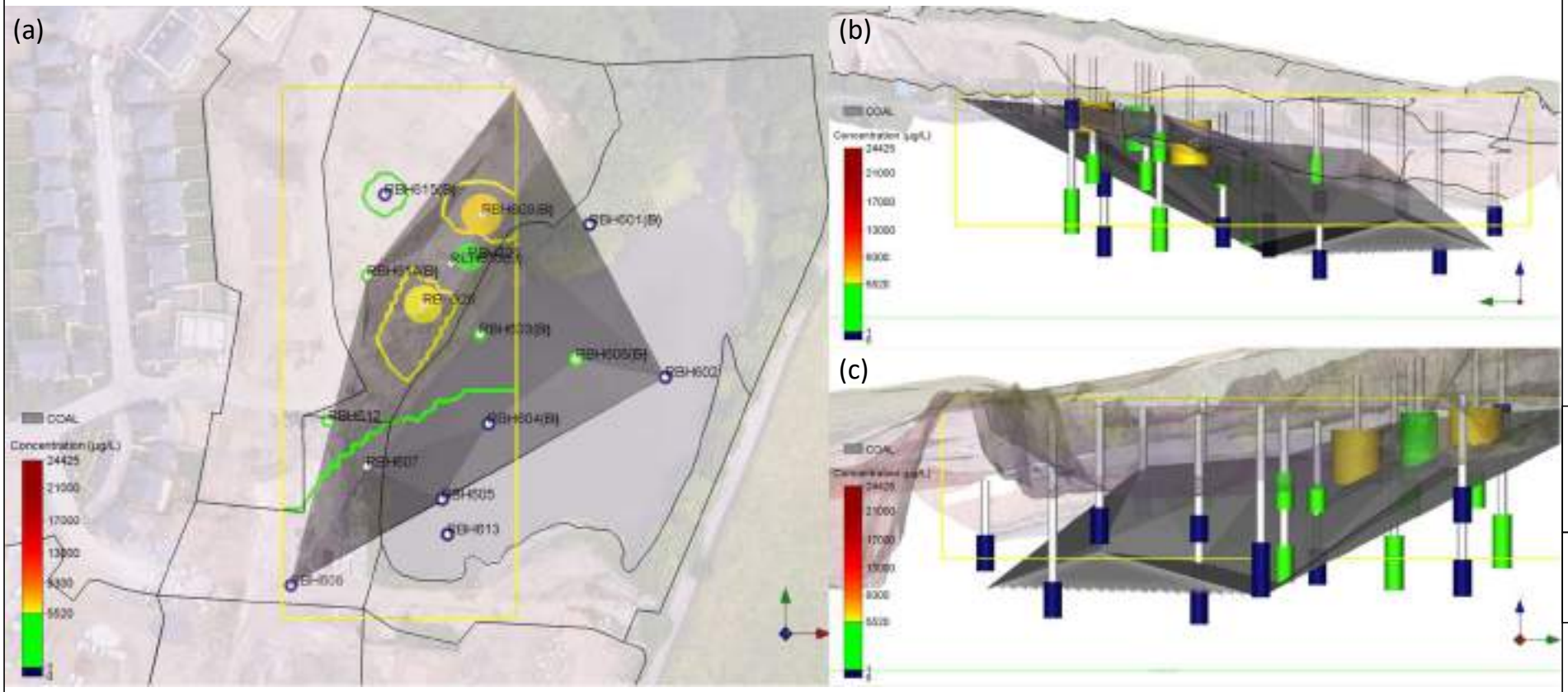
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Toluene + COAL

Drawing No.
A231001/C/10

Client
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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Visualisation of COAL seam and 2024 groundwater concentrations of ethylbenzene shown in (a) plan view and viewed from (b) the west and (c) the east

Geochem
Cutting-Edge Geochemistry

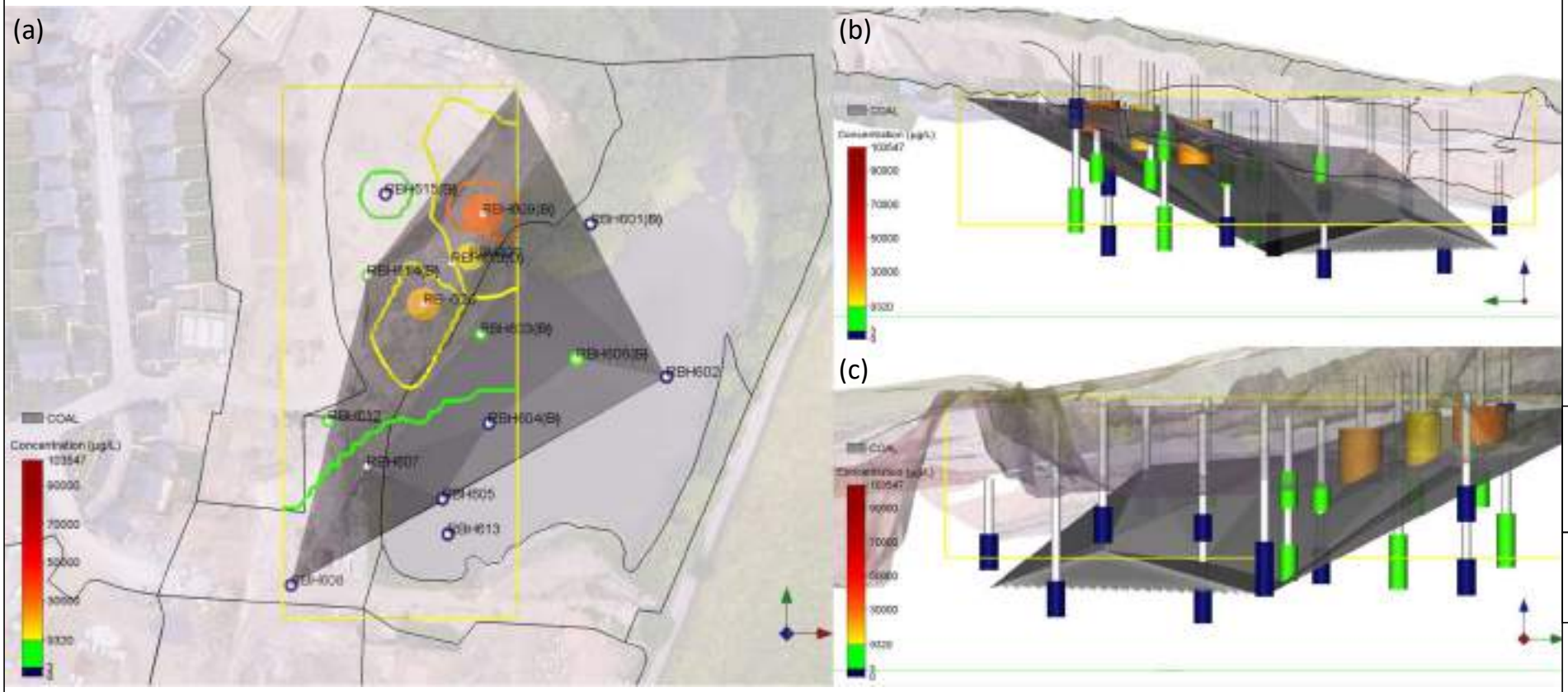
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Ethylbenzene + COAL

Drawing No.
A231001/C/11

Client
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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Visualisation of COAL seam and 2024 groundwater concentrations of total xylene shown in (a) plan view and viewed from (b) the west and (c) the east

Geochem
Cutting-Edge Geochemistry

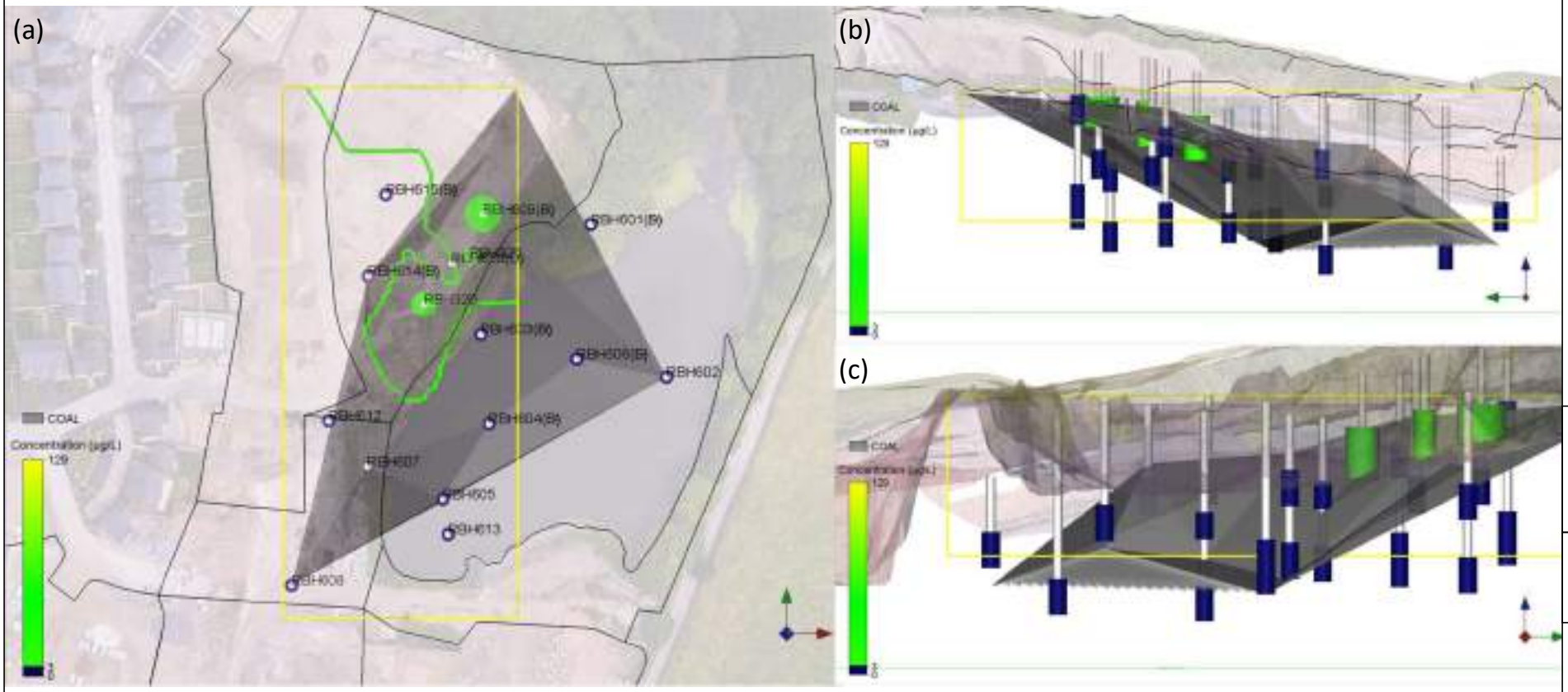
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Xylene + COAL

Drawing No.
A231001/C/12

Client
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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Visualisation of COAL seam and 2024 groundwater concentrations of tetrachloroethylene (PCE) shown in (a) plan view and viewed from (b) the west and (c) the east

Geochem
Cutting-Edge Geochemistry

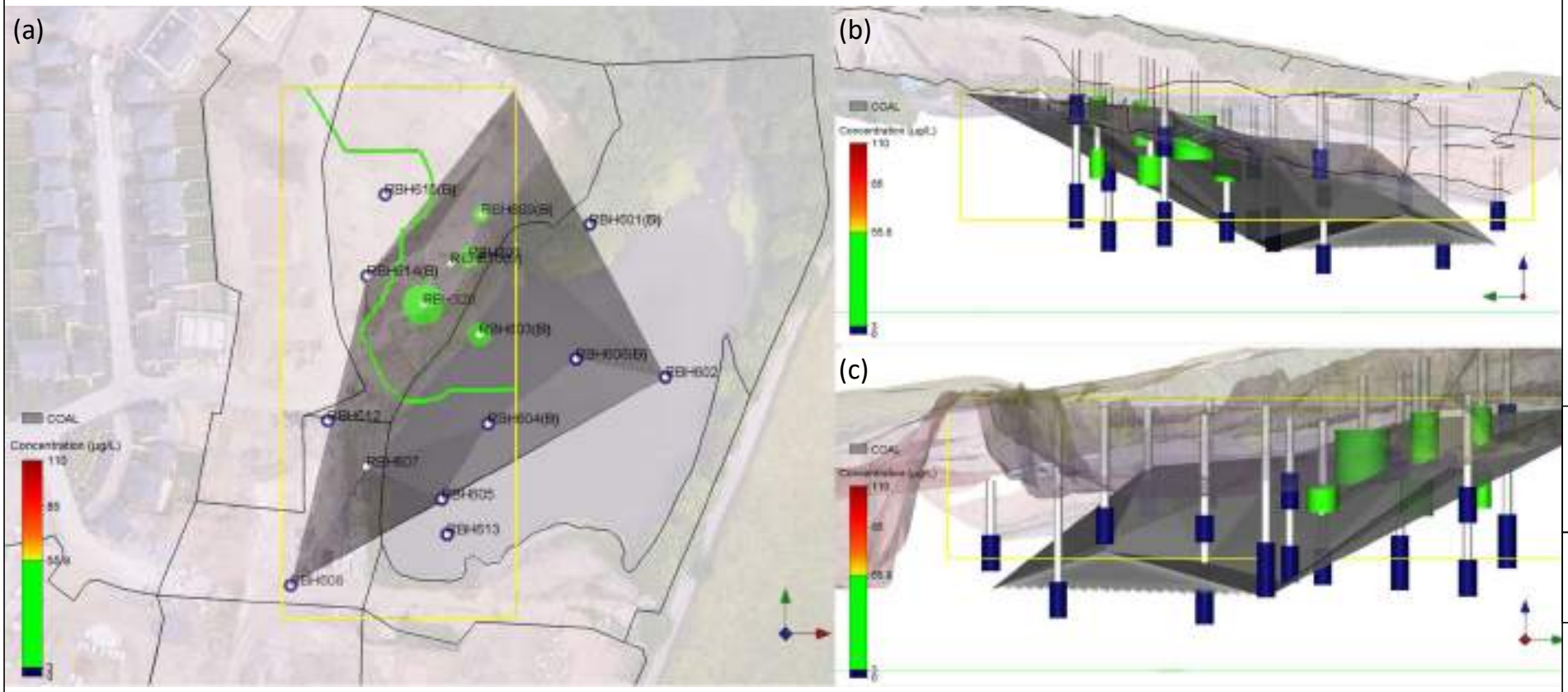
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
PCE + COAL

Drawing No.
A231001/C/13

Client
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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Visualisation of COAL seam and 2024 groundwater concentrations of trichloroethylene (TCE) shown in (a) plan view and viewed from (b) the west and (c) the east

Geochem
Cutting-Edge Geochemistry

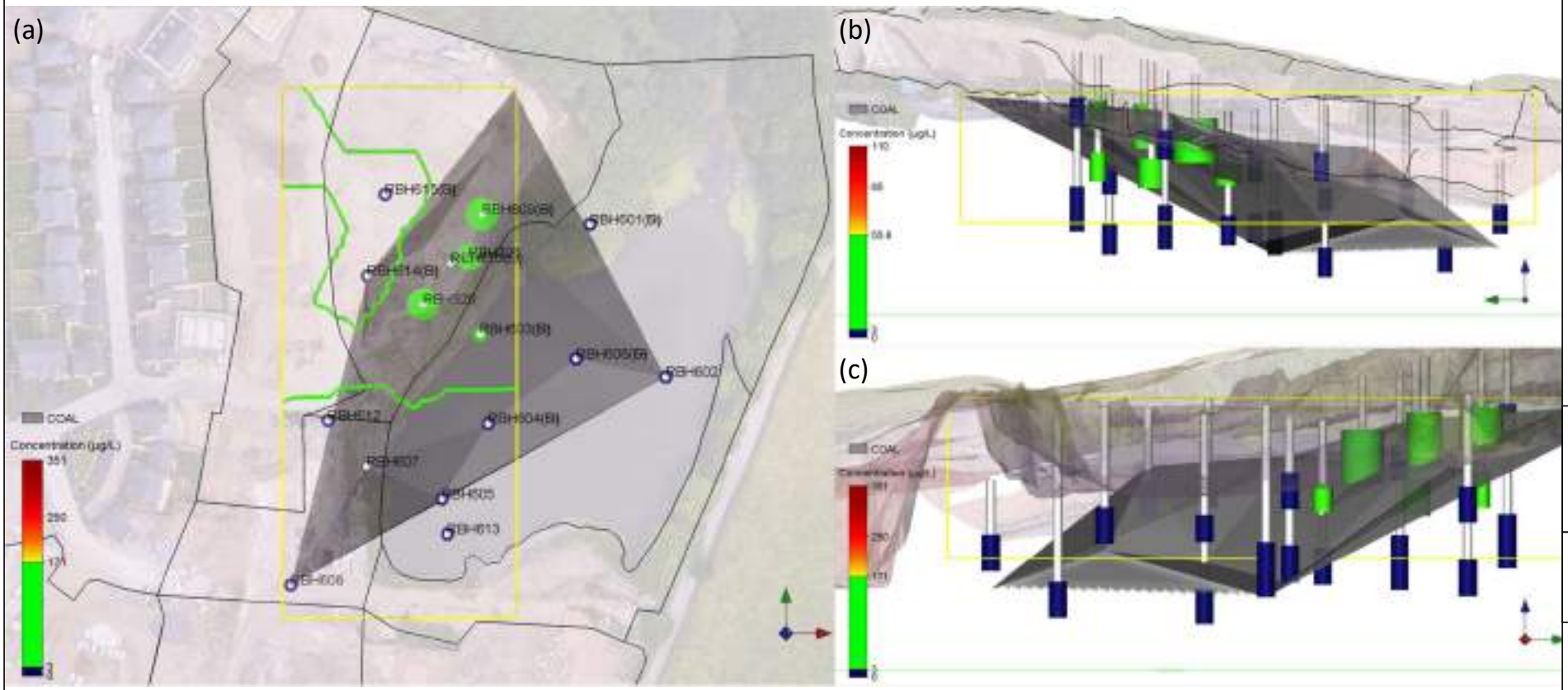
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
TCE + COAL

Drawing No.
A231001/C/14

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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Visualisation of COAL seam and 2024 groundwater concentrations of cis-1,2-dichloroethylene (cis-1,2-DCE) shown in (a) plan view and viewed from (b) the west and (c) the east

Geochem
Cutting-Edge Geochemistry

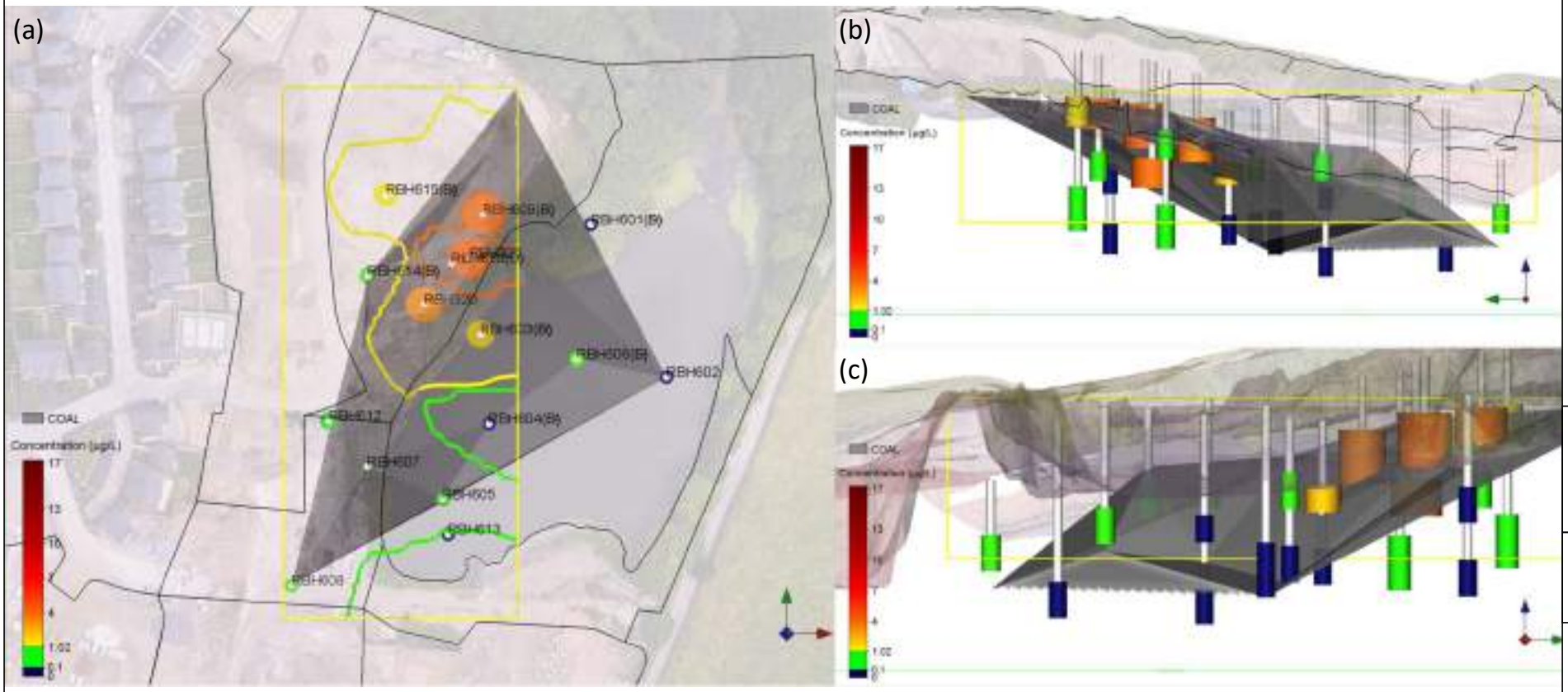
Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
Cis-1,2-DCE + COAL

Drawing No.
A231001/C/15

Client
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Version
3



- 3D plume model produced in Voxler® Version 4 (Golden Software)
- Visualisation of COAL seam and 2024 groundwater concentrations of vinyl chloride (VC) shown in (a) plan view and viewed from (b) the west and (c) the east

Geochem
Cutting-Edge Geochemistry

Project
A231001 Tetrosyl Plume Visualisation and Microbial Profiling Study

Drawing Title
VC + COAL

Drawing No.
A231001/C/16

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Appendix B: Genetic Profiling Analysis

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SITE LOGIC Report

QuantArray®-Petro Study

Contact: Tom Mullan
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Ashover, Derbyshire
United Kingdom S45 0DX

MI Identifier: 403EVD

Report Date: 01/05/2024

Project: Tetrosyl

Reviewed By: *Sarah Keys*

Comments:

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The QuantArray®-Petro Approach

Comprehensive evaluation of biodegradation potential at petroleum impacted sites is inherently problematic due to two factors:

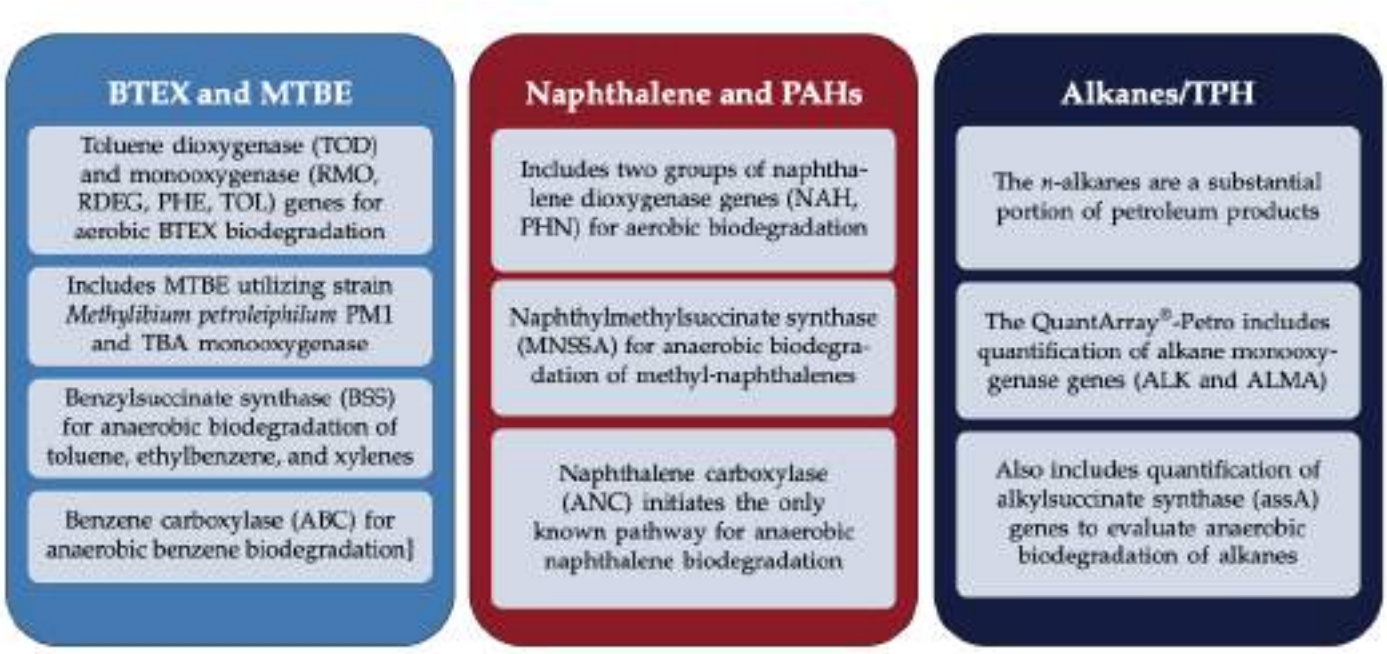
(1) Petroleum products are complex mixtures of hundreds of aliphatic, aromatic, cyclic, and heterocyclic compounds.

(2) Even for common classes of contaminants like benzene, toluene, ethylbenzene, and xylenes (BTEX), biodegradation can proceed by a multitude of pathways.

The QuantArray®-Petro has been designed to address both of these issues by providing the simultaneous quantification of the specific functional genes responsible for both aerobic and anaerobic biodegradation of BTEX, PAHs, and a variety of short and long chain alkanes.

Thus, when combined with chemical and geochemical groundwater monitoring programs, the QuantArray®-Petro allows site managers to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of petroleum hydrocarbons through a multitude of aerobic and anaerobic pathways to give a much clearer and comprehensive view of contaminant biodegradation.

The QuantArray®-Petro is used to quantify specific microorganisms and functional genes to evaluate aerobic and anaerobic biodegradation of the following classes of compounds present in petroleum products:



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Results

Table 1: Summary of the QuantArray®-Petro results obtained for samples RBH614(S), RBH320, and RBH605

Sample Name Sample Date	RBH614(S) 03/04/2024	RBH320 03/04/2024	RBH605 03/04/2024
Aerobic BTEX and MTBE	cells/mL	cells/mL	cells/mL
Toluene/Benzene Dioxygenase (TOD)	<2.50E-01	<2.50E-01	<7.80E-01
Phenol Hydroxylase (PHE)	**2.30E+04**	**5.00E+04**	**3.80E+02**
Toluene 2 Monooxygenase/Phenol Hydroxylase (RDEG)	**7.30E+03**	**1.10E+04**	**7.00E+02**
Toluene Ring Hydroxylating Monooxygenases (RMO)	**1.80E+04**	**8.80E+03**	<7.80E-01
Xylene/Toluene Monooxygenase (TOL)	<2.50E-01	**4.30E+02**	<7.80E-01
Ethylbenzene/Isopropylbenzene Dioxygenase (EDO)	<2.50E-01	**9.20E+03**	**2.70E+02**
Biphenyl/Isopropylbenzene Dioxygenase (BPH4)	**4.70E+00**	**1.20E+03**	<7.80E-01
Methylibium petroleiphilum PM1 (PM1)	<2.50E-01	<2.50E-01	<7.80E-01
TBA Monooxygenase (TBA)	<2.50E-01	<2.50E-01	<7.80E-01
Aerobic PAHs and Alkanes			
Naphthalene Dioxygenase (NAH)	<2.50E-01	<2.50E-01	<7.80E-01
Naphthalene-inducible Dioxygenase (NidA)	**3.60E+01**	<2.50E-01	<7.80E-01
Phenanthrene Dioxygenase (PHN)	**8.00E+01**	**2.10E+01**	<7.80E-01
Alkane Monooxygenase (ALK)	<2.50E-01	**1.50E+03**	<7.80E-01
Alkane Monooxygenase (ALMA)	<2.50E-01	<2.50E-01	<7.80E-01
Anaerobic BTEX			
Benzoyl Coenzyme A Reductase (BCR)	**4.30E+02**	**2.10E+02**	**5.70E+01**
Benzylsuccinate Synthase (BSS)	**2.50E+02**	**1.70E+04**	<7.80E-01
Benzene Carboxylase (ABC)	<2.50E-01	<2.50E-01	<7.80E-01
Anaerobic PAHs and Alkanes			
Naphthylmethylsuccinate Synthase (MNSSA)	<2.50E-01	**1.80E+02**	<7.80E-01
Naphthalene Carboxylase (ANC)	<2.50E-01	**6.90E+01**	<7.80E-01
Alkylsuccinate Synthase (ASSA)	<2.50E-01	**2.90E+02**	<7.80E-01
Other			
Total Eubacteria (EBAC)	**2.20E+06**	**3.80E+06**	**3.70E+04**
Sulfate Reducing Bacteria (APS)	**1.00E+04**	**1.30E+04**	**1.30E+03**

Legend:

NA = Not Analyzed
NS = Not Sampled
J = Estimated Gene Copies Below PQL but Above LQL
I = Inhibited
< = Result Not Detected

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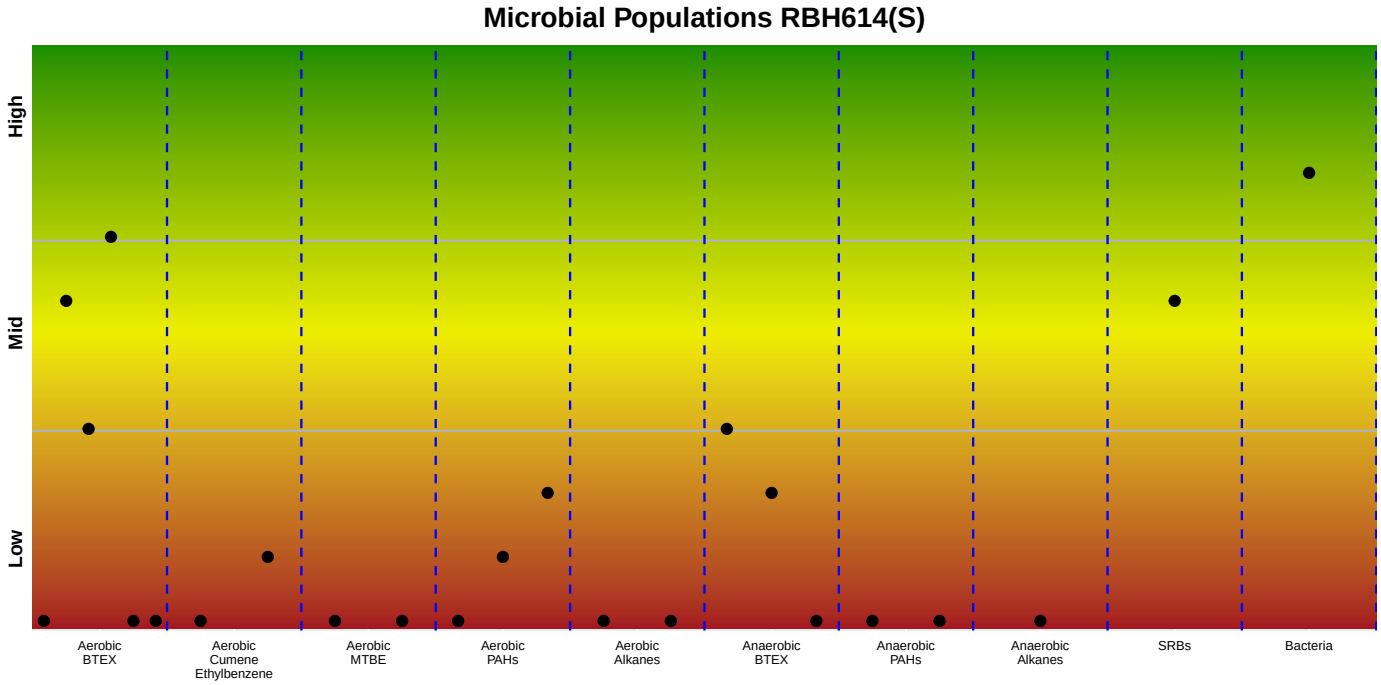


Figure 1: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants. See below to understand the correlation between contaminants and their associated qPCR assays.

Aerobic		Anaerobic	
BTEX	TOD, PHE, RDEG, RMO, TOL, EDO	BTEX	BCR, BSS, ABC
Cumene, Ethylbenzene	EDO, BPH4	Naphthalene/Methylnaphthalene	MNSSA, ANC
MTBE/TBA	PM1, TBA	Alkanes	assA
Naphthalene	NAH, NidA		
Phenanthrene	PHN		
Alkanes	ALK, ALMA		

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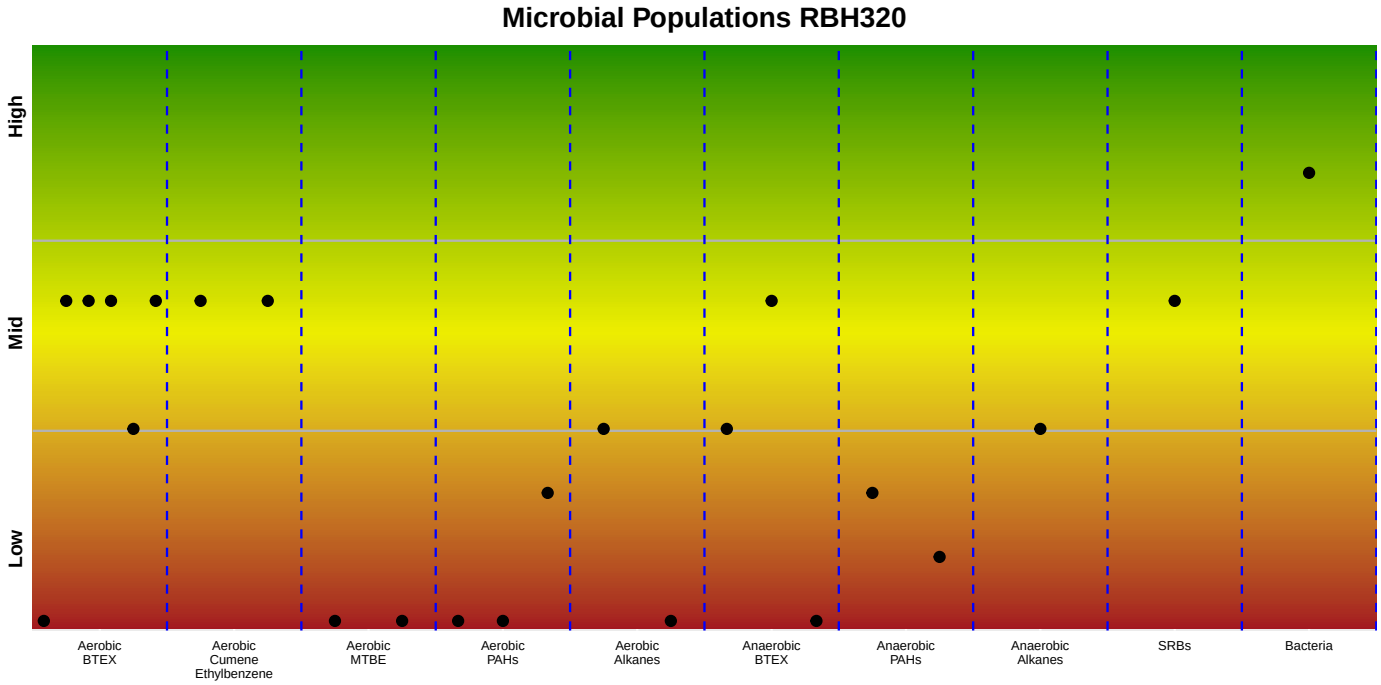


Figure 2: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants. See below to understand the correlation between contaminants and their associated qPCR assays.

Aerobic		Anaerobic	
BTEX	TOD, PHE, RDEG, RMO, TOL, EDO	BTEX	BCR, BSS, ABC
Cumene, Ethylbenzene	EDO, BPH4	Naphthalene/Methylnaphthalene	MNSSA, ANC
MTBE/TBA	PM1, TBA	Alkanes	assA
Naphthalene	NAH, NidA		
Phenanthrene	PHN		
Alkanes	ALK, ALMA		

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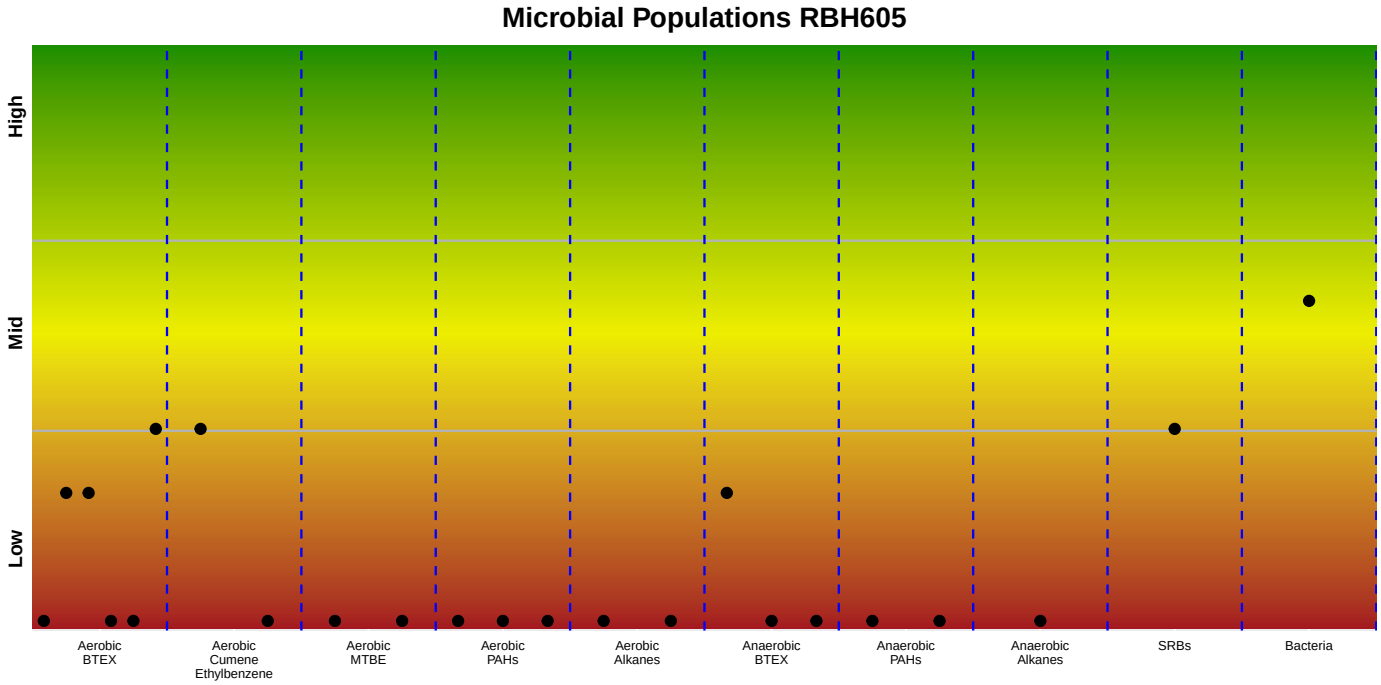


Figure 3: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants. See below to understand the correlation between contaminants and their associated qPCR assays.

Aerobic		Anaerobic	
BTEX	TOD, PHE, RDEG, RMO, TOL, EDO	BTEX	BCR, BSS, ABC
Cumene, Ethylbenzene	EDO, BPH4	Naphthalene/Methylnaphthalene	MNSSA, ANC
MTBE/TBA	PM1, TBA	Alkanes	assA
Naphthalene	NAH, NidA		
Phenanthrene	PHN		
Alkanes	ALK, ALMA		

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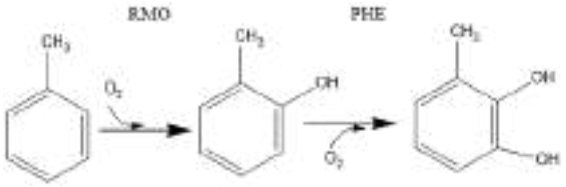
Interpretation

The overall purpose of the QuantArray®-Petro is to give site managers the ability to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of contaminants found in petroleum products through a multitude of aerobic and anaerobic pathways to give a much more clear and comprehensive view of contaminant biodegradation. The following discussion describes interpretation of results in general terms and is meant to serve as a guide.

Aerobic Biodegradation - Benzene Toluene, Ethylbenzene, and Xylenes (BTEX): At sites impacted by petroleum products, aromatic hydrocarbons including BTEX are often contaminants of concern. Aerobic biodegradation of aromatic hydrocarbons has been intensively studied and multiple catabolic pathways have been well characterized. The substrate specificity of each pathway (range of compounds biodegraded via each pathway) is largely determined by the specificity of the initial oxygenase enzyme. The QuantArray®-Petro includes a suite of assays targeting the initial oxygenase genes of the known pathways for aerobic BTEX biodegradation.

Toluene/Benzene Dioxygenase (TOD): Toluene/benzene dioxygenase (TOD) incorporates both atoms of molecular oxygen into the aromatic ring. Although commonly called toluene dioxygenase, the substrate specificity of this enzyme is relaxed, allowing growth on toluene and benzene along with co-oxidation of a variety of compounds including ethylbenzene, *o*-xylene, *m*-xylene, and trichloroethene (TCE) when expressed.

Toluene/Benzene Monooxygenases (RMO/RDEG) and Phenol Hydroxylases (PHE): The next three known pathways for aerobic biodegradation of toluene (as well as benzene and xylenes) involve two steps: (1) an initial oxidation mediated by a toluene monooxygenase and (2) a second oxidation step catalyzed by a phenol hydroxylase. In these pathways, the toluene monooxygenases have been referred to as "ring hydroxylating monooxygenases" because they initiate biodegradation of toluene by incorporating oxygen directly into the aromatic ring rather than at a methyl group. The ring hydroxylating monooxygenases (RMOs) can be further described as toluene-2-monooxygenases, toluene-3-monooxygenases, or toluene-4-monooxygenases based upon where they attack the aromatic ring.



In General, phenol hydroxylases (PHE) catalyze the continued oxidation of phenols produced by RMOs. However, the difference between toluene monooxygenases (RMOs) and phenol hydroxylases (PHEs) is not absolute in terms of substrate specificity and catabolic function. For example, the TbmD toluene/benzene-2-monooxygenase [1] may be responsible for both the initial and second oxidation step [2].

The RMO, RDEG, and PHE assays target groups of genes encoding enzymes which perform the critical first and/or second steps in the aerobic biodegradation of BTEX compounds. In general terms, the RMO assay quantifies families of toluene-3-monooxygenase and toluene-4-monooxygenase genes. The RDEG assay is used to quantify groups of toluene-2-monooxygenase and phenol hydroxylase genes. Similarly, the PHE assay targets phenol hydroxylase genes and several benzene monooxygenase genes which catalyze both oxidation steps.

Toluene/Xylene Monooxygenase (TOL): The final known pathway for aerobic toluene biodegradation involves initial monooxygenase attack at the methyl group by a toluene/xylene monooxygenase.

Ethylbenzene Dioxygenase (EDO): Similar to TOD, this group of aromatic oxygenases exhibits relatively broad specificity and is responsible for aerobic biodegradation of alkylbenzenes including ethylbenzene and isopropylbenzene or cumene [3].

Biphenyl Dioxygenase (BPH4): In environmental restoration, biphenyl dioxygenases are best known for cometabolism of polychlorinated biphenyls (PCBs). However, this subfamily includes benzene [4] and isopropylbenzene [5] dioxygenases from *Rhodococcus* spp.

Aerobic Biodegradation - MTBE and TBA: With increased use in the 1990s, the fuel oxygenate methyl *tert*-butyl ether (MTBE) has become one of the most commonly detected groundwater contaminants at gasoline contaminated sites. Pure cultures capable of utilizing MTBE as a growth supporting substrate have been isolated [6] and aerobic

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biodegradation of MTBE and the intermediate *tert*-butyl alcohol (TBA) has been reasonably well characterized. The QuantArray®-Petro includes quantification of two gene targets to assess the potential for aerobic biodegradation of MTBE and TBA.

Methylibium petroleiphilum PM1 (PM1): One of the few organisms isolated to date which is capable of utilizing MTBE and TBA as growth supporting substrates [6].

TBA Monooxygenase (TBA): Targets the TBA monooxygenase gene responsible for oxidation of TBA by *Methylibium petroleiphilum* PM1 [7].

Aerobic Biodegradation - Naphthalene and Other PAHs:

Naphthalene Dioxygenase (NAH): Naphthalene dioxygenase incorporates both atoms of molecular oxygen into naphthalene to initiate aerobic metabolism of the compound. However, the broad substrate specificity of naphthalene dioxygenase has been widely noted. When expressed, naphthalene dioxygenase is capable of catalyzing the oxidation of larger PAHs like anthracene, phenanthrene, acenaphthylene, fluorene, and acenaphthene. For a more comprehensive list of reactions mediated by naphthalene dioxygenases, see the University of Minnesota Biocatalysis/Biodegradation Database. (http://eawag-bbd.ethz.ch/naph/ndo.html, [8]).

Phenanthrene Dioxygenases (PHN): The PHN assays quantify phenanthrene/naphthalene dioxygenase genes from a diverse collection of microorganisms including *Pseudomonas*, *Burkholderia*, *Sphingomonas*, and *Acidovorax* spp. As with other naphthalene dioxygenases, substrate specificity is relatively broad and phenanthrene dioxygenases have been implicated in the biodegradation of naphthalene, phenanthrene, and anthracene and the co-oxidation of larger PAHs. Moreover, at least one research group has suggested that the PHN group of phenanthrene/naphthalene dioxygenases may be more environmentally relevant than the classical *nah*-like naphthalene dioxygenase [9].

Aerobic Biodegradation - *n*-alkanes: The *n*-alkanes are a substantial portion of petroleum products and are a component of TPH concentrations. The QuantArray®-Petro also includes quantification of alkane monooxygenase genes (ALK) which allow a wide range of *Proteobacteria* and *Actinomycetals* to grow on *n*-alkanes with carbon lengths from C_5 to C_{16} [10]. The QuantArray®-Petro also includes a second type of alkane hydroxylase (almA) which catalyzes the aerobic biodegradation of longer chain alkanes (C_{20}-C_{32}) by some *Alcanivorax* spp. considered dominant in marine systems [11].

Anaerobic Biodegradation - Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX): BTEX compounds are also susceptible to biodegradation under anoxic and anaerobic conditions although biodegradation pathways for each compound are not as well characterized as aerobic pathways. The QuantArray®-Petro includes sets of assays targeting a number of upper and lower pathway functional genes involved in the anaerobic catabolism of BTEX compounds for better evaluation of anaerobic biodegradation at petroleum contaminated sites.

Benzylsuccinate Synthase (BSS): Of the BTEX compounds, toluene biodegradation under anaerobic conditions is the most extensively studied and best characterized. The first step in this pathway, mediated by benzylsuccinate synthase (*bss*A) is the addition of fumarate onto the toluene methyl group to form benzylsuccinate. While additional pathways are possible, some bacterial isolates capable of anaerobic biodegradation of ethylbenzene and xylenes follow the same metabolic approach where the first step is the addition of fumarate.

Anaerobic Benzene Carboxylase (ABC): Although additional pathways are possible, the only pathway for anaerobic biodegradation of benzene elucidated to date is initiated by a benzene carboxylase enzyme.

Benzoyl Coenzyme A Reductase (BCR): Benzoyl-CoA is the central intermediate in the anaerobic biodegradation of many aromatic hydrocarbons. Benzoyl-CoA Reductase (BCR) is the essential enzyme for reducing the benzene ring structure.

Anaerobic Biodegradation - PAHs: The anaerobic biodegradation of PAHs involves analogous mechanisms to those described for anaerobic biodegradation of BTEX compounds. For example, the anaerobic biodegradation of methyl-substituted PAHs like 2-methylnaphthalene is initiated by fumarate addition to the methyl group while the only characterized pathway for anaerobic naphthalene biodegradation is initiated by a carboxylase.

Naphthylmethylsuccinate Synthase (MNSSA): MNSSA is analogous to the benzylsuccinate synthase described above for anaerobic biodegradation of toluene. Naphthylmethylsuccinate synthase catalyzes the addition of fumarate onto the methyl group of 2-methylnaphthalene [12].

Anaerobic Naphthalene Carboxylase (ANC): To date, the only pathway that has been characterized for anaerobic biodegradation of naphthalene is initiated by a naphthalene carboxylase enzyme [13].

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Anaerobic Biodegradation - *n*-alkanes: As mentioned previously, the *n*-alkanes are a substantial portion of petroleum products and should be considered particularly when site cleanup goals include TPH reduction. The addition of fumarate is a common mechanism for activating and initiating biodegradation of a variety of petroleum hydrocarbons under anaerobic conditions including *n*-alkanes. The QuantArray®-Petro includes quantification of alkyl succinate synthase genes (assA) which have been characterized in nitrate reducing and sulfate reducing isolates utilizing *n*-alkanes from C_6 to at least C_{18} [14].

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SITE LOGIC Report

QuantArray®-Chlor Study

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Report Date: 01/05/2024

Project: Tetrosyl

Reviewed By: *Sarah Keys*

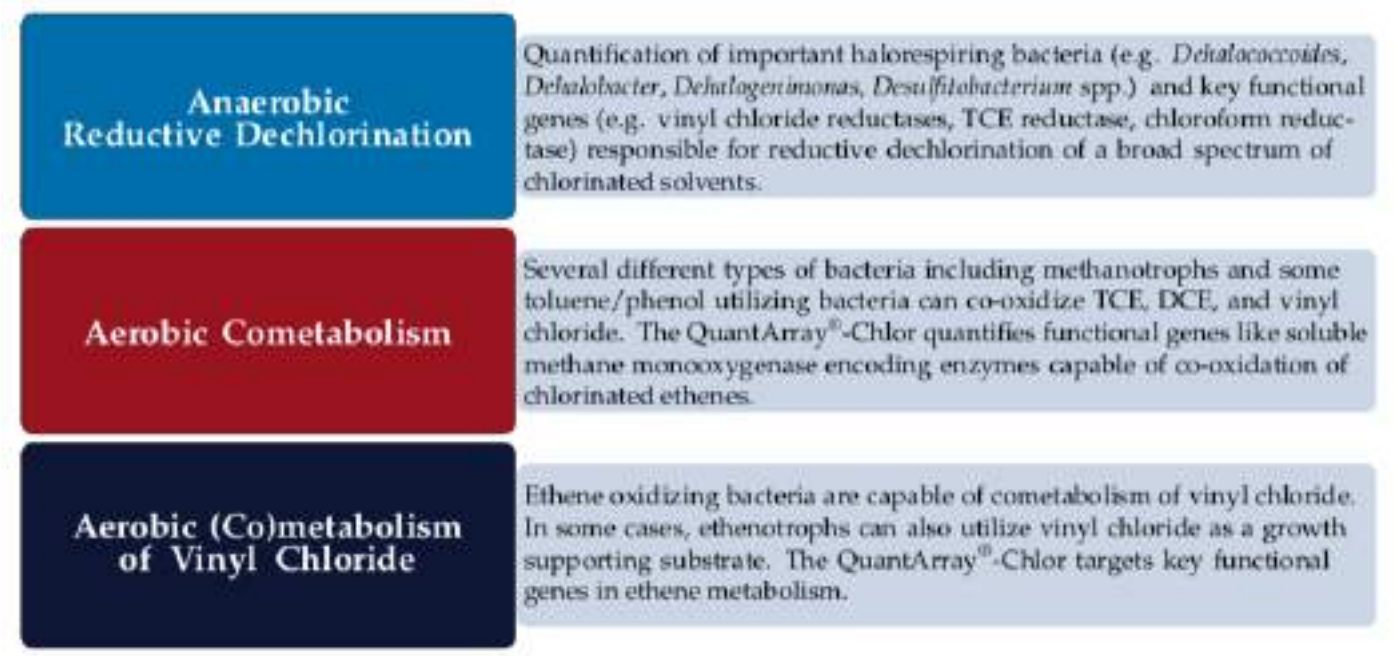
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The QuantArray®-Chlor Approach

Quantification *Dehalococcoides*, the only known bacterial group capable of complete reductive dechlorination of PCE and TCE to ethene, has become an indispensable component of assessment, remedy selection, and performance monitoring at sites impacted by chlorinated solvents. While undeniably a key group of halorespiring bacteria, *Dehalococcoides* are not the only bacteria of interest in the subsurface because reductive dechlorination is not the only potential biodegradation pathway operative at contaminated sites, and chlorinated ethenes are not always the primary contaminants of concern. The QuantArray®-Chlor not only includes a variety of halorespiring bacteria (*Dehalococcoides*, *Dehalobacter*, *Dehalogenimonas*, etc.) to assess the potential for reductive dechlorination of chloroethenes, chloroethanes, chlorobenzenes, chlorophenols, and chloroform, but also provides quantification of functional genes involved in aerobic (co)metabolic pathways for biodegradation of chlorinated solvents and even competing biological processes. Thus, the QuantArray®-Chlor will give site managers the ability to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of common chlorinated contaminants through a multitude of anaerobic and aerobic (co)metabolic pathways to give a much more clear and comprehensive view of contaminant biodegradation.

The QuantArray®-Chlor is used to quantify specific microorganisms and functional genes to evaluate the following:



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Results

Table 1: Summary of the QuantArray®-Chlor results obtained for samples RBH614(S), RBH320, and RBH605

Sample Name Sample Date	RBH614(S) 03/04/2024	RBH320 03/04/2024	RBH605 03/04/2024
Reductive Dechlorination	cells/mL	cells/mL	cells/mL
Dehalococcoides (DHC)	**3.70E+01**	**1.90E+03**	**1.80E+00**
tceA Reductase (TCE)	**3.70E+00**	**5.90E+01**	<7.80E-01
BAV1 Vinyl Chloride Reductase (BVC)	**1.00E+00**	**2.00E+02**	<7.80E-01
Vinyl Chloride Reductase (VCR)	**6.50E+00**	**3.90E+02**	<7.80E-01
Dehalobacter spp. (DHBt)	**4.10E+03**	**1.10E+05**	<7.80E-01
Dehalobacter DCM (DCM)	<2.50E-01	**9.80E+01**	<7.80E-01
Dehalogenimonas spp. (DHG)	**4.40E+02**	<2.50E-01	<7.80E-01
cerA Reductase (CER)	<2.50E-01	<2.50E-01	<7.80E-01
trans-1,2-DCE Reductase (TDR)	<2.50E-01	<2.50E-01	<7.80E-01
Desulfitobacterium spp. (DSB)	**5.70E+03**	**9.90E+04**	**2.60E+01**
Dehalobium chlorocoercia (DECO)	**9.50E+02**	**1.20E+03**	<7.80E-01
Desulfuromonas spp. (DSM)	**4.50E+01**	**2.40E+03**	<7.80E-01
PCE Reductase (PCE-1)	<2.50E-01	**6.70E+01**	<7.80E-01
PCE Reductase (PCE-2)	<2.50E-01	<2.50E-01	<7.80E-01
Chloroform Reductase (CFR)	<2.50E-01	<2.50E-01	<7.80E-01
1,1 DCA Reductase (DCA)	<2.50E-01	<2.50E-01	<7.80E-01
1,2 DCA Reductase (DCAR)	<2.50E-01	<2.50E-01	<7.80E-01
Aerobic (Co)Metabolic			
Soluble Methane Monooxygenase (SMMO)	<2.50E-01	<2.50E-01	<7.80E-01
Toluene Dioxygenase (TOD)	<2.50E-01	<2.50E-01	<7.80E-01
Phenol Hydroxylase (PHE)	**2.30E+04**	**5.00E+04**	**3.80E+02**
Trichlorobenzene Dioxygenase (TCBO)	<2.50E-01	**6.10E+01**	<7.80E-01
Toluene Monooxygenase 2 (RDEG)	**7.30E+03**	**1.10E+04**	**7.00E+02**
Toluene Monooxygenase (RMO)	**1.80E+04**	**8.80E+03**	<7.80E-01
Ethene Monooxygenase (EtnC)	<2.50E-01	<2.50E-01	<7.80E-01
Epoxyalkane Transferase (EtnE)	**1.50E+02**	<2.50E-01	<7.80E-01
Dichloromethane Dehalogenase (DCMA)	<2.50E-01	<2.50E-01	<7.80E-01
Other			
Total Eubacteria (EBAC)	**2.20E+06**	**3.80E+06**	**3.70E+04**
Sulfate Reducing Bacteria (APS)	**1.00E+04**	**1.30E+04**	**1.30E+03**
Methanogens (MGN)	**9.10E+01**	**3.80E+02**	**4.80E-01 (J)**

Legend:

NA = Not Analyzed
NS = Not Sampled
J = Estimated Gene Copies Below PQL but Above LQL
I = Inhibited
< = Result Not Detected

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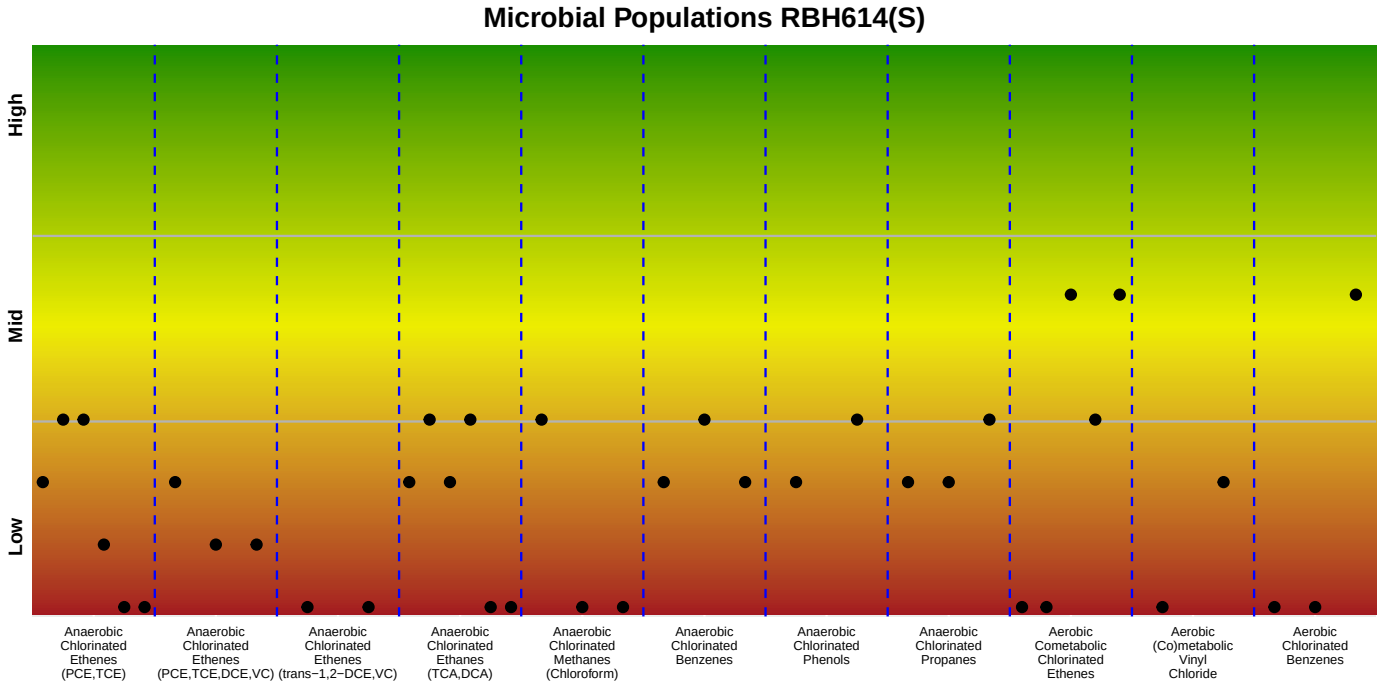


Figure 1: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants. See below to understand the correlation between contaminants and their associated qPCR assays.

Anaerobic - Reductive Dechlorination or Dichloroelimination	
Contaminants	**qPCR Assays**
Chlorinated Ethenes (PCE, TCE)	DHC, DHBt, DSB, DSM, PCE-1, PCE-2
Chlorinated Ethenes (PCE, TCE, DCE, VC)	DHC, BVC, VCR
Chlorinated Ethenes (trans-1,2-DCE, VC)	TDR, CER
Chlorinated Ethanes (TCA and 1,2- DCA)	DHC, DHBt, DHG, DSB[1], DCA, DCAR
Chlorinated Methanes (Chloroform)	DHBt, DCM, CFR
Chlorinated Benzenes	DHC, DHBt[2], DECO
Chlorinated Phenols	DHC, DSB
Chlorinated Propanes	DHC, DHG, DSB[1]
Aerobic - (Co)metabolism	
Chlorinated Ethenes (TCE,DCE,VC)	sMMO, TOD, PHE, RDEG, RMO
(Co)metabolic Vinyl Chloride	etnC, etnE
Chlorinated Benzenes	TOD, TCBO, PHE

[1] *Desulfitobacterium dichloroeliminans* DCA1. [2] Implicated in reductive dechlorination of dichlorobenzene and potentially chlorobenzene.

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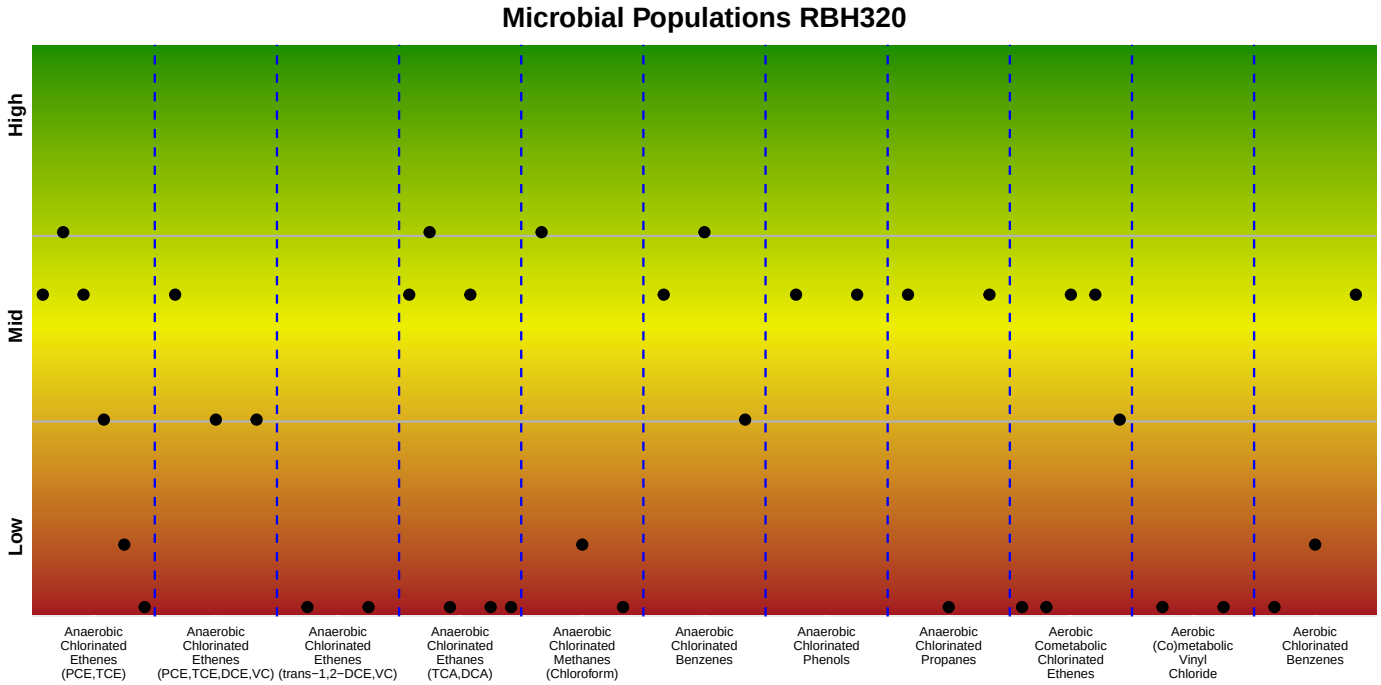


Figure 2: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants. See below to understand the correlation between contaminants and their associated qPCR assays.

Anaerobic - Reductive Dechlorination or Dichloroelimination	
Contaminants	**qPCR Assays**
Chlorinated Ethenes (PCE, TCE)	DHC, DHBt, DSB, DSM, PCE-1, PCE-2
Chlorinated Ethenes (PCE, TCE, DCE, VC)	DHC, BVC, VCR
Chlorinated Ethenes (trans-1,2-DCE, VC)	TDR, CER
Chlorinated Ethanes (TCA and 1,2- DCA)	DHC, DHBt, DHG, DSB[1], DCA, DCAR
Chlorinated Methanes (Chloroform)	DHBt, DCM, CFR
Chlorinated Benzenes	DHC, DHBt[2], DECO
Chlorinated Phenols	DHC, DSB
Chlorinated Propanes	DHC, DHG, DSB[1]
Aerobic - (Co)metabolism	
Chlorinated Ethenes (TCE,DCE,VC)	sMMO, TOD, PHE, RDEG, RMO
(Co)metabolic Vinyl Chloride	etnC, etnE
Chlorinated Benzenes	TOD, TCBO, PHE

[1] *Desulfitobacterium dichloroeliminans* DCA1. [2] Implicated in reductive dechlorination of dichlorobenzene and potentially chlorobenzene.

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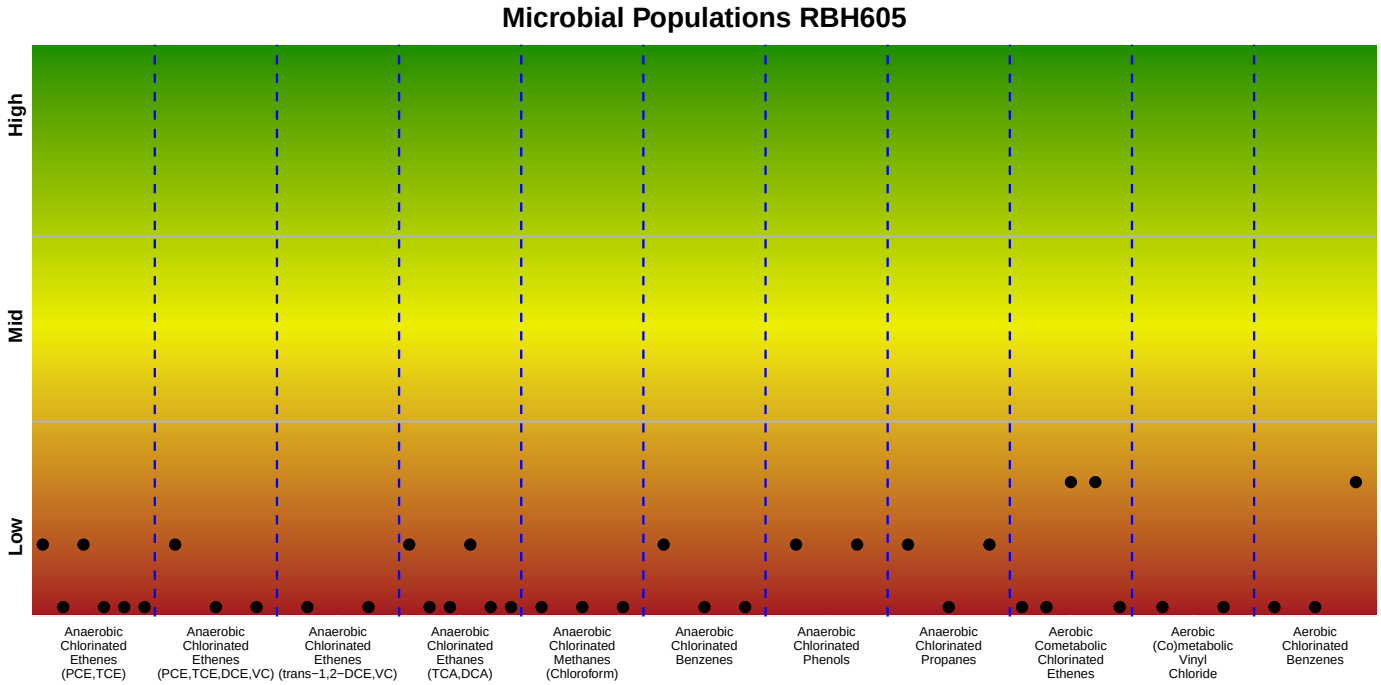


Figure 3: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants. See below to understand the correlation between contaminants and their associated qPCR assays.

Anaerobic - Reductive Dechlorination or Dichloroelimination	
Contaminants	**qPCR Assays**
Chlorinated Ethenes (PCE, TCE)	DHC, DHBt, DSB, DSM, PCE-1, PCE-2
Chlorinated Ethenes (PCE, TCE, DCE, VC)	DHC, BVC, VCR
Chlorinated Ethenes (trans-1,2-DCE, VC)	TDR, CER
Chlorinated Ethanes (TCA and 1,2- DCA)	DHC, DHBt, DHG, DSB[1], DCA, DCAR
Chlorinated Methanes (Chloroform)	DHBt, DCM, CFR
Chlorinated Benzenes	DHC, DHBt[2], DECO
Chlorinated Phenols	DHC, DSB
Chlorinated Propanes	DHC, DHG, DSB[1]
Aerobic - (Co)metabolism	
Chlorinated Ethenes (TCE,DCE,VC)	sMMO, TOD, PHE, RDEG, RMO
(Co)metabolic Vinyl Chloride	etnC, etnE
Chlorinated Benzenes	TOD, TCBO, PHE

[1] *Desulfitobacterium dichloroeliminans* DCA1. [2] Implicated in reductive dechlorination of dichlorobenzene and potentially chlorobenzene.

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Interpretation

The overall purpose of the QuantArray®-Chlor is to give site managers the ability to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of common chlorinated contaminants through a multitude of anaerobic and aerobic (co)metabolic pathways in order to provide a clearer and more comprehensive view of contaminant biodegradation. The following discussion describes the interpretation of results in general terms and is meant to serve as a guide.

Reductive Dechlorination - Chlorinated Ethenes: While a number of bacterial cultures including *Dehalococcoides*, *Dehalobacter*, *Desulfitobacterium*, *Desulfuromonas* spp. capable, of utilizing PCE and TCE as growth-supporting electron acceptors have been isolated [1–5], *Dehalococcoides* may be the most important because they are the only bacterial group that has been isolated to date which is capable of complete reductive dechlorination of PCE to ethene [6]. In fact, the presence of *Dehalococcoides* has been associated with complete reductive dechlorination to ethene at sites across North America and Europe. Hendrickson and Lu have proposed using a *Dehalococcoides* concentration of 1 x 10^4 cells/mL as a screening criterion to identify sites where biological reductive dechlorination is predicted to proceed at "generally useful" rates [7,8].

At chlorinated ethene sites, any "stall" leading to the accumulation of daughter products, especially vinyl chloride, would be a substantial concern. While *Dehalococcoides* concentrations greater than 1 x 10^4 cells/mL correspond to ethene production and useful rates of dechlorination, the range of chlorinated ethenes degraded varies by strain within the *Dehalococcoides* genus [6,9] and the presence of co-contaminants and competitors can have complex impacts on the halorespiring microbial community [10–15]. Therefore, QuantArray®-Chlor also provides quantification of a suite of reductive dehalogenase genes (PCE, TCE, BVC, VCR, CER, and TDR) to more definitively confirm the potential for reductive dechlorination of all chlorinated ethene compounds including vinyl chloride.

Perhaps most importantly, QuantArray®-Chlor quantifies TCE reductase (TCE) and both known vinyl chloride reductase genes (BVC, VCR) from *Dehalococcoides* to conclusively evaluate the potential for complete reductive dechlorination of chlorinated ethenes to non-toxic ethene [16–18]. In addition, the analysis also includes quantification of reductive dehalogenase genes from *Dehalogenimonas* spp. capable of reductive dechlorination of chlorinated ethenes. More specifically, these are the trans-1,2-DCE dehalogenase gene (TDR) from strain WBC-2 [19] and the vinyl chloride reductase gene (CER) from GP, the only known organisms other than *Dehalococcoides* capable of vinyl chloride reduction [20]. Finally, PCE reductase genes responsible for sequential reductive dechlorination of PCE to *cis*-DCE by *Sulfurospirillum* and *Geobacter* spp. are also quantified. In mixed cultures, evidence increasingly suggests that partial dechlorinators like *Sulfurospirillum}* and *Geobacter* may be responsible for the majority of reductive dechlorination of PCE to TCE and *cis*-DCE while *Dehalococcoides* functions more as *cis*-DCE and vinyl chloride reducing specialists [10,21].

Reductive Dechlorination - Chlorinated Ethanes: Under anaerobic conditions, chlorinated ethanes are susceptible to reductive dechlorination by several groups of halorespiring bacteria including *Dehalobacter*, *Dehalogenimonas*, and *Dehalococcoides*. While the reported range of chlorinated ethanes utilized varies by genus, species, and sometimes at the strain level, several general observations can be made regarding biodegradation pathways and daughter product formation. *Dehalobacter* spp. have been isolated that are capable of sequential reductive dechlorination of 1,1,1-TCA through 1,1-DCA to chloroethane [13]. Biodegradation of 1,1,2-TCA by several halorespiring bacteria including *Dehalobacter* and *Dehalogenimonas* spp. proceeds via dichloroelimination producing vinyl chloride [22–24]. Similarly, 1,2-DCA biodegradation by *Dehalobacter*, *Dehalogenimonas*, and *Dehalococcoides* occurs via dichloroelimination producing ethene. While not utilized by many *Desulfitobacterium* isolates, at least one strain, *Desulfitobacterium dichloroeliminans* strain DCA1, is also capable of dichloroelimination of 1,2-DCA [25]. The 1,2-dichloroethane reductive dehalogenase gene (DCAR) from members of *Desulfitobacterium* and *Dehalobacter* is known to dechlorinate 1,2-DCA to ethene, while the 1,1-dichloroethane reductive dehalogenase (DCA) targets the gene responsible for 1,1-DCA dechlorination in some strains of *Dehalobacter*. In addition to chloroform, chloroform reductase (CFR) has also been shown to be responsible for reductive dechlorination of 1,1,1-TCA [26].

Reductive Dechlorination - Chlorinated Methanes: Chloroform is a common co-contaminant at chlorinated solvent sites and can inhibit reductive dechlorination of chlorinated ethenes. Grostern et al. demonstrated that a *Dehalobacter* population was capable of reductive dechlorination of chloroform to produce dichloromethane [27]. The *cfrA* gene encodes the reductase which catalyzes this initial step in chloroform biodegradation [26]. Justicia-Leon et al. have since shown that dichloromethane can support growth of a distinct group of *Dehalobacter* strains via fermentation [28]. The *Dehalobacter* DCM assay targets the 16S rRNA gene of these strains.

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Reductive Dechlorination - Chlorinated Benzenes: Chlorinated benzenes are an important class of industrial solvents and chemical intermediates in the production of drugs, dyes, herbicides, and insecticides. The physical-chemical properties of chlorinated benzenes as well as susceptibility to biodegradation are functions of their degree of chlorination and the positions of chlorine substituents. Under anaerobic conditions, reductive dechlorination of higher chlorinated benzenes including hexachlorobenzene (HCB), pentachlorobenzene (PeCB), tetrachlorobenzene (TeCB) isomers, and trichlorobenzene (TCB) isomers has been well documented [29], although biodegradation of individual compounds and isomers varies between isolates. For example, *Dehalococcoides* strain CBDB1 reductively dechlorinats HCB, PeCB, all three TeCB isomers, 1,2,3-TCB, and 1,2,4-TCB [9]. *Dehalobium chlorocoercia* DF-1 has been shown to be capable of reductive dechlorination of HCB, PeCB, and 1,2,3,5-TeCB [31]. The dichlorobenzene (DCB) isomers and chlorobenzene (CB) were considered relatively recalcitrant under anaerobic conditions. However, new evidence has demonstrated reductive dechlorination of DCBs to CB and CB to benzene [32] with corresponding increases in concentrations of *Dehalobacter* spp. [33].

Reductive Dechlorination - Chlorinated Phenols: Pentachlorophenol (PCP) was one of the most widely used biocides in the U.S. and despite residential use restrictions, is still extensively used industrially as a wood preservative. Along with PCP, the tetrachlorophenol and trichlorophenol isomers were also used as fungicides in wood preserving formulations. 2,4-Dichlorophenol and 2,4,5-TCP were used as chemical intermediates in herbicide production (e.g. 2,4-D) and chlorophenols are known byproducts of chlorine bleaching in the pulp and paper industry. While the range of compounds utilized varies by strain, some *Dehalococcoides* isolates are capable of reductive dechlorination of PCP and other chlorinated phenols. For example, *Dehalococcoides* strain CBDB1 is capable of utilizing PCP, all three tetrach lorophenol (TeCP) congeners, all six trichlorophenol (TCP) congeners, and 2,3-dichlorophenol (2,3-DCP). PCP dechlorination by strain CBDB1 produces a mixture of 3,5-DCP, 3,4-DCP, 2,4-DCP, 3-CP, and 4-CP [34]. In the same study, however, *Dehalococcoides* strain 195 dechlorinated a more narrow spectrum of chlorophenols which included 2,3-DCP, 2,3,4-TCP, and 2,3,6-TCP, but no other TCPs or PCP. Similar to *Dehalococcoides*, some species and strains of *Desulfitobacterium* are capable of utilizing PCP and other chlorinated phenols. *Desulfitobacterium hafniense* PCP-1 is capable of reductive dechlorination of PCP to 3-CP [35]. However, the ability to biodegrade PCP is not universal among *Desulfitobacterium* isolates. *Desulfitobacterium* spp. strain PCE1 and *D. chlororespirans* strain Co23, for example, can utilize some TCP and DCP isomers, but not PCP for growth [2,36].

Reductive Dechlorination - Chlorinated Propanes: *Dehalogenimonas* is a recently described bacterial genus of the phylum Chloroflexi which also includes the well-known chloroethene-respiring *Dehalococcoides* [23]. The *Dehalogenimonas* isolates characterized to date are also halorespiring bacteria, but utilize a rather unique range of chlorinated compounds as electron acceptors including chlorinated propanes (1,2,3-TCP and 1,2-DCP) and a variety of other vicinally chlorinated alkanes including 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, and 1,2-dichloroethane [23].

Aerobic - Chlorinated Ethene Cometabolism: Under aerobic conditions, several different types of bacteria including methane-oxidizing bacteria (methanotrophs), and many benzene, toluene, ethylbenzene, xylene, and (BTEX)-utilizing bacteria can cometabolize or co-oxidize TCE, DCE, and vinyl chloride [37]. In general, cometabolism of chlorinated ethenes is mediated by monooxygenase enzymes with "relaxed" specificity that oxidize a primary (growth supporting) substrate (*e.g.* methane) and co-oxidize the chlorinated compound (*e.g.* TCE). QuantArray®-Chlor provides quantification of a suite of genes encoding oxygenase enzymes capable of co-oxidation of chlorinated ethenes including soluble methane monooxygenase (sMMO). Soluble methane monooxygenases co-oxidize a broad range of chlorinated compounds [38–41] including TCE, *cis*-DCE, and vinyl chloride. Furthermore, soluble methane monooxygenases are generally believed to support greater rates of aerobic cometabolism [40]. QuantArray®-Chlor also quantifies aromatic oxygenase genes encoding ring hydroxylating toluene monooxygenase genes (RMO, RDEG), toluene dioxygenase (TOD) and phenol hydroxylases (PHE) capable of TCE co-oxidation [42–46]. TCE or a degradation product has been shown to induce expression of toluene monooxygenases in some laboratory studies [43,47] raising the possibility of TCE cometabolism with an alternative (non-aromatic) growth substrate. Moreover, while a number of additional factors must be considered, recent research under ESTCP Project 201584 has shown positive correlations between concentrations of monooxygenase genes (soluble methane monooxygenase, ring hydroxylating monooxygenases, and phenol hydroxylase) and the rate of TCE degradation [48].

Aerobic - Chlorinated Ethane Cometabolism: While less widely studied than cometabolism of chlorinated ethenes, some chlorinated ethanes are also susceptible to co-oxidation. As mentioned previously, soluble methane monooxygenases (sMMO) exhibit very relaxed specificity. In laboratory studies, sMMO has been shown to co-oxidize a number of chlorinated ethanes including 1,1,1-TCA and 1,2-DCA [38,40].

Aerobic - Vinyl Chloride Cometabolism: Beginning in the early 1990s, numerous microcosm studies demonstrated

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aerobic oxidation of vinyl chloride under MNA conditions without the addition of exogenous primary substrates. Since then, strains of *Mycobacterium*, *Nocardioides*, *Pseudomonas*, *Ochrobactrum*, and *Ralstonia* species have been isolated which are capable of aerobic growth on both ethene and vinyl chloride (see Mattes et al. [49] for a review). The initial steps in the pathway are the monooxygenase (*etn*ABCD) catalyzed conversion of ethene and vinyl chloride to their respective epoxyalkanes (epoxyethane and chlorooxirane), followed by epoxyalkane:CoM transferase (*etn*E) mediated conjugation and breaking of the epoxide [50].

Aerobic - Chlorinated Benzenes: In general, chlorobenzenes with four or less chlorine groups are susceptible to aerobic biodegradation and can serve as growth-supporting substrates. Toluene dioxygenase (TOD) has a relatively relaxed substrate specificity and mediates the incorporation of both atoms of oxygen into the aromatic ring of benzene and substituted benzenes (toluene and chlorobenzene). Comparison of TOD levels in background and source zone samples from a CB-impacted site suggested that CBs promoted growth of TOD-containing bacteria [51]. In addition, aerobic biodegradation of some trichlorobenzene and even tetrachlorobenzene isomers is initiated by a group of related trichlorobenzene dioxygenase genes (TCBO). Finally, phenol hydroxylases catalyze the continued oxidation and in some cases, the initial oxidation of a variety of monoaromatic compounds. In an independent study, significant increases in numbers of bacteria containing PHE genes corresponded to increases in biodegradation of DCB isomers [51].

Aerobic - Chlorinated Methanes: Many aerobic methylotrophic bacteria, belonging to diverse genera (*Hyphomicrobium*, *Methylobacterium*, *Methylophilus*, *Pseudomonas*, *Paracoccus*, and *Alibacter*) have been isolated which are capable of utilizing dichloromethane (DCM) as a growth substrate. The DCM metabolic pathway in methylotrophic bacteria is initiated by a dichloromethane dehalogenase (DCMA) gene. DCMA is responsible for aerobic biodegradation of dichloromethane by methylotrophs by first producing formaldehyde which is then further oxidized [52].

As discussed in previous sections, soluble methane monooxygenase (sMMO) exhibits relaxed specificity and co-oxidizes a broad spectrum of chlorinated hydrocarbons. In addition to chlorinated ethenes, sMMO has been shown to co-oxidize chloroform in laboratory studies [38,41].

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APPENDIX D

Site-Specific Chemical Test Results & Field Monitoring Data

Phase 2 Sampling event 03-04 April 2024					Aliphatics								Aromatics						
Sample	Depth		Sample Type	Date sampled	>C5-C6	>C6-C8	>C8-C10	>C10-C12	>C12-C16	>C16-C21	>C21-C35	Total aliphatics C5-35	>C5-EC7	>EC7-EC8	>EC8-EC10	>EC10-EC12	>EC12-EC16	>EC16-EC21	>EC21-EC35
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	34	17	15	<5	<10	<10	<10	66	<10	<10	<10	<5	<10	<10	<10
RBH608	3.00-5.00		Ground Water	04/04/2024	14	<10	<10	<5	<10	<10	<10	14	<10	<10	<10	<5	<10	<10	<10
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	15	505	167	<5	<10	<10	<10	687	<10	1769	877	<5	<10	<10	<10
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	657$_{AC}$	17363$_{AC}$	8352$_{AC}$	25	<10	<10	<10	26397	<100$_{AC}$	56719$_{AC}$	41555$_{AC}$	618	<10	<10	<10
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<10	178	94	<5	<10	<10	<10	272	<10	528	431	<5	<10	<10	<10
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<10	37	16	<5	<10	<10	<10	53	<10	60	43	<5	<10	<10	<10
RBH320	3.00-6.00		Ground Water	24/01/2024	65	11828	5835	<5	<10	<10	<10	17728	74	40248	27130	657	<10	<10	<10
RBH321	3.00-6.00		Ground Water	03/04/2024	81	3076	1777	<5	<10	<10	<10	4934	12	10083	8519	227	<10	<10	<10
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	19	41	25	<5	<10	<10	<10	85	<10	<10	<10	<5	<10	<10	<10
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	65	692	248	<5	<10	<10	<10	1005	10	107	428	<5	<10	<10	<10
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	34	57	124	<5	<10	<10	<10	215	<10	42	369	<5	<10	<10	<10
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	62	69	131	<5	<10	<10	<10	262	<10	19	324	<5	<10	<10	<10
RBH612	4.00-6.00		Ground Water	04/04/2024	55	<10	<10	<5	<10	<10	<10	55	<10	<10	<10	<5	<10	<10	<10
RBH613	9.00-11.00		Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10
RBH605	5.50-7.50		Ground Water	03/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	31	332	20	<5	<10	<10	<10	383	<10	25	83	<5	<10	<10	<10
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<10	99	<10	<5	<10	<10	<10	99	<10	<10	<10	<5	<10	<10	<10
RBH602	7.50-10.50		Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10
Min					<10	17	15	<5	<10	<10	<10	<10	10	<10	<10	<5	<10	<10	<10
Max					657	17363	8352	25	<10	<10	<10	26397	74	56719	41555	657	<10	<10	<10
Criteria					15,000	4,030,000	No breakthrough at compliance point	No breakthrough at compliance point	300	-	-	-	19.9	165	182	No breakthrough at compliance point	90	90	90
					WHO	SS	SS	SS	WHO				SS	SS	SS	SS	WHO	WHO	WHO

Phase 2 Sampling event 03-04 April 2024							MTBE & BTEX													
Sample	Depth		Sample Type	Date sampled	Total aromatics C5-35	Total aliphatics and aromatics(C5-35)	Methyl Tertiary Butyl Ether	Benzene	Toluene	Ethylbenzene	m/p-Xylene	o-Xylene	total-Xylene	Dichlorodifluoromethane	Methyl Tertiary Butyl Ether	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024			2.6	1.9	<5	<1	<2	<1	<3	591	2.6	<3	1	<1	<3	<3
RBH608	3.00-5.00		Ground Water	04/04/2024			2.2	<0.5	<5	<1	<2	<1	<3	451	2.2	<3	0.3	<1	<3	<3
RBH603(S)	3.50-5.00		Ground Water	04/04/2024			2.1	3.4	1923$_{AB}$	168	565	126		159	2.1	<3	1.6	<1	<3	<3
RBH603(D)	7.00-9.00		Ground Water	04/04/2024			0.1	<0.5	<5	<1	<2	<1	<3	56	0.1	<3	<0.1	<1	<3	<3
RBH601(S)	5.00-7.00		Ground Water	03/04/2024			<0.1	<0.5	<5	<1	<2	<1	<3	<2	<0.1	<3	<0.1	<1	<3	<3
RBH601(D)	9.00-11.00		Ground Water	03/04/2024			<0.1	<0.5	<5	<1	<2	<1	<3	<2	<0.1	<3	<0.1	<1	<3	<3
RBH609(S)	3.00-5.00		Ground Water	03/04/2024			23	50.2	61942$_{AD}$	8207$_{AC}$	29765$_{AD}$	6455$_{AC}$	36220	5	23	<3	4.4	<1	<3	<3
RBH609(D)	6.50-8.50		Ground Water	03/04/2024			1.5	1.2	596	33	359	69	428	23	1.5	<3	0.5	<1	<3	<3
RBH610(D)	6.50-8.00		Ground Water	03/04/2024			0.6	1.1	59	7	21	3	24	99	0.6	<3	3.6	<1	<3	<3
RBH320	3.00-6.00		Ground Water	24/01/2024			13.2	88.5	47763$_{AD}$	6823$_{AC}$	19978$_{AD}$	3980$_{AC}$	23958	87	13.2	<3	3.9	<1	<3	<3
RBH321	3.00-6.00		Ground Water	03/04/2024			8	12.8	10339$_{AD}$	1582$_{AC}$	6228$_{AC}$	1236$_{AC}$	7464	74	8	<3	5.2	<1	<3	<3
RBH615(S)	3.00-5.00		Ground Water	03/04/2024			5.9	<0.5	<5	<1	<2	<1	<3	88	5.9	<3	1.8	<1	<3	<3
RBH615(D)	9.00-12.00		Ground Water	03/04/2024			0.6	10.5	118	221	211	36	247	661	0.6	<3	0.4	<1	<3	<3
RBH614(S)	4.00-6.00		Ground Water	03/04/2024			5.8	8.3	44	142	195	33	228	217	5.8	<3	0.7	<1	<3	<3
RBH614(D)	9.00-12.00		Ground Water	03/04/2024			1.3	9.9	20	227	131	14	145	627	1.3	<3	0.7	<1	<3	<3
RBH612	4.00-6.00		Ground Water	04/04/2024			3.1	<0.5	<5	<1	<2	<1	<3	871	3.1	<3	0.7	<1	<3	<3
RBH613	9.00-11.00		Ground Water	04/04/2024			0.3	<0.5	<5	<1	<2	<1	<3	61	0.3	<3	<0.1	<1	<3	<3
RBH605	5.50-7.50		Ground Water	03/04/2024			0.9	<0.5	<5	<1	<2	<1	<3	134	0.9	<3	0.3	<1	<3	<3
RBH604(S)	5.50-7.00		Ground Water	04/04/2024			0.3	<0.5	<5	<1	<2	<1	<3	32	0.3	<3	<0.1	<1	<3	<3
RBH604(D)	9.50-11.50		Ground Water	04/04/2024			<0.1	<0.5	<5	<1	<2	<1	<3	23	<0.1	<3	<0.1	<1	<3	<3
RBH606(S)	3.00-5.00		Ground Water	04/04/2024			18.8	5.9	28	45	32	7		278	18.8	<3	0.2	<1	<3	<3
RBH606(D)	7.00-9.00		Ground Water	04/04/2024			5.1	<0.5	<5	2	3	1		72	5.1	<3	<0.1	<1	<3	<3
RBH602	7.50-10.50		Ground Water	04/04/2024			0.6	<0.5	<5	<1	<2	<1	<3	10	0.6	<3	<0.1	<1	<3	<3
Min		0			0	0	<0.1	<0.5	<5	<1	<2	<1	<3	<2	<0.1	<3	<0.1	<1	<3	<3
Max		0			0	0	23	88.5	61942	8207	29765	6455	36220	871	23	<3	5.2	<1	<3	<3
Criteria		-			-	-	273 SS	19.9 SS	165 SS	145 SS	30 EQS AA	30 EQS AA	177 SS	-	273 SS		0.612 SS			

Phase 2 Sampling event 03-04 April 2024

Sample	Depth		Sample Type	Date sampled	1,1-Dichloroethene (1,1 DCE)	Dichloromethane (DCM)	trans-1-2-Dichloroethene	1,1-Dichloroethane	cis-1-2-Dichloroethene	2,2-Dichloropropane	Bromochloromethane	Chloroform	1,1,1-Trichloroethane	1,1-Dichloropropene	Carbon tetrhloride	1,2-Dichloroethane	Benzene	Trichloroethene (TCE)	1,2-Dichloropropane	Dibromomethane
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	1.9	<3	<2	<3
RBH608	3.00-5.00		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<3	<3	<3	<3	6	<1	<2	<2	<2	<3	<2	<2	3.4	7	<2	<3
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	<3	<3	<3	<3	62	<1	<2	<2	<2	<3	<2	<2	50.2	4	<2	<3
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	1.2	<3	<2	<3
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<3	<3	5	<3	23	<1	<2	<2	<2	<3	<2	<2	1.1	9	<2	<3
RBH320	3.00-6.00		Ground Water	24/01/2024	<3	<3	<3	4	58	<1	<2	10	3	<3	<2	<2	88.5	16	<2	<3
RBH321	3.00-6.00		Ground Water	03/04/2024	<3	<3	4	<3	28	<1	<2	<2	<2	<3	<2	<2	12.8	6	<2	<3
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	10.5	<3	<2	<3
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	8.3	<3	<2	<3
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	9.9	<3	<2	<3
RBH612	4.00-6.00		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH613	9.00-11.00		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH605	5.50-7.50		Ground Water	03/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	5.9	<3	<2	<3
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
RBH602	7.50-10.50		Ground Water	04/04/2024	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3

Min	<3	<3	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3
Max	<3	<3	<3	<3	62	<1	<2	10	3	<3	<2	<2	88.5	16	<2	<3
Criteria		924			69.3			5.69				10	19.9	14.1		
		SS			SS			SS				EQS AA	SS	SS		

Phase 2 Sampling event 03-04 April 2024				VOCs															
Sample	**Depth**		**Sample Type**	**Date sampled**	Bromodichloromethane	cis-1-3-Dichloropropene	Toluene	trans-1-3-Dichloropropene	1,1,2-Trichloroethane	Tetrachloroethene (PCE)	1,3-Dichloropropane	Dibromochloromethane	1,2-Dibromoethane	Chlorobenzene	1,1,1,2-Tetrhloroethane	Ethylbenzene	m/p-Xylene	o-Xylene	Xylene-Total	Styrene
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<3	<2
RBH608	3.00-5.00		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<3	<2
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<2	<2	1923$_{AB}$	<2	<2	<3	<2	<2	<2	<2	<2	168	565	126	691	<2
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	<2	<2	61942$_{AD}$	<2	<2	21	<2	<2	<2	72	<2	8207$_{AC}$	29765$_{AD}$	6455$_{AC}$	44427	<2
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<2	<2	596	<2	<2	<3	<2	<2	<2	<2	<2	33	359	69	428	<2
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<2	<2	59	<2	<2	<3	<2	<2	<2	<2	<2	7	21	3	24	<2
RBH320	3.00-6.00		Ground Water	24/01/2024	<2	<2	47763$_{AD}$	<2	<2	12	<2	<2	<2	45	<2	6823$_{AC}$	19978$_{AD}$	3980$_{AC}$	30781	<2
RBH321	3.00-6.00		Ground Water	03/04/2024	<2	<2	10339$_{AD}$	<2	<2	<3	<2	<2	<2	16	<2	1582$_{AC}$	6228$_{AC}$	1236$_{AC}$	9046	<2
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<2	<2	118	<2	<2	<3	<2	<2	<2	<2	<2	221	211	36	247	<2
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<2	<2	44	<2	<2	<3	<2	<2	<2	<2	<2	142	195	33	228	<2
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<2	<2	20	<2	<2	<3	<2	<2	<2	<2	<2	227	131	14	145	<2
RBH612	4.00-6.00		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH613	9.00-11.00		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH605	5.50-7.50		Ground Water	03/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<2	<2	28	<2	<2	<3	<2	<2	<2	<2	<2	45	32	7	39	<2
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	2	3	1	4	<2
RBH602	7.50-10.50		Ground Water	04/04/2024	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2

Min	<2	<2	<5	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2
Max	<2	<2	61942	<2	<2	21	<2	<2	<2	72	<2	8207	29765	6455	44427	<2
Criteria			165			15.5				300		145	30	30	177	
			SS			SS				WHO		SS	EQS AA	EQS AA	SS	

Phase 2 Sampling event 03-04 April 2024

Sample	Depth		Sample Type	Date sampled	Bromoform	Isopropylbenzene	1,1,2,2-Tetrhloroethane	Bromobenzene	1,2,3-Trichloropropane	Propylbenzene	2-Chlorotoluene	1,3,5-Trimethylbenzene	4-Chlorotoluene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	4-Isopropyltoluene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	n-Butylbenzene
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH608	3.00-5.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	3	<3	<3	11	<3	<3	<3	<3	<3
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	<2	107	<4	<2	<3	181	<3	407	<3	8	1409$_{AC}$	9	8	<3	<3	<3
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	8	<3	<3	<3	<3	<3
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH320	3.00-6.00		Ground Water	24/01/2024	<2	106	<4	<2	<3	174	<3	296	<3	21	1273$_{AC}$	15	13	<3	<3	<3
RBH321	3.00-6.00		Ground Water	03/04/2024	<2	18	<4	<2	<3	27	<3	82	<3	<3	328	<3	<3	<3	<3	<3
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<2	5	<4	<2	<3	6	<3	13	<3	<3	27	<3	<3	<3	<3	<3
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<2	5	<4	<2	<3	4	<3	8	<3	<3	19	<3	<3	<3	<3	<3
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<2	4	<4	<2	<3	4	<3	14	<3	<3	32	<3	<3	<3	<3	<3
RBH612	4.00-6.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH613	9.00-11.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH605	5.50-7.50		Ground Water	03/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
RBH602	7.50-10.50		Ground Water	04/04/2024	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3

Min	<2	<3	<4	<2	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Max	<2	107	<4	<2	<3	181	<3	407	<3	21	1409	15	13	<3	<3	<3	
Criteria				-				-		-		-	-	20/200	20/200	-	

EQS AA/MAC EQS AA/MAC E

Phase 2 Sampling event 03-04 April 2024											Phenols									
Sample	**Depth**		**Sample Type**	**Date sampled**	1,2-Dichlorobenzene	1,2-Dibromo-3-chloropropane	1,2,4-Trichlorobenzene	Hexhlorobutiene	Naphthalene	1,2,3-Trichlorobenzene	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH608	3.00-5.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	0.7	<0.5	<0.5	<1	<0.5	<1	<0.5	1	<10
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	3	<2	<3	<3	13	<3	<1	32.5	<0.5	<0.5	24	<0.5	<1	<0.5	71	<10
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	3.3	<0.5	<0.5	<1	<0.5	<1	<0.5	2	<10
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH320	3.00-6.00		Ground Water	24/01/2024	3	<2	<3	<3	33	<3	<1	112.7$_{AB}$	<0.5	<0.5	52	<0.5	<1	<0.5	142$_{AB}$	<10
RBH321	3.00-6.00		Ground Water	03/04/2024	<3	<2	<3	<3	4	<3	<1	16.6	<0.5	<0.5	10	<0.5	<1	<0.5	30	<10
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	0.9	<0.5	<0.5	3	<0.5	<1	<0.5	2	<10
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	1.1	<0.5	<0.5	8	<0.5	<1	<0.5	<1	<10
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	0.6	<0.5	<0.5	7	<0.5	<1	<0.5	<1	<10
RBH612	4.00-6.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH613	9.00-11.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH605	5.50-7.50		Ground Water	03/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	0.7	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
RBH602	7.50-10.50		Ground Water	04/04/2024	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10

Min	<3	<2	<3	<3	<2	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10
Max	3	<2	<3	<3	33	<3	<1	112.7	<0.5	<0.5	52	<0.5	<1	<0.5	142	<10
Criteria	20/200				2/130				-	-	4.2/140	-				-
	:QS AA/MAC				EQS AA/MAC						EQS AA/MAC					

Phase 2 Sampling event 03-04 April 2024							PAHs													
Sample	**Depth**		**Sample Type**	**Date sampled**	Penthlorophenol	Phenol	2-Chloronaphthalene	2-Methylnaphthalene	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthrene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<1	<1	<1	<1	0.3	<0.005	0.401	0.194	0.019	0.007	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH608	3.00-5.00		Ground Water	04/04/2024	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<1	<1	<1	<1	0.4	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	<1	5	<1	2	19.0$_{AC}$	<0.005	0.269	0.095	0.181	0.012	0.016	0.013	<0.005	<0.005	<0.008	<0.008
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<1	<1	<1	<1	0.3	<0.005	0.061	0.018	0.009	<0.005	0.005	0.005	<0.005	<0.005	<0.008	<0.008
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<1	<1	<1	<1	<0.1	<0.005	0.013	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH320	3.00-6.00		Ground Water	24/01/2024	<1	<1	<1	6	21.8$_{AC}$	<0.005	0.07	0.117	0.029	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH321	3.00-6.00		Ground Water	03/04/2024	<1	<1	<1	<1	4.9	<0.005	0.043	0.016	0.023	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<1	<1	<1	<1	0.4	0.008	0.745	0.406	0.072	0.018	0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<1	<1	<1	<1	1.8	0.025	1.904	1.145	0.359	0.034	0.009	0.005	<0.005	<0.005	<0.008	<0.008
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<1	<1	<1	<1	1.3	<0.005	0.369	0.148	0.019	0.009	0.008	0.006	<0.005	<0.005	<0.008	<0.008
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<1	<1	<1	<1	2.8	0.016	1.587	0.833	0.169	0.04	0.03	0.015	<0.005	<0.005	<0.008	<0.008
RBH612	4.00-6.00		Ground Water	04/04/2024	<1	<1	<1	<1	<0.1	0.01	0.182	0.113	<0.005	<0.005	0.019	0.021	0.016	0.011	0.011	<0.008
RBH613	9.00-11.00		Ground Water	04/04/2024	<1	<1	<1	<1	0.4	<0.005	<0.005	<0.005	<0.005	<0.005	0.014	0.015	0.012	0.008	0.01	<0.008
RBH605	5.50-7.50		Ground Water	03/04/2024	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	0.011	<0.005	0.02	0.022	0.016	0.013	0.017	<0.008
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<1	<1	<1	<1	<0.1	<0.005	0.008	0.007	0.035	0.009	0.07	0.07	0.039	0.04	0.047	0.018
RBH602	7.50-10.50		Ground Water	04/04/2024	<1	<1	<1	<1	<0.1	<0.005	0.011	0.01	0.043	0.015	0.063	0.06	0.035	0.033	<0.008	<0.008

Min	<1	<1	<1	<1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.055	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008
Max	<1	5	<1	6	21.8	0.025	1.904	1.145	0.359	0.04	0.07	0.07	0.039	0.04	0.047	0.018
Criteria		1,430,000		-	2/130	-	-	-	-	0.1	0.0063 / 0.12	-	-	-	0.017	0.017
		SS			EQS AA/MAC					EQS AA/MAC	QS AA/MAC				EQS MAC	EQS MAC

Phase 2 Sampling event 03-04 April 2024									Phthalates												
Sample	**Depth**		**Sample Type**	**Date sampled**	Benzo(a)pyrene	Indeno(123cd)pyrene	Dibenzo(ah)anthrene	Benzo(ghi)perylene	Bis(2-ethylhexyl) phthalate	Butylbenzyl phthalate	Di-n-butyl phthalate	Di-n-Octyl phthalate	Diethyl phthalate	Dimethyl phthalate	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Nitroaniline	2,4-Dinitrotoluene
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH608	3.00-5.00		Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	3	<1	1	<1	<1	<0.5
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH320	3.00-6.00		Ground Water	24/01/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	3	<1	2	<1	<1	<0.5
RBH321	3.00-6.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH612	4.00-6.00		Ground Water	04/04/2024	0.007	0.005	<0.005	0.006	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH613	9.00-11.00		Ground Water	04/04/2024	0.007	0.005	<0.005	0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH605	5.50-7.50		Ground Water	03/04/2024	0.012	0.009	<0.005	0.009	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	0.039	0.026	0.006	0.024	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
RBH602	7.50-10.50		Ground Water	04/04/2024	<0.005	0.026	<0.005	0.025	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
Min					<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
Max					0.039	0.026	0.006	0.025	<5	<1	<1.5	<1	<1	<1	3	<1	2	<1	<1	<0.5
Criteria					.00017/0.2	-	-	0.0082	-								20/200		20/200	20/200
					QS AA/MAC			EQS MAC									EQS AA/MAC		EQS AA/MA	QS AA/MA

Phase 2 Sampling event 03-04 April 2024				Other SVOCs															
Sample	**Depth**		**Sample Type**	**Date sampled**	2,6-Dinitrotoluene	3-Nitroaniline	4-Bromophenyl phenylether	4-Chloroaniline	4-Chlorophenyl phenylether	4-Nitroaniline	Azobenzene	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Carbazole	Dibenzofuran	Hexhlorobenzene	Hexhlorobutiene	Hexhlorocyclopentiene	Hexhloroethane	Isophorone
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH608	3.00-5.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH320	3.00-6.00		Ground Water	24/01/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH321	3.00-6.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	0.6	1	<1	<1	<1	<1	<0.5
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	0.6	<1	<1	<1	<1	<0.5
RBH612	4.00-6.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH613	9.00-11.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH605	5.50-7.50		Ground Water	03/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
RBH602	7.50-10.50		Ground Water	04/04/2024	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
Min					<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5
Max					<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	0.6	1	<1	<1	<1	<1	<0.5
Criteria																				

Phase 2 Sampling event 03-04 April 2024							Glycols					Speciated Phenols								
Sample	**Depth**		**Sample Type**	**Date sampled**	N-nitrosodi-n-propylamine	Nitrobenzene	Monoethylene glycol	Propylene glycol	Diethylene glycol	Triethylene glycol	Thiodiglycol	Resorcinol	Catechol	Phenol	m/p-cresol	o-cresol	Total cresols	Xylenols	1-naphthol	2,3,5-trimethyl phenol
	m/bgl				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH608	3.00-5.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	0.02	0.11	0.05	0.16	0.06	<0.01	<0.01
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH320	3.00-6.00		Ground Water	24/01/2024	<0.5	<1						0.01	<0.01	<0.01	0.23	0.18	0.41	0.09	<0.01	<0.01
RBH321	3.00-6.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	0.05	0.03	0.08	<0.06	<0.01	<0.01
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH612	4.00-6.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH613	9.00-11.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH605	5.50-7.50		Ground Water	03/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
RBH602	7.50-10.50		Ground Water	04/04/2024	<0.5	<1						<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
Min					<0.5	<1	0	0	0	0	0	<0.01	<0.01	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01
Max					<0.5	<1	0	0	0	0	0	0.01	<0.01	0.02	0.23	0.18	0.41	0.09	<0.01	<0.01
Criteria									14,000 USEPA	14,000 USEPA	14,000 USEPA	14,000 USEPA	14,000 USEPA	1,280,000 SS	-	-	-	-	-	-

Phase 2 Sampling event 03-04 April 2024						
Sample	**Depth**		**Sample Type**	**Date sampled**	2-isopropylphenol	Total Speciated Phenols HPLC
	m/bgl				ug/l	mg/l
RBH607	4.00-6.00		Ground Water	04/04/2024	<0.01	<0.1
RBH608	3.00-5.00		Ground Water	04/04/2024	<0.01	<0.1
RBH603(S)	3.50-5.00		Ground Water	04/04/2024	<0.01	<0.1
RBH603(D)	7.00-9.00		Ground Water	04/04/2024	<0.01	<0.1
RBH601(S)	5.00-7.00		Ground Water	03/04/2024	<0.01	<0.1
RBH601(D)	9.00-11.00		Ground Water	03/04/2024	<0.01	<0.1
RBH609(S)	3.00-5.00		Ground Water	03/04/2024	<0.01	0.2
RBH609(D)	6.50-8.50		Ground Water	03/04/2024	<0.01	<0.1
RBH610(D)	6.50-8.00		Ground Water	03/04/2024	<0.01	<0.1
RBH320	3.00-6.00		Ground Water	24/01/2024	<0.01	0.5
RBH321	3.00-6.00		Ground Water	03/04/2024	<0.01	<0.1
RBH615(S)	3.00-5.00		Ground Water	03/04/2024	<0.01	<0.1
RBH615(D)	9.00-12.00		Ground Water	03/04/2024	<0.01	<0.1
RBH614(S)	4.00-6.00		Ground Water	03/04/2024	<0.01	<0.1
RBH614(D)	9.00-12.00		Ground Water	03/04/2024	<0.01	<0.1
RBH612	4.00-6.00		Ground Water	04/04/2024	<0.01	<0.1
RBH613	9.00-11.00		Ground Water	04/04/2024	<0.01	<0.1
RBH605	5.50-7.50		Ground Water	03/04/2024	<0.01	<0.1
RBH604(S)	5.50-7.00		Ground Water	04/04/2024	<0.01	<0.1
RBH604(D)	9.50-11.50		Ground Water	04/04/2024	<0.01	<0.1
RBH606(S)	3.00-5.00		Ground Water	04/04/2024	<0.01	<0.1
RBH606(D)	7.00-9.00		Ground Water	04/04/2024	<0.01	<0.1
RBH602	7.50-10.50		Ground Water	04/04/2024	<0.01	<0.1

Min	<0.01	<0.1
Max	<0.01	0.5
Criteria	-	-

Phase 2 Sampling event 24-25 January 2024					Aliphatics											
Lab ref	Sample	Depth	Sample Type	Date sampled	>C5-C6	>C6-C8	>C8-C10	>C10-C12	>C12-C16	>C16-C21	>C21-C35	Total aliphatics C5-35	>C5-EC7	>EC7-EC8	>EC8-EC10	>EC10-EC12
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	48	29	21	*5*	*10*	*10*	*10*	98	*10*	*10*	*10*	*5*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	17	*10*	*10*	*10*	*5*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	512	17132	9407	*5*	*10*	*10*	*10*	27051	*100*	53437	46625	542
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	49	608	233	*5*	*10*	*10*	*10*	890	*10*	1962	1195	41
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*10*	19	*10*	*5*	*10*	*10*	*10*	19	*10*	*10*	*10*	*5*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*100*	13584	6322	*5*	*10*	*10*	*10*	19906	*100*	45151	29068	676
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	199	12576	6801	54	*10*	*10*	*10*	19630	*100*	40900	33107	453
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	14	20	17	*5*	*10*	*10*	*10*	51	*10*	*10*	*10*	*5*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	21	308	67	*5*	*10*	*10*	*10*	396	*10*	19	33	*5*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	28	71	27	*5*	*10*	*10*	*10*	126	*10*	*10*	36	*5*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	92	464	245	*5*	*10*	*10*	*10*	801	10	151	730	67
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	75	40	46	*5*	*10*	*10*	*10*	161	*10*	*10*	51	*5*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*10*	34	*10*	*5*	*10*	*10*	*10*	34	*10*	*10*	*10*	*5*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*

Min	10	10	10	5	10	10	10	10	10	10	10	5
Max	512	17132	9407	54	10	10	10	27051	100	53437	46625	676
Criteria	15,000	4,030,000	No breakthrough at compliance point	No breakthrough at compliance point	300	-	-	-	19.9	165	182	No breakthrough at compliance point
	WHO	SS	SS	SS	WHO				SS	SS	SS	SS

Phase 2 Sampling event 24-25 January 2024				Aromatics						MTBE & BTEX						
Lab ref	Sample	Depth	Sample Type	Date sampled	>EC12-EC16	>EC16-EC21	>EC21-EC35	Total aromatics C5-35	Total aliphatics and aromatics(C5-35)	Methyl Tertiary Butyl Ether	Benzene	Toluene	Ethylbenzene	m/p-Xylene	o-Xylene	Total-Xylene
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	98	3.1	3.8	*5*	1	2	*1*	*3*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	*10*	2	*0.5*	*5*	*1*	*2*	*1*	*3*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	17	3.8	1.8	*5*	*1*	*2*	1	3
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	*10*	0.6	*0.5*	*5*	*1*	*2*	*1*	*3*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	*10*	*0.1*	*0.5*	*5*	*1*	*2*	*1*	*3*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	*10*	*0.1*	*0.5*	*5*	*1*	*2*	*1*	*3*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	100604	127655	14.6	42.3	45156	6011	25450	4755	30205
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*10*	*10*	*10*	3198	4088	2.4	3.4	2216	197	823	208	1031
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	19	0.7	1.2	*5*	*1*	*2*	1	3
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	50	*10*	*10*	74945	94851	11.2	86.6	48798	6010	18873	3497	22370
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*10*	*10*	*10*	74460	94090	10.3	35.4	42239	5660	20745	4456	25201
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	51	5.3	3.3	*5*	*1*	*2*	*1*	
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*10*	*10*	*10*	52	448	0.7	2	22	15	12	2	14
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*10*	*10*	*10*	36	162	5.2	4	*5*	12	15	3	18
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*10*	*10*	*10*	958	1759	1.8	11.5	175	306	366	76	442
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*10*	*10*	*10*	51	212	3.6	7.5	*5*	11	7	*1*	
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.2	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	1.3	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.4	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.3	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	34	2.3	0.6	*5*	2	*2*	*1*	
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.6	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.6	*0.5*	*5*	*1*	*2*	*1*	

Min	10	10	10	10	10	0.1	0.5	5	1	2	1	
Max	50	10	10	100604	127655	14.6	86.6	48798	6011	25450	4755	30205
Criteria	90	90	90	-	-	273	19.9	165	145	30	30	177
	WHO	WHO	WHO			SS	SS	SS	SS	EQS AA	EQS AA	SS

Phase 2 Sampling event 24-25 January 2024																
Lab ref	Sample	Depth	Sample Type	Date sampled	Dichlorodifluoromethane	Methyl Tertiary Butyl Ether	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	1,1-Dichloroethene (1,1 DCE)	Dichloromethane (DCM)	trans-1-2-Dichloroethene	1,1-Dichloroethane
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	539	3.1	*3*	1	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	248	2	*3*	0.1	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	162	3.8	*3*	3	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	54	0.6	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*2*	*0.1*	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*2*	*0.1*	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	5	14.6	*3*	4	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	34	2.4	*3*	0.5	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	78	0.7	*3*	4.5	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	79	11.2	*3*	3.3	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	22	10.3	*3*	3.8	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	41	5.3	*3*	1.5	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	334	0.7	*3*	0.9	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	255	5.2	*3*	0.4	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	828	1.8	*3*	0.8	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	863	3.6	*3*	0.9	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	46	0.2	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	110	1.3	*3*	0.3	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	33	0.4	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	24	0.3	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	29	2.3	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	16	0.6	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	5	0.6	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*

Min	2	0.1	3	0.1	1	3	3	3	3	3	3
Max	863	14.6	3	4.5	1	3	3	3	3	3	3
Criteria	-	273		0.612					924		
		SS		SS					SS		

Phase 2 Sampling event 24-25 January 2024																
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	cis-1-2-Dichloroethene	2,2-Dichloropropane	Bromochloromethane	Chloroform	1,1,1-Trichloroethane	1,1-Dichloropropene	Carbon tetrhloride	1,2-Dichloroethane	Benzene	Trichloroethene (TCE)	1,2-Dichloropropane
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	3.8	*3*	*2*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	9	*1*	*2*	*2*	*2*	*3*	*2*	*2*	1.8	12	*2*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	55	*1*	*2*	*2*	*2*	*3*	*2*	*2*	42.3	5	*2*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	5	*1*	*2*	*2*	*2*	*3*	*2*	*2*	3.4	5	*2*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	29	*1*	*2*	*2*	*2*	*3*	*2*	*2*	1.2	11	*2*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	53	*1*	*2*	8	*2*	*3*	*2*	*2*	86.6	23	*2*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	51	*1*	*2*	*2*	*2*	*3*	*2*	*2*	35.4	9	*2*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	3.3	*3*	*2*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	2	*3*	*2*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	4	*3*	*2*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	11.5	*3*	*2*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	7.5	*3*	*2*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	0.6	*3*	*2*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*

Min	3	1	2	2	2	3	2	2	0.5	3	2
Max	55	1	2	8	2	3	2	2	86.6	23	2
Criteria	69.3			5.69				10	19.9	14.1	
	SS			SS				EQS AA	SS	SS	

Phase 2 Sampling event 24-25 January 2024					VOCs										
Lab ref	Sample	Depth	Sample Type	Date sampled	Dibromomethane	Bromodichloromethane	cis-1-3-Dichloropropene	Toluene	trans-1-3-Dichloropropene	1,1,2-Trichloroethane	Tetrhloroethene (PCE)	1,3-Dichloropropane	Dibromochloromethane	1,2-Dibromoethane	Chlorobenzene
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*2*	*2*	45156	*2*	*2*	17	*2*	*2*	*2*	66
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*3*	*2*	*2*	2216	*2*	*2*	*3*	*2*	*2*	*2*	3
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*3*	*2*	*2*	48798	*2*	*2*	10	*2*	*2*	*2*	39
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*3*	*2*	*2*	42239	*2*	*2*	7	*2*	*2*	*2*	55
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*3*	*2*	*2*	22	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*3*	*2*	*2*	175	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*

Min	3	2	2	5	2	2	3	2	2	2	2
Max	3	2	2	48798	2	2	17	2	2	2	66
Criteria				165			15.5				300
				SS			SS				WHO

Phase 2 Sampling event 24-25 January 2024															
Lab ref	Sample	Depth	Sample Type	Date sampled	1,1,1,2-Tetrhloroethane	Ethylbenzene	m/p-Xylene	o-Xylene	Total-Xylene	Styrene	Bromoform	Isopropylbenzene	1,1,2,2-Tetrhloroethane	Bromobenzene	1,2,3-Trichloropropane
		m/bgl			ug/l	ug/l	ug/l	ug/l		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*2*	1	2	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*2*	*1*	*2*	1		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*2*	6011	25450	4755	30205	*2*	*2*	79	*4*	*2*	*3*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*2*	197	823	208	1031	*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*2*	*1*	*2*	1	3	*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*2*	6010	18873	3497	22370	*2*	*2*	78	*4*	*2*	*3*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*2*	5660	20745	4456	25201	*2*	*2*	69	*4*	*2*	*3*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*2*	15	12	2	14	*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*2*	12	15	3	18	*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*2*	306	366	76	442	*2*	*2*	5	*4*	*2*	*3*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*2*	11	7	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*2*	2	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*

Min	2	1	2	1	3	2	2	3	4	2	3
Max	2	6011	25450	4755	30205	2	2	79	4	2	3
Criteria		145	30	30	177					-	
		SS	EQS AA	EQS AA	SS						

Phase 2 Sampling event 24-25 January 2024														
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	Propylbenzene	2-Chlorotoluene	1,3,5-Trimethylbenzene	4-Chlorotoluene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	4-Isopropyltoluene	1,3-Dichlorobenzene
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	130	*3*	435	*3*	5	1336	11	10	*3*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*3*	*3*	8	*3*	*3*	25	*3*	*3*	*3*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	144	*3*	308	*3*	19	1047	15	12	*3*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	123	*3*	342	*3*	6	1251	8	6	*3*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	7	*3*	10	*3*	*3*	28	*3*	*3*	*3*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	5	*3*	*3*	*3*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*

Min	3	3	3	3	3	3	3	3	3
Max	144	3	435	3	19	1336	15	12	3
Criteria			-		-		-	-	20/200

EQS AA/MAC

Phase 2 Sampling event 24-25 January 2024													
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	1,4-Dichlorobenzene	n-Butylbenzene	1,2-Dichlorobenzene	1,2-Dibromo-3-chloropropane	1,2,4-Trichlorobenzene	Hexhlorobutiene	Naphthalene	1,2,3-Trichlorobenzene	2-Chlorophenol
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*3*	10	3	*2*	*3*	*3*	31	*3*	*20*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*3*	9	*3*	*2*	*3*	*3*	7	*3*	*1*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*3*	5	*3*	*2*	*3*	*3*	5	*3*	*1*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	2	*3*	*1*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*

Min	3	3	3	2	3	3	2	3	1
Max	3	10	3	2	3	3	31	3	20
Criteria	20/200	-	20/200				2/130		
	EQS AA/MAC		EQS AA/MAC				EQS AA/MAC		

Phase 2 Sampling event 24-25 January 2024				Phenols											
Lab ref	Sample	Depth	Sample Type	Date sampled	2-Methylphenol	2-Nitrophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Penthlorophenol	Phenol
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	29.4	*10*	*10*	27	*10*	*20*	*0.5*	54	*200*	*20*	20
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	10.9	*0.5*	*0.5*	1	*0.5*	*1*	*0.5*	5	*10*	*1*	*1*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	67.6	*0.5*	*0.5*	36	*0.5*	*1*	*0.5*	119	*10*	*1*	*1*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	39	*0.5*	*0.5*	36	*0.5*	*1*	*0.5*	67	*10*	*1*	2
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	1.4	*0.5*	*0.5*	10	*0.5*	*1*	*0.5*	2	*10*	*1*	*1*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*

Min	0.5	0.5	0.5	1	0.5	1	0.5	1	10	1	1
Max	67.6	10	10	36	10	20	0.5	119	200	20	20
Criteria		-	-	4.2/140	-				-		1,430,000
				EQS AA/MAC							SS

Phase 2 Sampling event 24-25 January 2024					PAHs									
Lab ref	Sample	Depth	Sample Type	Date sampled	2-Chloronaphthalene	2-Methylnaphthalene	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*1*	*1*	0.3	0.011	0.44	0.202	0.021	0.008	0.005	*0.005*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*20*	*20*	13.4	*0.005*	0.246	0.103	0.168	0.018	0.021	0.018
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*1*	*1*	0.5	*0.005*	0.024	0.01	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	0.011	0.009	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*1*	5	18.6	*0.005*	0.073	0.128	0.033	*0.005*	*0.005*	*0.005*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*1*	2	9.5	*0.005*	0.12	0.046	0.092	0.017	0.066	0.065
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	0.207	0.092	0.018	0.007	0.019	0.021
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*1*	*1*	0.1	0.005	0.312	0.213	0.058	0.013	0.008	0.005
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	0.1	0.01	0.154	0.064	0.147	0.039	0.306	0.037
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*1*	*1*	1.6	*0.005*	1.442	0.816	0.147	0.051	0.023	0.01
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	0.8	*0.005*	0.732	0.508	0.044	0.016	0.005	0.005
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*1*	*1*	0.9	*0.005*	*0.005*	*0.005*	0.019	0.007	0.028	0.03
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	0.012	*0.005*	0.012	0.013
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	0.009	0.009	0.021	0.006	0.021	0.023
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	0.017	0.018	0.019	0.005	*0.005*	*0.005*

Min	1	1	0.1	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Max	20	20	18.6	0.011	1.442	0.816	0.168	0.051	0.306	0.065
Criteria		-	2/130	-	-	-	-	0.1	0.0063/0.12	-
			EQS AA/MAC					EQS AA/MAC	EQS AA/MAC	

Phase 2 Sampling event 24-25 January 2024													Phthalates			
Lab ref	Sample	Depth	Sample Type	Date sampled	Benzo(a)anthrene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(123cd)pyrene	Dibenzo(ah)anthrene	Benzo(ghi)perylene	Bis(2-ethylhexyl) phthalate	Butylbenzyl phthalate	Di-n-butyl phthalate	Di-n-Octyl phthalate
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1*	*1*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*100*	*20*	*30*	*20*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*0.005*	0.005	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*0.005*	*0.005*	0.032	0.013	0.028	0.027	0.006	0.026	*5*	*1*	*1.5*	*1*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	0.006	0.015	0.012	*0.008*	0.014	0.01	*0.005*	0.011	*5*	*1*	*1.5*	*1*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	0.143	0.2	0.215	0.083	0.181	0.109	0.028	0.115	*5*	*1*	*1.5*	*1*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	0.01	0.021	0.019	*0.008*	0.02	0.013	*0.005*	0.013	*5*	*1*	*1.5*	*1*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*0.005*	0.011	*0.008*	*0.008*	0.01	0.006	*0.005*	0.006	*5*	*1*	*1.5*	*1*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	0.007	0.014	0.013	*0.008*	0.015	0.01	*0.005*	0.01	*5*	*1*	*1.5*	*1*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*

Min	0.005	0.005	0.008	0.008	0.005	0.005	0.005	0.005	5	1	1	1
Max	0.143	0.2	0.215	0.083	0.181	0.109	0.028	0.115	100	20	30	20
Criteria	-	-	0.017 EQS MAC	0.017 EQS MAC	0.00017/0.27 EQS AA/MAC	-	-	0.0082 EQS MAC	-			

Phase 2 Sampling event 24-25 January 2024															
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	Diethyl phthalate	Dimethyl phthalate	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Nitroaniline	2,4-Dinitrotoluene	2,6-Dinitrotoluene	3-Nitroaniline
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*10*	*20*	*20*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	3	*1*	1	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	2	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*

Min	1	1	1	1	1	1	1	0.5	1	1
Max	20	20	20	20	20	20	20	10	20	20
Criteria					20/200		20/200	20/200		
					EQS AA/MAC		EQS AA/MA	EQS AA/MAC		

Phase 2 Sampling event 24-25 January 2024					Other SVOCs								
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	4-Bromophenylphenylether	4-Chloroaniline	4-Chlorophenylphenylether	4-Nitroaniline	Azobenzene	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Carbazole	Dibenzofuran
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*20*	*20*	*20*	*10*	*10*	*10*	*20*	*10*	*10*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	0.6
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*

Min	1	1	1	0.5	0.5	0.5	1	0.5	0.5
Max	20	20	20	10	10	10	20	10	10
Criteria									

Phase 2 Sampling event 24-25 January 2024												Glycols					
Lab ref	Sample	Depth	Sample Type	Date sampled	Hexhloroben zene	Hexhlorobuti ene	Hexhlorocycl opentiene	Hexhloroetha ne	Isophorone	N-nitrosodi-n-propylamine	Nitrobenzene	Monoethylene glycol	Propylene glycol	Diethylene glycol	Triethylene glycol	Thiodiglycol	Resorcinol
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*20*	*20*	*20*	*20*	*10*	*10*	*20*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	20
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*

Min	1	1	1	1	0.5	0.5	1	10	10	10	10	10	10				
Max	20	20	20	20	10	10	20	10	10	10	10	10	20				
Criteria										14,000	14,000	14,000	14,000				
										USEPA	USEPA	USEPA	USEPA				

Phase 2 Sampling event 24-25 January 2024				Speciated Phenols										
Lab ref	Sample	Depth	Sample Type	Date sampled	Catechol	Phenol	m/p-cresol	o-cresol	Total cresols	Xylenols	1-naphthol	2,3,5-trimethyl phenol	2-isopropylphenol	Total Speciated Phenols HPLC
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*10*	20	100	50	150	80	*10*	*10*	*10*	30
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*10*	*10*	*20*	20	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*10*	*10*	150	100	250	70	*10*	*10*	*10*	30
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*10*	*10*	110	60	170	80	*10*	*10*	*10*	30
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*

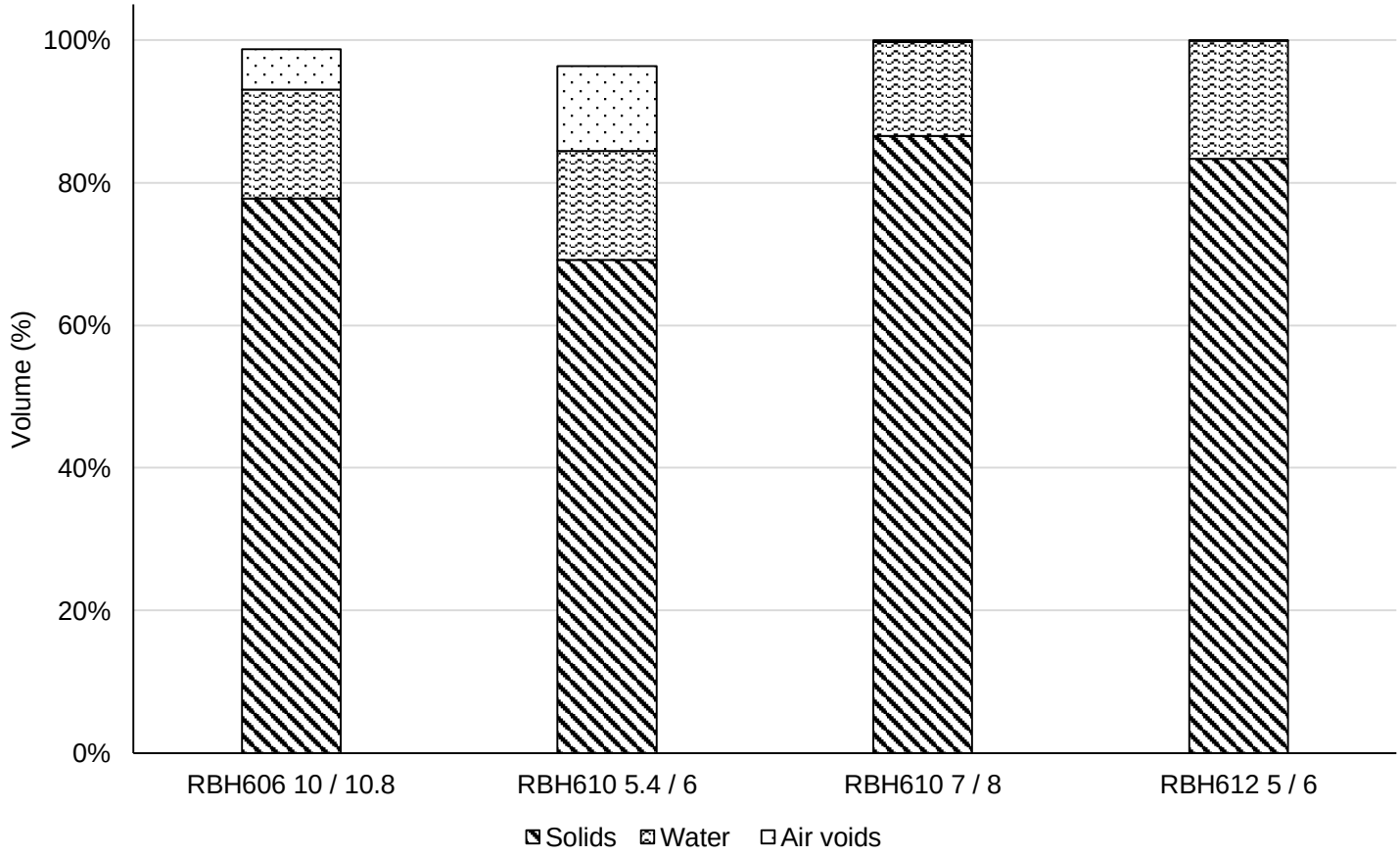
Min	10	10	20	10	30	60	10	10	10	10
Max	10	20	150	100	250	80	10	10	10	30
Criteria	14,000	1,280,000	-	-	-	-	-	-	-	-
	USEPA	SS								

Appendix D.1

Total Porosity & Bulk Density Chemical Test Reports

Geochem	**Porosity and Bulk Density Test Certificate**	**Client**	Smith Grant LLP
		Sample Received	06/12/2023, 7/12/2023, 5/1/2024
Project ID	A231001	**Testing Commenced**	05/03/2024
Project Name	Tetrosyl Porosity and Bulk Density Testing	**Testing Completed**	07/03/2024
Sample Description	Borehole cores sampled from the former Tetrosyl site	**Test Method**	BS1377: Part1: 1990, BS 1377: Part 2: 2022, BS EN 17892: Part 2: 2014
		Tested By	CE Geochem
Sample Preparation and Storage	Snap-frozen on site and stored at -20 °C.	**Analytical Reports**	n/a
		Date Issued	08/03/2024

Borehole ID		**RBH606**	**RBH610**	**RBH610**	**RBH612**
Depth (mbgl)		10 / 10.8	5.4 / 6	7 / 8	5 / 6
Description		SILTSTONE	COAL	SANDSTONE	SANDSTONE
Parameter	Unit				
Bulk Density (ρ)	Mg/m^3	2.35	1.18	2.43	2.39
Moisture Content	%	5.6%	11%	5.0%	6.3%
Dry Density (ρ_d)	Mg/m^3	2.23	1.06	2.31	2.25
Particle Density (ρ_s)	Mg/m^3	2.72	1.39	2.62	2.62
Voids Ratio (e)	–	0.22	0.31	0.13	0.17
Porosity (n)	–	0.18	0.24	0.12	0.14
Degree of Saturation (S_r)	–	0.69	0.49	0.98	1.00
Percentage of Air Voids (V_a)	–	0.06	0.12	0.002	0.001



CE Geochem Ltd

CEG Laboratories
Matlock Road, Kelstedge
Derbyshire. S45 0DX

Version

Remarks

Testing on RBH606 and RBH610 samples performed on partial cores (half-cylinders), testing on RBH612 performed on full cylinder sample.

Approved by:

Thomas Mullan - Environmental Geochemist

APPENDIX D.2

Falling Head Test Data

Smith Grant LLP Falling Head Test Protocol – Tetrosyl, Waldmer's Wood, Bury (13th-14th February 2024)

Tests are to be carried out in the following boreholes:

- BH601 (deep) – should be 50mm standpipe but please check
- BH602
- BH603 (shallow) – should be 19mm standpipe but please check
- BH605
- BH607
- BH610 (deep) – should be 19mm standpipe but please check
- BH612
- BH614 (both)
- BH615 (shallow) – should be 19mm standpipe but please check

See plan for locations.

The following measurements are to be taken prior to the falling head tests:

- Depth to base of borehole (also to be taken following test) from:
    - Ground level
    - Top of standpipe
- Depth to existing groundwater from:
    - Ground level
    - Top of standpipe

Test procedure:

- **Add water into standpipe – to fill up and reach top of casing**,
- Record the flow and the time (in seconds) it has taken to reach the top of casing.
- **Cease filling and immediately take measurements.**
- Take water depth measurements **from the top of casing** as follows (given that the response zones are situated in sandstone and we are expecting fast infiltration rates, quickfire measurements in the first minute are imperative):

    - **Immediately**
    - Every 5 seconds for the first 30 seconds;
    - Every 10 seconds from 30 seconds to 1 minute;
    - Every 30 seconds from 1 minute to 5 minutes;
    - Every 1 minute thereafter until the water level reaches original GW level / stabilises.

We would like 2 test runs to be carried out for each of the boreholes but please do a single round of all of the boreholes first and then repeat the tests for a second time but only once the water level has equilibrated.

Falling Head Permeability Tests
BS 5930. 1999. Section 25.4.6.1

Type: Well point or hole extended in uniform soil

$$K = \frac{A}{F(t_2 - t_1)} log_e \frac{H_1}{H_2}$$

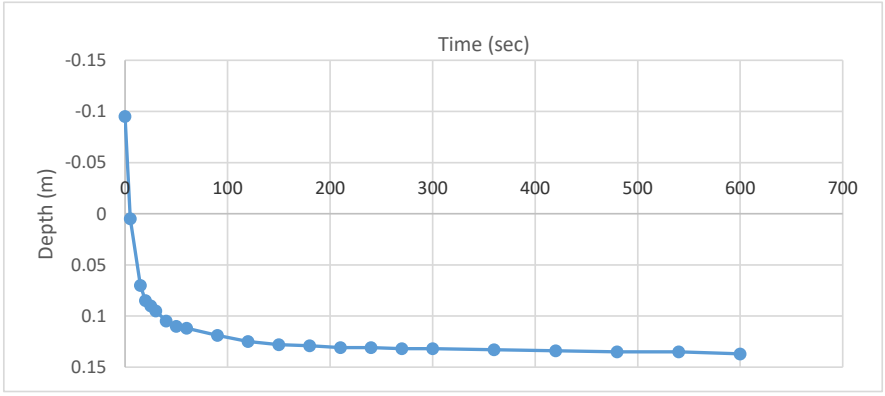
K = Permeability of the soil
A = cross-section area of borehole
F = Intake factor
H_1 = Head measured at time t_1 after commencement of the test
H_2 = Head measured at time t_2 after commencement of the test

	Enter	
Borehole diameter (D)	0.087	metres
Length of test section (L)	1.65	metres
Head at t_1 (H_1)	0.245	metres
Head at t_2 (H_2)	0.013	metres
Time 1 selected t_1	0	seconds
Time 2 selected t_2	600	seconds

Cross section area of borehole (A) = 0.01 m^2

Intake Factor (F) = 2.66

Permeability (K) = 1.09E-05 m / sec



Depth of borehole	11.320 m
Groundwater level before test	0.150 m

Time Sec	Depth (m)	Head (m)
0	-0.095	0.245
5	0.005	0.145
15	0.07	0.080
20	0.085	0.065
25	0.09	0.060
30	0.095	0.055
40	0.105	0.045
50	0.11	0.040
60	0.112	0.038
90	0.119	0.031
120	0.125	0.025
150	0.128	0.022
180	0.129	0.021
210	0.131	0.019
240	0.131	0.019
270	0.132	0.018
300	0.132	0.018
360	0.133	0.017
420	0.134	0.016
480	0.135	0.015
540	0.135	0.015
600	0.137	0.013

Falling Head Permeability Tests
BS 5930. 1999. Section 25.4.6.1

Type: Well point or hole extended in uniform soil

$$K = \frac{A}{F(t_2 - t_1)} log_e \frac{H_1}{H_2}$$

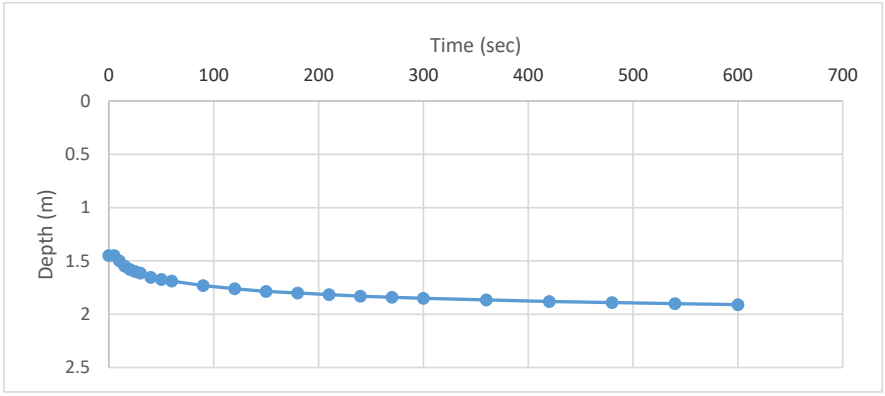
K = Permeability of the soil
A = cross-section area of borehole
F = Intake factor
H_1 = Head measured at time t_1 after commencement of the test
H_2 = Head measured at time t_2 after commencement of the test

	Enter	
Borehole diameter (D)	0.0925	metres
Length of test section (L)	2.62	metres
Head at t_1 (H_1)	0.245	metres
Head at t_2 (H_2)	0.013	metres
Time 1 selected t_1	0	seconds
Time 2 selected t_2	600	seconds

Cross section area of borehole (A) = 0.01 m^2

Intake Factor (F) = 3.83

Permeability (K) = 8.60E-06 m / sec



Depth of borehole	10.120 m
Groundwater level before test	1.960 m

Time (s)	Depth (m)	Head (m)
0	1.45	0.510
5	1.45	0.510
10	1.5	0.460
15	1.55	0.410
20	1.58	0.380
25	1.6	0.360
30	1.615	0.345
40	1.655	0.305
50	1.675	0.285
60	1.69	0.270
90	1.73	0.230
120	1.76	0.200
150	1.785	0.175
180	1.8	0.160
210	1.815	0.145
240	1.83	0.130
270	1.84	0.120
300	1.85	0.110
360	1.865	0.095
420	1.88	0.080
480	1.89	0.070
540	1.9	0.060
600	1.91	0.050

Falling Head Permeability Tests
BS 5930. 1999. Section 25.4.6.1

Type: Well point or hole extended in uniform soil

$$K = \frac{A}{F(t_2 - t_1)} log_e \frac{H_1}{H_2}$$

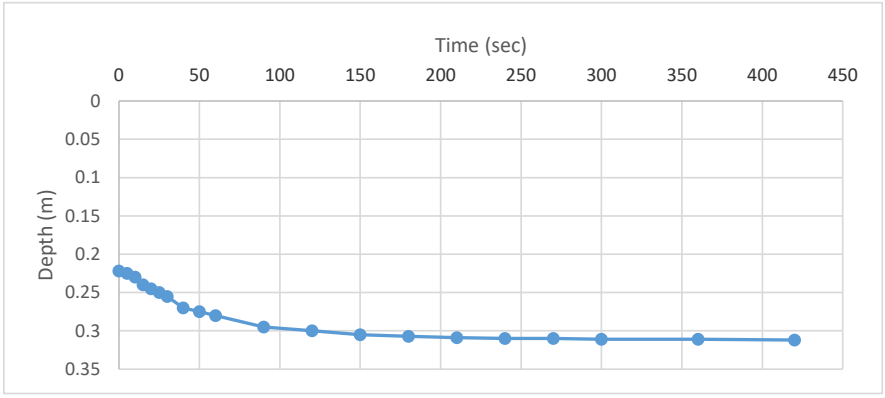
K = Permeability of the soil
A = cross-section area of borehole
F = Intake factor
H_1 = Head measured at time t_1 after commencement of the test
H_2 = Head measured at time t_2 after commencement of the test

	Enter	
Borehole diameter (D)	0.0925	metres
Length of test section (L)	1.52	metres
Head at t_1 (H_1)	0.222	metres
Head at t_2 (H_2)	0.312	metres
Time 1 selected t_1	0	seconds
Time 2 selected t_2	420	seconds

Cross section area of borehole (A) = 0.01 m^2

Intake Factor (F) = 2.54

Permeability (K) = -2.14E-06 m / sec



Depth of borehole	4.520 m
Groundwater level before test	0.036 m

Time (s)	Depth (m)	Head (m)
0	0.222	-0.186
5	0.225	-0.189
10	0.23	-0.194
15	0.24	-0.204
20	0.245	-0.209
25	0.25	-0.214
30	0.255	-0.219
40	0.27	-0.234
50	0.275	-0.239
60	0.28	-0.244
90	0.295	-0.259
120	0.3	-0.264
150	0.305	-0.269
180	0.307	-0.271
210	0.309	-0.273
240	0.31	-0.274
270	0.31	-0.274
300	0.311	-0.275
360	0.311	-0.275
420	0.312	-0.276
480		
540		
600		

Falling Head Permeability Tests
BS 5930. 1999. Section 25.4.6.1

Type: Well point or hole extended in uniform soil

$$K = \frac{A}{F(t_2 - t_1)} log_e \frac{H_1}{H_2}$$

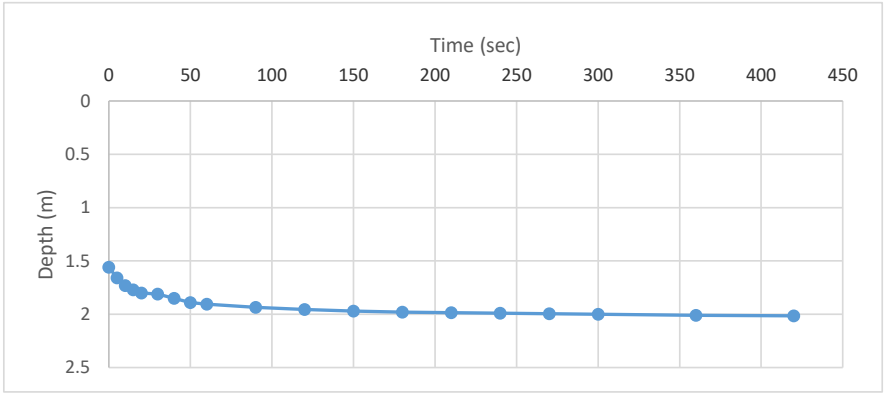
K = Permeability of the soil
A = cross-section area of borehole
F = Intake factor
H_1 = Head measured at time t_1 after commencement of the test
H_2 = Head measured at time t_2 after commencement of the test

	Enter	
Borehole diameter (D)	0.0925	metres
Length of test section (L)	1.9	metres
Head at t_1 (H_1)	0.545	metres
Head at t_2 (H_2)	0.081	metres
Time 1 selected t_1	0	seconds
Time 2 selected t_2	600	seconds

Cross section area of borehole (A) = 0.01 m^2

Intake Factor (F) = 3.00

Permeability (K) = 7.12E-06 m / sec



Depth of borehole	6.270 m
Groundwater level before test	2.105 m

Time (s)	Depth (m)	Head (m)
0	1.56	0.545
5	1.66	0.445
10	1.73	0.375
15	1.77	0.335
20	1.8	0.305
30	1.81	0.295
40	1.85	0.255
50	1.89	0.215
60	1.905	0.200
90	1.935	0.170
120	1.955	0.150
150	1.97	0.135
180	1.98	0.125
210	1.985	0.120
240	1.99	0.115
270	1.995	0.110
300	2	0.105
360	2.01	0.095
420	2.015	0.090
480	2.02	0.085
540	2.021	0.084
600	2.024	0.081

Falling Head Permeability Tests
BS 5930. 1999. Section 25.4.6.1

Type: Well point or hole extended in uniform soil

$$K = \frac{A}{F(t_2 - t_1)} log_e \frac{H_1}{H_2}$$

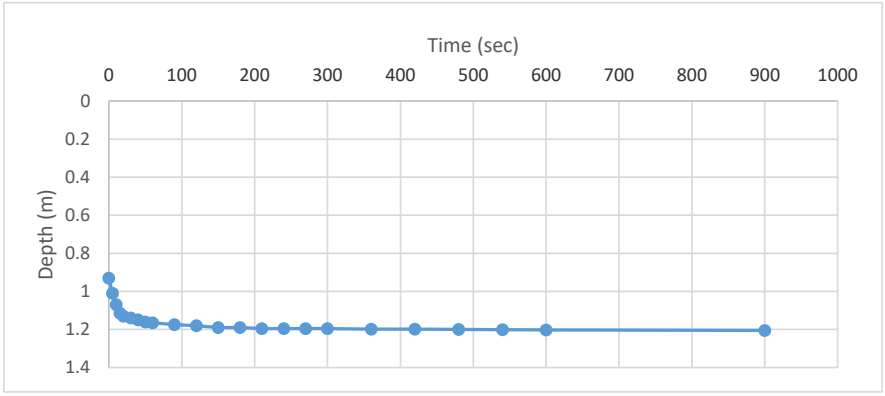
K = Permeability of the soil
A = cross-section area of borehole
F = Intake factor
H_1 = Head measured at time t_1 after commencement of the test
H_2 = Head measured at time t_2 after commencement of the test

	Enter	
Borehole diameter (D)	0.0925	metres
Length of test section (L)	1.8	metres
Head at t_1 (H_1)	0.55	metres
Head at t_2 (H_2)	0.825	metres
Time 1 selected t_1	0	seconds
Time 2 selected t_2	900	seconds

Cross section area of borehole (A) = 0.01 m^2

Intake Factor (F) = 2.88

Permeability (K) = -1.05E-06 m / sec



Depth of borehole	5.800 m
Groundwater level before test	1.260 m

Time (s)	Depth (m)	Head (m)
0	0.93	0.330
5	1.01	0.250
10	1.07	0.190
15	1.115	0.145
20	1.13	0.130
30	1.14	0.120
40	1.15	0.110
50	1.16	0.100
60	1.165	0.095
90	1.175	0.085
120	1.18	0.080
150	1.19	0.070
180	1.19	0.070
210	1.195	0.065
240	1.195	0.065
270	1.195	0.065
300	1.195	0.065
360	1.198	0.062
420	1.198	0.062
480	1.2	0.060
540	1.201	0.059
600	1.202	0.058
900	1.205	0.055

Falling Head Permeability Tests
BS 5930. 1999. Section 25.4.6.1

Type: Well point or hole extended in uniform soil

$$K = \frac{A}{F(t_2 - t_1)} log_e \frac{H_1}{H_2}$$

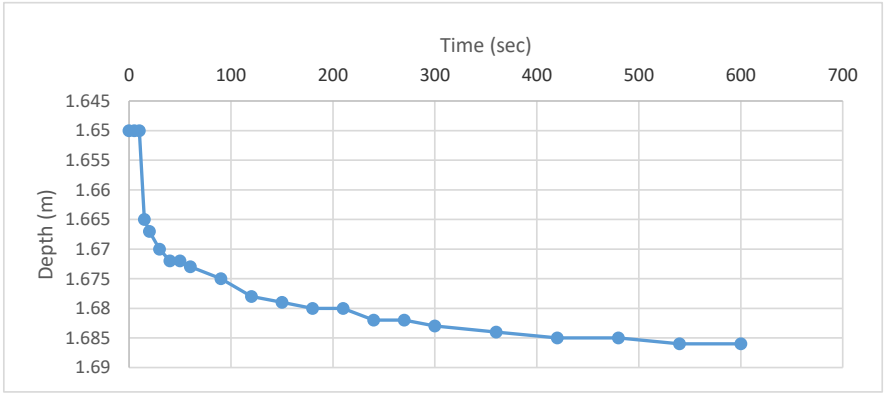
K = Permeability of the soil
A = cross-section area of borehole
F = Intake factor
H_1 = Head measured at time t_1 after commencement of the test
H_2 = Head measured at time t_2 after commencement of the test

	Enter	
Borehole diameter (D)	0.087	metres
Length of test section (L)	1.4	metres
Head at t_1 (H_1)	0.04	metres
Head at t_2 (H_2)	0.004	metres
Time 1 selected t_1	0	seconds
Time 2 selected t_2	900	seconds

Cross section area of borehole (A) = 0.01 m^2

Intake Factor (F) = 2.36

Permeability (K) = 6.45E-06 m / sec



Depth of borehole	10.400 m
Groundwater level before test	1.690 m

Time (s)	Depth (m)	Head (m)
0	1.65	0.040
5	1.65	0.040
10	1.65	0.040
15	1.665	0.025
20	1.667	0.023
30	1.67	0.023
40	1.672	0.020
50	1.672	0.018
60	1.673	0.018
90	1.675	0.017
120	1.678	0.015
150	1.679	0.012
180	1.68	0.011
210	1.68	0.010
240	1.682	0.010
270	1.682	0.008
300	1.683	0.008
360	1.684	0.007
420	1.685	0.005
480	1.685	0.005
540	1.686	0.004
600	1.686	0.004

Falling Head Permeability Tests
BS 5930. 1999. Section 25.4.6.1

Type: Well point or hole extended in uniform soil

$$K = \frac{A}{F(t_2 - t_1)} log_e \frac{H_1}{H_2}$$

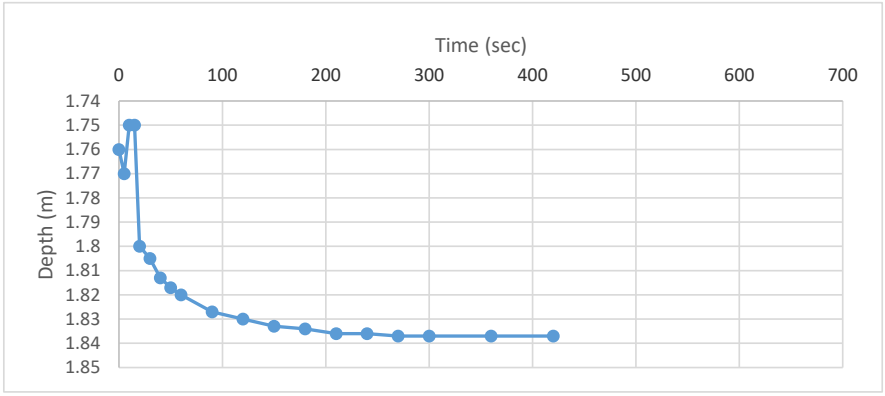
K = Permeability of the soil
A = cross-section area of borehole
F = Intake factor
H_1 = Head measured at time t_1 after commencement of the test
H_2 = Head measured at time t_2 after commencement of the test

	Enter	
Borehole diameter (D)	0.0925	metres
Length of test section (L)	1.8	metres
Head at t_1 (H_1)	0.08	metres
Head at t_2 (H_2)	0.003	metres
Time 1 selected t_1	0	seconds
Time 2 selected t_2	900	seconds

Cross section area of borehole (A) = 0.01 m^2

Intake Factor (F) = 2.88

Permeability (K) = 8.51E-06 m / sec

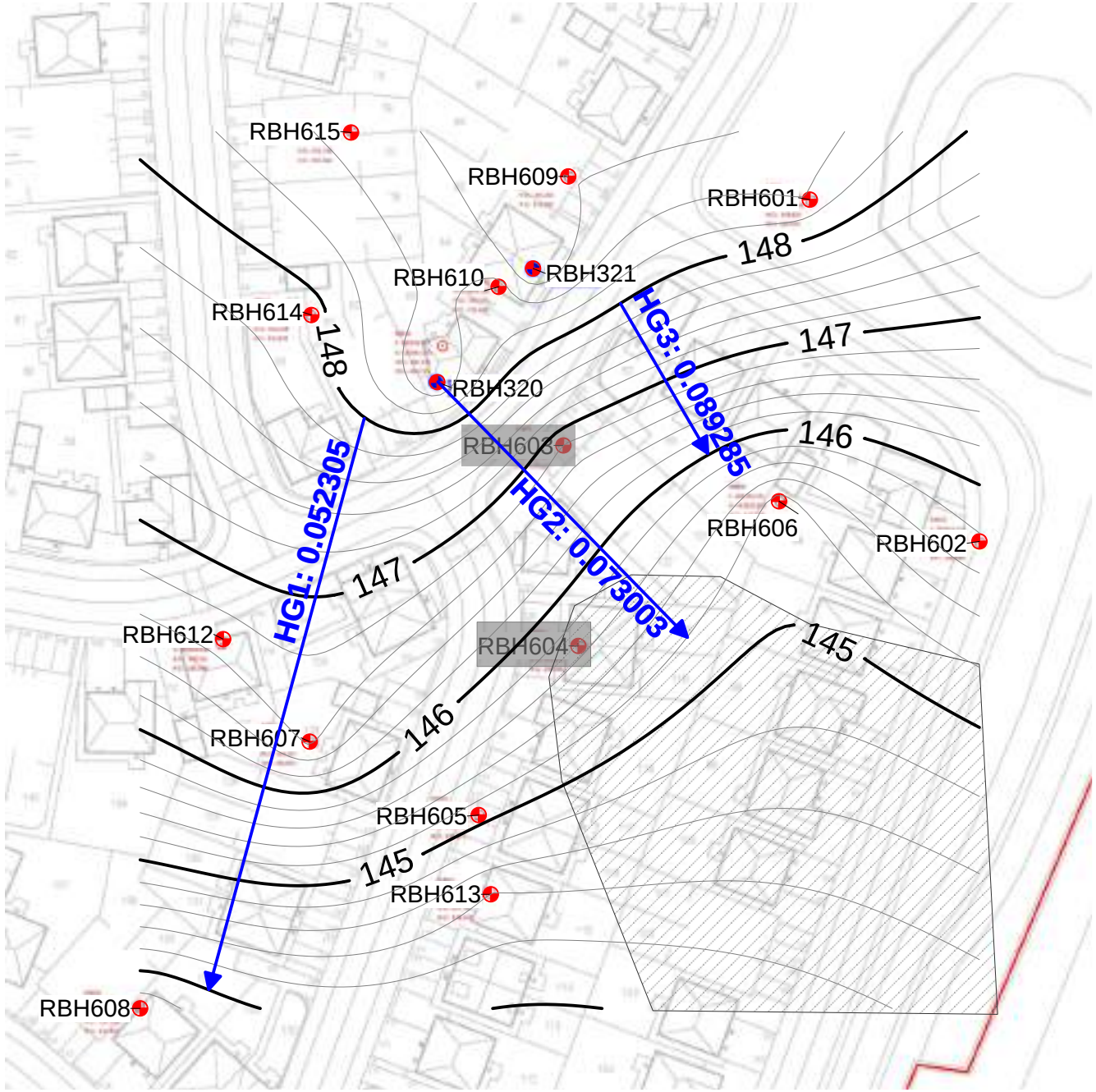


Depth of borehole	4.800 m
Groundwater level before test	1.840 m

Time (s)	Depth (m)	Head (m)
0	1.76	0.080
5	1.77	0.070
10	1.75	0.090
15	1.75	0.090
20	1.8	0.040
30	1.805	0.040
40	1.813	0.035
50	1.817	0.027
60	1.82	0.023
90	1.827	0.020
120	1.83	0.013
150	1.833	0.010
180	1.834	0.007
210	1.836	0.006
240	1.836	0.004
270	1.837	0.004
300	1.837	0.003
360	1.837	0.003
420	1.837	0.003
480		
540		
600		

APPENDIX E

Piezometric Survey Outputs



Key

- Wells with artesian conditions
- SGP 2023 GW monitoring wells
- Hydraulic Gradient (HG) in AOD groundwater level/distance
- Area of extrapolated data

**RBH606(D) has been excluded as install entered siltstone*

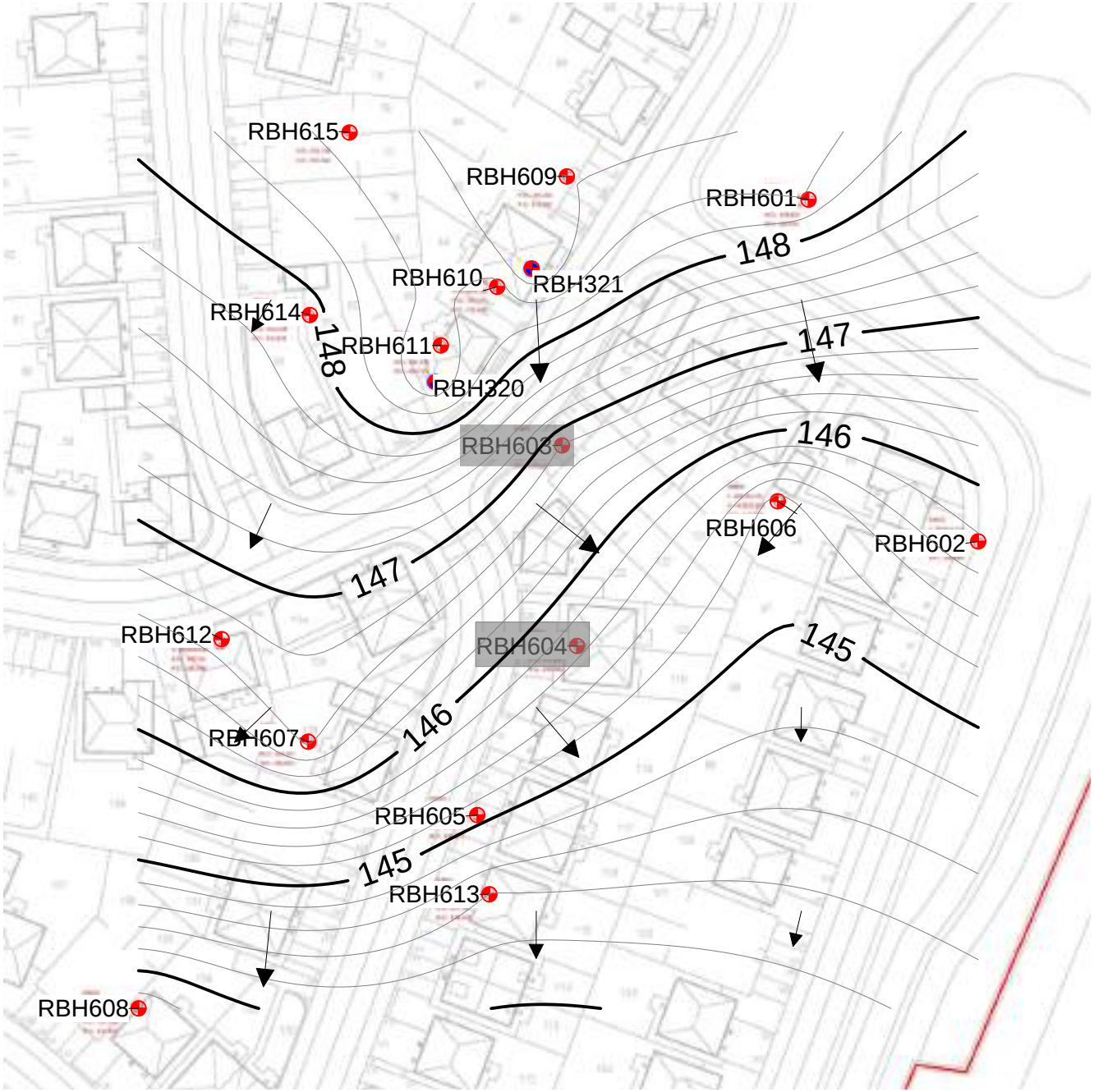
***RBH603(D), RBH604(s), and RBH604(D)have been excluded due to artesian conditions*

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email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2A/B and reservoir	
Drawing: Groundwater Contours GW01-Jan 2024	
Drawn by: MJ	Checked: LS
Date: 10.04.24	Report no: R22
Job No: R2174	Drg No: 007



Key

Wells with artesian conditions

SGP 2023 GW monitoring wells

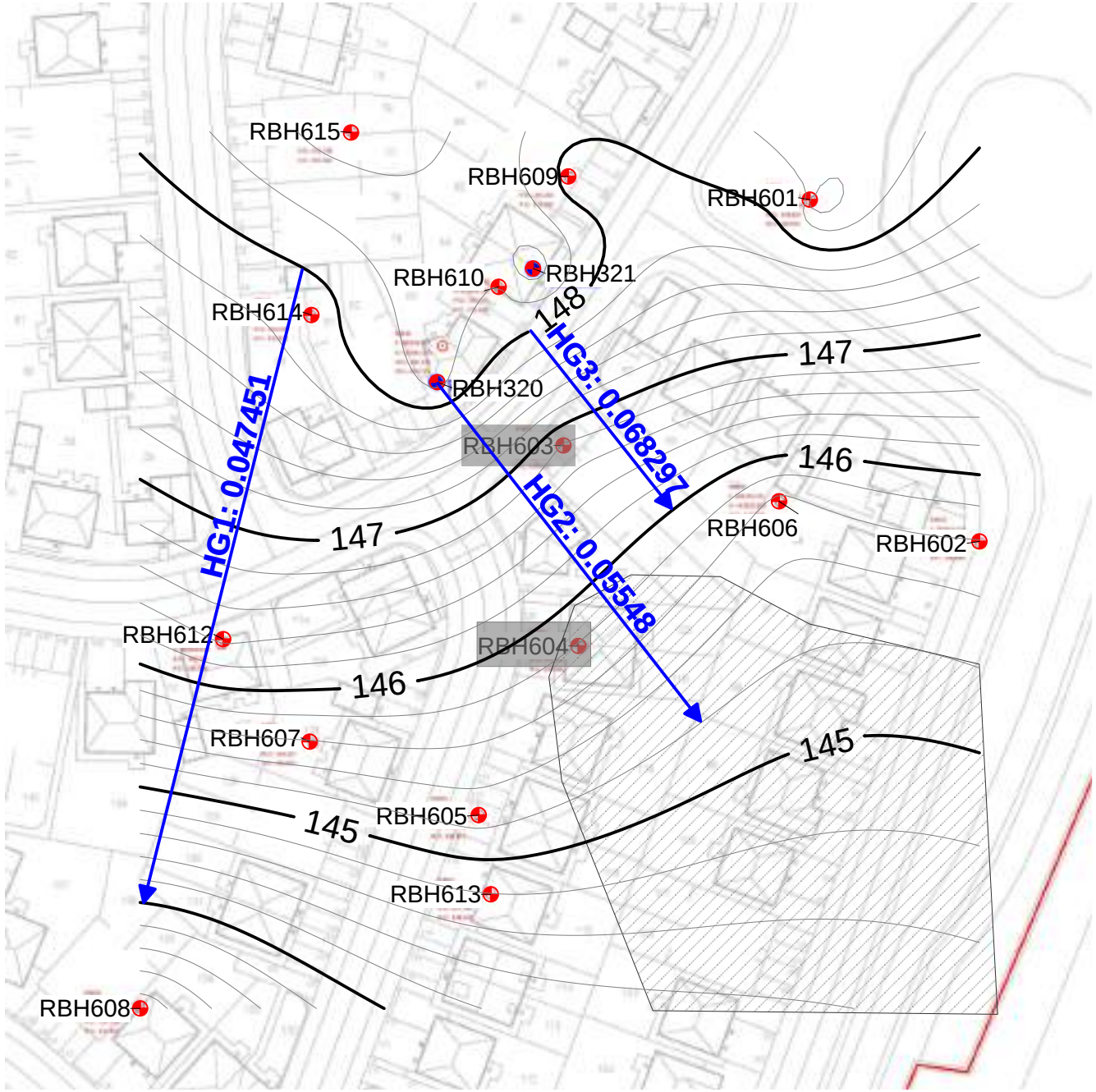
**RBH606(D) has not been included as install entered siltstone*

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Project: Tetrosyl-Phase 2	
Drawing: Groundwater Contours GW01-Jan 2024	
Drawn by: MJ	Checked: LS
Date: 10.04.24	Report no: R22
Job No: R2174	Drg No: 004



Key

- Wells with artesian conditions
- SGP 2023 GW monitoring wells
- Hydraulic Gradient (HG) in AOD groundwater level/distance
- Area of extrapolated data

**RBH606(D) has been excluded as install entered siltstone*

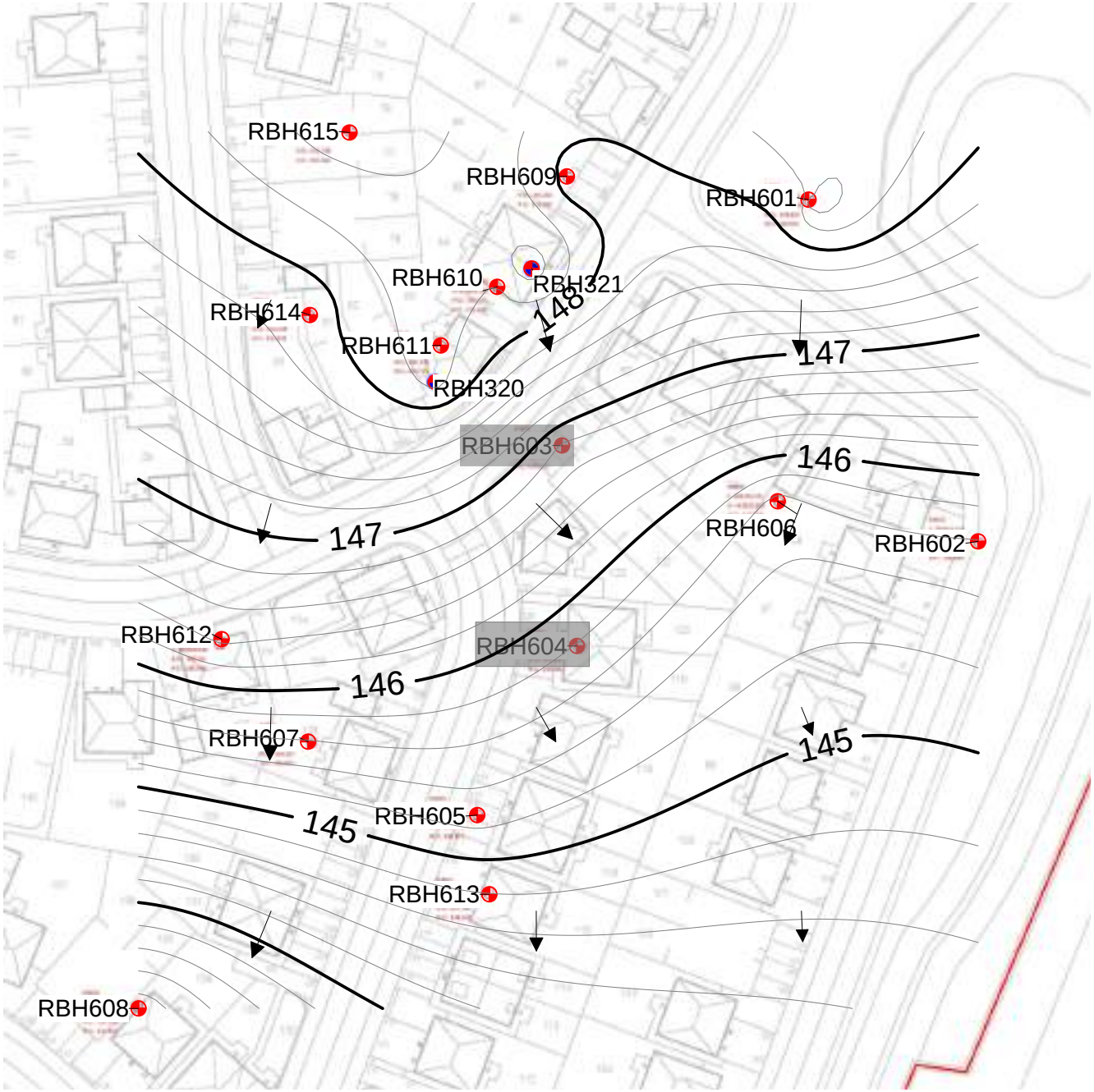
***RBH603(D), RBH604(s), and RBH604(D)have been excluded due to artesian conditions*

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Project: Tetrosyl-Phase 2A/B and reservoir	
Drawing: Groundwater Contours GW02-Apr 2024	
Drawn by: MJ	Checked: LS
Date: 10.04.24	Report no: R22
Job No: R2174	Drg No: 008



Key

Wells with artesian conditions

SGP 2023 GW monitoring wells

**RBH606(D) has not been included as install entered siltstone*

Smith Grant LLP

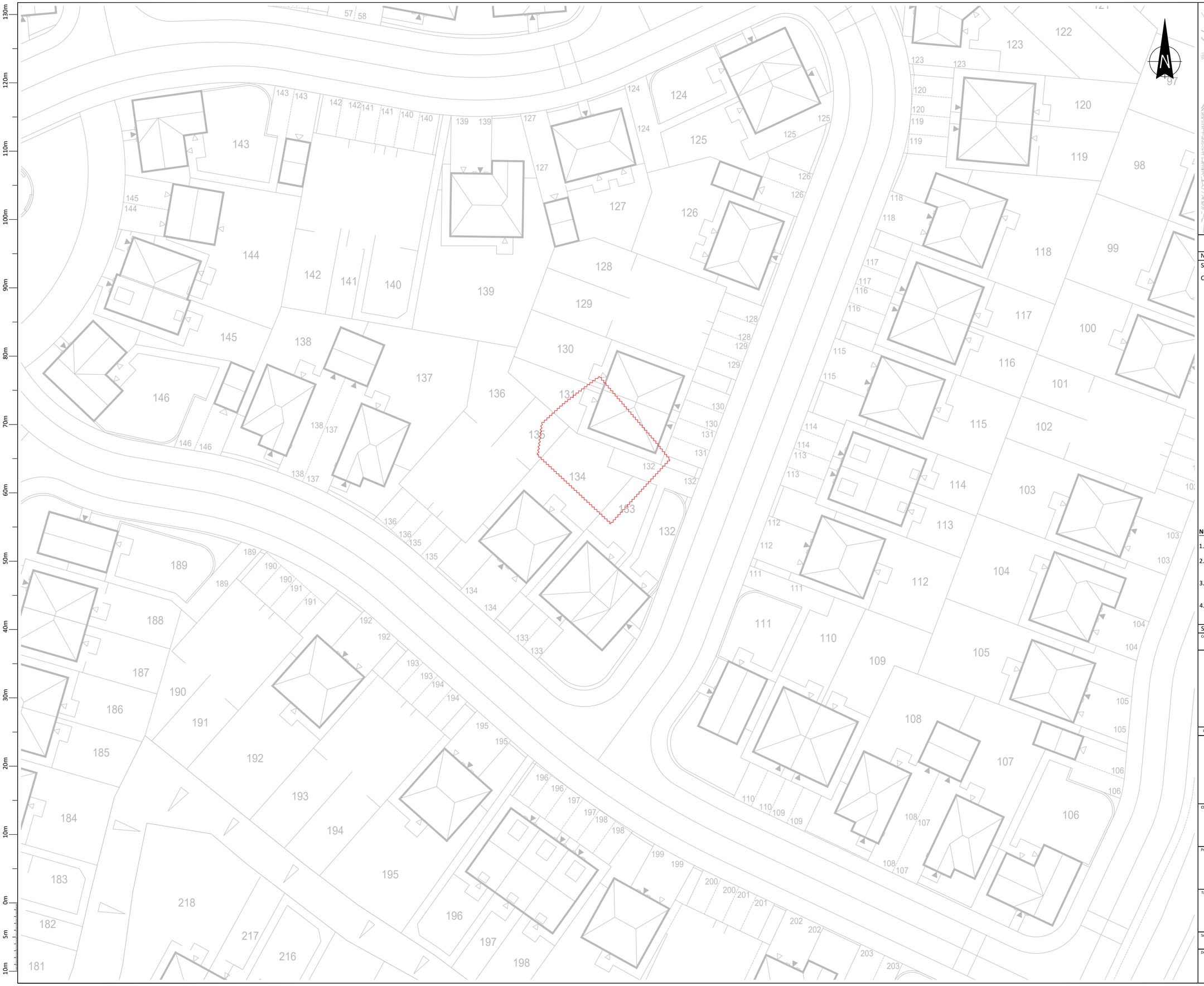
Suite 16, Bryn Estyn Business Centre
Bryn Estyn Road, Wrexham. LL13 9TY
Tel: 01978 822367

www.smithgrant.co.uk
email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Groundwater Contours GW02-Apr 2024	
Drawn by: MJ	Checked: LS
Date: 10.04.24	Report no: R22
Job No: R2174	Drg No: 005

APPENDIX F

Coal band Sub crop close to boundary of Phase 2B with 2C


130m
120m
110m
100m
90m
80m
70m
60m
50m
40m
30m
20m
10m
0m
5m
10m
N
57 58
143 143 142 142 141 141 140 140
139 139 127
124 124 125 125 126 126
127
128 129 130 131 132 133 134 135 136 137 138
139
140 141 142 143 144 145 146
136
137 138
146 146
138 137
136 136 135 135
134 134 133 133
132 132
131 131 130 130 129 129 128 128
189 189 190 190 191 191 192 192 193 193 194 194 195 195 196 196 197 197 198 198 199 199 200 200 201 201 202 202 203 203
188 187 186 185 184 183 182 181
190 191 192 193 194 195 196 197 198
218 217 216
97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123
123 123 120 120 119 119 118 118 117 117 116 116 115 115 114 114 113 113 112 112 111 111
N
Location Plan
Scale 1:5000
Notes:
Site boundary
Coal
Notes
1. This plan is to be read in conjunction with the associated Completion Report.
2. The residential layout depicted on this plan is extracted from drawing '491-ED-08' supplied digitally by Barrat Homes Manchester.
3. Due to potential live services and issues associated with withdrawal of support; remediation works have been carried out to within circa 1m of the site boundary unless otherwise detailed.
4. All CBR tests were carried out by Murray Rix.
Survey Information:
Co-ord System: OS(15)
Co-ord Type: Grid
Primary Survey Control: Leica SmartNet
Secondary Survey Control: Site
Rev
Date
Amendment
Drawn
Checked
Urban Regen
ESTABLISHED 2001
Client:
Barratt Homes
Manchester
Project:
Waldmers Wood
Former Tetrosyl Works
Title:
Coal Location
Scale: 1:200
First Issue: 11/06/2024
Drawn: R.Corrigan
Checked: R.Parry
Drawing No:
333/11/06/24
Revision:

Coal subcrop located within northern areas of Phase 2C with sandstone shown above. Photo facing north/northwest



APPENDIX G

R2174-R15-V2: Site Investigation on Former Reservoir & Additional Investigation on Phase 2B July 2024

Contaminated Land
Air Quality
Environmental Audit

SMITH GRANT Environmental Consultancy LLP

Partnership No: OC 300776

FORMER TETROSYL WORKS, BEVIS GREEN, BURY

SITE INVESTIGATION ON FORMER MILL LODGE RESERVOIR & ADDITIONAL INVESTIGATION OF PHASE 2B

For: Barratt Homes Manchester

August 2024

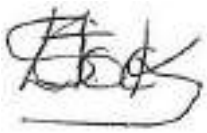
R2174-R15-v3 Final

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tel: 01978 822367 e-mail: consult@smithgrant.co.uk web: www.smithgrant.co.uk
Members: K E Hawkins (Chair), A F Smith, D Wayland

DOCUMENT CONTROL SHEET

Report Title:	Former Tetrosyl Works, Bevis Green, Bury Site Investigation on Former Mill Lodge Reservoir & Additional Investigation of Phase 2B
Client:	Barratt Homes Manchester
Report Reference Number:	R2174-R15
Issue	Final
Version:	Version 3
Report Date:	August 2024

Signed for Smith Grant LLP

	Name	Position	Signature	Date
Authors	L Stock BSc (Hons) MSc CSci MiEnvSc	Associate		**13.08.24**
Reviewer	D Wayland BSc MSc AssocMCIWM MCIWEM C.WEM	Partner		**13.08.24**

Document Revision Record:

Version	Report Status	Date	Details of Revision
v1	Draft	June 2024	Issued to Client for comment
V2	Final	July 2024	Amended to include updated RTVs
V3	Final	August 2024	Minor edits

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2. Site Background
3. Investigation Scope and Methodology
4. Results of Fieldwork
5. Results of Laboratory Analysis
6. Conclusions and Recommendations

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002	Contaminant Indicators Recorded during GW Monitoring
003A	Groundwater Levels (Single / Shallow Wells)
003B	Groundwater Levels (Deep Wells)
004 – 014	Groundwater exceedance Drawings
456/ED/05	Remediation Phasing Plan (Includes Development Layout Plan)
333/12/01/24	Borehole Locations (including historic boreholes RBH320 & RBH321 and depth to coal layer)

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C Site Photographs
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1. Introduction

1.1 The former Tetrosyl Works (the 'Site') is split into two main areas: Phase 1 (which covers the western half, the majority of which has been built out and is occupied with residents), and Phase 2 which is split into nine sub areas (A-H) plus the proposed attenuation pond. The appended Barratt Homes Remediation Phasing Plan (ref: 456/ED/05) shows the different sub areas on the Site.

1.2 Remedial criteria have been agreed with the Environment Agency (EA) on Phase 2, including sub areas 2C to 2G which are currently undergoing remediation earthworks to prepare them for residential development. Such works are being undertaken by Urban Regen Ltd. (URL) who is the Principal Contractor under the CDM as appointed by the Client, Barratt Homes Manchester (BHM). Validation of the remedial works in these parts of the Site is currently being undertaken by a sub-consultant of URL.

1.3 There has been extensive investigation previously undertaken on the Site by Smith Grant LLP (SGP) and Third Parties. This has included intrusive investigation and assessment, detailed (controlled waters) risk assessment, remedial strategies and validation works. Validation works are currently ongoing within Phase 1.

1.4 Previous investigation and assessment have identified contamination within the smear zone and bedrock (Rough Rock Sandstone) aquifer comprising BTEX[1] and chlorinated solvents. The source of the contamination appears to be pinpointed to the former processing area where the bulk storage of chemicals and fuels was located (area zoned as Phase 2B and partially affecting Phase 2A).

1.5 Owing to the topography of the site and groundwater contours modelled within an existing hydrogeological assessment, the groundwater from Phase 2b is anticipated to flow southeast beneath the reservoir. It is therefore possible that the residual contaminant plume sourced from Phase 2B may have partially impacted the Rough Rock Sandstone bedrock beneath the former reservoir.

1.6 There has been no previous access to the former Mill Lodge reservoir as this has been waterfilled (with a continuous throughflow of water from a tributary of Pigg Lee Brook). During the last quarter of 2023, the tributary of Pigg Lee Brook was diverted within an open culvert to along the western boundary of the reservoir as a temporary feature (before it is realigned along the eastern site boundary). The Mill Lodge reservoir was then dewatered, silts at the base were removed, and the void was infilled with engineered layers of validated clayey fill.

1.7 It has previously been acknowledged that further information on Phase 2B was necessary to assist with plume modelling, aquifer characterisation and refinement of the detailed quantitative

[1] benzene, toluene, ethylbenzene and xylenes

risk assessment (DQRA). All this information is to ultimately assist with providing a detailed options appraisal for the remediation of impacted groundwater within the bedrock aquifer.

1.8 SGP has been appointed to undertake investigations and monitoring on the former reservoir area in addition to undertaking further intrusive investigation on Phase 2B to further delineate the source zone and to allow depth profiling and plume characterisation.

2. Site Background

2.1. Site Setting

2.1.1. The Site is in the northern part of Bury, Greater Manchester, occupying the valley of a tributary to Pigg Lee Brook. The original site topography sloped from approximately 154m above ordnance datum (AOD) in the north to 139m AOD at the site boundary in the southwest. There are substantial drops in levels across the reservoir dam in the east and over a series of large retaining structures to the west.

Table 1.1: Site Details

Address	Bevis Green Works, Mill Road, Bury BL9 6RE
National Grid Reference	380950, 413950
Local Authority	Bury Metropolitan Borough Council (BMBC)
Site Area	~10.4 ha
Previous Use of Site	Office, warehouse, solvent recovery farm and packaging operations for chemical products used in vehicle maintenance. Remediation and preparatory earthworks currently ongoing.
Planning Reference:	63533
Proposed Use	Residential development with associated car parking, infrastructure and open spaces.

Figure 1.1: Site Location



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2.2. Site History, Geology, Topography, Hydrogeology and Hydrology

2.2.1. During the site's historical development prior to 1844, a tributary of Pigg Lee Brook, which previously flowed through the site was dammed to form a reservoir in the centre-east, originally discharged to two smaller reservoirs to the south and a culvert below the southeast part of the site. These reservoirs facilitated the original known development of the site, the Bentley and Lumn Cotton Mills.

2.2.2. By 1890 a change to the use of the site had occurred, referred to in the mapping as 'Lumn Mills (Cotton & Logwood dyes)', and the main reservoir is shown to have significantly expanded northwards; a new earth-retained reservoir is also indicated in the southwest. The usage of the site changed again to the 'Bevis Green Print Works' by 1928, with a rock quarry also indicated in the centre-north of the site to the west of the main reservoir. By the mid-1960s, Tetrosyl had acquired and further developed the site as a 'Car Accessories Factory' which latterly included a solvent bulk storage and recovery plant in the centre-northwest adjacent to the remaining reservoir.

2.2.3. All of the onsite reservoirs have now been drained and infilled. Most recently this has included the main Mill Lodge Reservoir in the northeastern part of the site which was drained, silts excavated and backfilled with engineered layers of clayey fill (up to 8m thickness in places).

2.2.4. The industrial use of the site finally ceased in late 2019, since which time a programme of demolition works and remediation earthworks has progressed in the Phase 1 part of the site which has been implemented to prepare the site for redevelopment to housing and much of this part of the Site is now occupied.

2.2.5. BGS mapping indicates superficial deposits of Glacial Till (Boulder Clay) across the site which have been confirmed at various locations, although site investigation information has shown this exists as a thin layer, typically less than 2m thick, whilst being completely absent across large parts of the site, likely because of the previous development. At these locations the underlying Rough Rock sandstone unit outcrops. The Rough Rock thins to the south and southwest and is absent from the most south-easterly parts of the site, where the mudstones of the underlying Rossendale Formation outcrop.

2.2.6. It is understood that the reservoir is located within a former valley and that boulder clay sits above the Sandstone bedrock (The Rough Rock).

2.2.7. A thin band of coal/seat-earth has previously been identified within the Rough Rock Sandstone which may be limiting the vertical mobilisation of the contamination plume identified in Phase 2B.

2.2.8. The presence of made ground has also been confirmed across the developed parts of the site during the various phases of site investigation, with only a thin veneer of hardcore noted in the northwest in the northern, undeveloped part of the site. The depths of made ground have

been shown to be variable generally extending down to 2-3m below ground level (bgl) in the central and southern sectors, with a maximum proven depth of 11m in the southwest, representing infill to the original Pigg Lee Brook Valley landform.

2.2.9. Groundwater levels fall across the Site in general accordance with the natural topography. In the northern areas groundwater is present at, or near to the top of, the Rough Rock, and a gradient down to the southwest is apparent over most of the central and western parts of the site. The situation in the east of the site is less clear, however groundwater flows here are likely to be influenced by the presence of the reservoir, dam and culverted watercourse. The culvert appears to be in hydrological continuity with the local groundwater and to serve as a groundwater drain. The Rough Rock is classified by the EA as a Secondary A Aquifer, potentially important for local water supply or providing baseflow to surface watercourses.

2.2.10. In the southernmost parts for the Site which have been subject to several rounds of groundwater monitoring, groundwater levels appear to follow the original valley profile with the levels concordant with the culvert invert levels. This therefore probably provides baseflow to the culverted watercourse which discharges some 200m from the site boundary in a steep valley to the southwest.

2.2.11. While the shallow groundwater in the Rough Rock is considered likely to be in hydraulic continuity with the deeper strata of the Rossendale Mudstone Formation, these are represented locally by shales and mudstones. Given the almost exclusive presence of light non-aqueous phase liquids (LNAPL) as the primary pollution sources on the site, impacts to groundwater bodies other than the Rough Rock aquifer are considered unlikely.

2.2.12. Glycols (antifreeze chemicals) have been detected at low levels (below drinking water standards) at the culvert outfall 200m from the site boundary. It is proposed that the reservoir surface water outflow will remain culverted in the southern part of the site and eastward diversion of the upper part of the watercourse is intended, which may reduce the likelihood of leaching from the contaminated parts of the site currently causing impacts.

2.2.13. SGP became involved with the project in 2019 which included a review of various Stage 1 & 2 Investigations and a Remediation Strategy for the site by several third parties and production of an Outline Remediation Strategy (ref: 2174-R01-v2; May 2019). This was prepared by SGP and submitted to Regulators including the EA and Bury Metropolitan Borough Council (BMBC) together with proposals for additional site investigation works. Regulators have acknowledged the general approach provided within the remedial strategy and reiterated the requirement for further investigations and better characterisation of the risks associated with the site before the Strategy could be approved site wide. The further investigations required relate to issues concerning the management of risks to human health from ground gas and volatile organic compounds (VOC) vapours, and the protection of Controlled Waters.

2.2.14. Several phased supplementary site investigation and groundwater investigation reports intended to address regulatory concerns regarding the delineation and characterisation of contamination at the site have since been produced by SGP. In particular, the results from the following reports have provided detail on the significant pollutants present and their distribution within soil and groundwater at the site:

- Phase 1 Supplementary Groundwater Investigation (ref: R2174c-R03-V1, Date: October 2020);
- Phase 2 Supplementary Site Investigations carried out to characterise the major identified potential pollution sources (ref: R2174-R06-V1, Date: April 2021);
- Phase 2 Supplementary Groundwater Investigation No 2. (ref: R2174c-R09-V1, Date: June 2021).

2.2.15. A previous Controlled Waters Risk Assessment (ref. R2174-R10-v2) was produced by SGP which included the derivation of Remedial Target Values (RTVs) for groundwater and soils remediation. However, following EA consultation (ref. ENVPAC/1/GMC/00223; 18 November 2021), further investigation was required within areas previously constrained which had been identified as potential hotspots. It was also acknowledged that some preparatory works including removal of any existing tanks would be necessary to facilitate such further investigations and that these should be carried out to reduce the likelihood of any continued contaminant loss from such sources.

2.2.16. Additional investigation works have been undertaken by Groundtech which included further monitoring of the existing groundwater wells and has led to the production of an updated Controlled Waters DQRA with derivation of RTVs for adoption under the Strategy. For clarity, the RTVs derived by Groundtech provided within letter report 'GRO-21459-4595' (dated 14th July 2023) have been incorporated in the Remedial Strategy (R11-v6 which relates to Phase 2 excluding 2A, 2B and the former Mill Lodge Reservoir).

2.2.17. A remedial strategy has since been produced by SGP concerning the Phase 2 areas of the site located to the south of Phases 2A and 2B and the Mill Lodge Reservoir (Ref: R2174-R11-v6, dated October 2023). This includes the RTVs derived by Groundtech. This report has recently been approved by Regulators.

2.2.18. A DQRA for controlled waters has been produced by SGP, with the findings being used to inform and refine RTVs and the CSM in this part of the Site (Phase 2A, 2B and the former Mill Lodge Reservoir). The RTVs derived within the DQRA have been used to compare the groundwater motoring and sampling events of January and April 2024, as detailed later within Section 5.

2.2.19. In October 2023, one round of groundwater monitoring and sampling was completed by SGP on a selection of the existing monitoring wells and at three points along the open watercourse (Tributary of the Pigs Lee Brook) running through the site. This was to provide additional contaminant data on groundwater and surface water to provide an up-to-date background.

2.2.20. During this groundwater sampling and monitoring event, the following contaminants were identified within select wells as elevated against previously derived RTVs:

- Fluoranthene
- Benzo(a)pyrene
- Aliphatic hydrocarbons (C8-C10 band)
- Aromatic hydrocarbons (C5-C7, C7-C8, and C8-C10 bands)
- Benzene
- Toluene
- Ethylbenzene
- m/p-Xylene
- Vinyl Chloride
- Chloroform

2.2.21. No LNAPL was recorded within any of the groundwater wells installed and all water sampled and analysed from the culverted watercourse was generally below corresponding laboratory limits of detection (<LOD).

3. Investigation Scope & Methodology

3.1. Aim

3.1.1. The aim of this site investigation has been to establish the lateral and vertical extent of the contamination plume. Moreover, the intention has been to ascertain whether the plume has extended into the former Mill Lodge Reservoir plus the outer fringes of Phase 2B, which has included the boundary between Phase 2B and Phase 2A and of Phase 2B with Phase 2C to the south.

3.2. Intrusive Investigation and Monitoring Objectives

3.2.1. The purpose of drilling the additional boreholes was two-fold:

- to enable their installation with monitoring wells to allow for a groundwater monitoring and sampling programme to establish the lateral and vertical extent of impacted groundwater within the bedrock both underlying the reservoir and to the south of a former wall located directly to the south of Phase 2B (previously theorised to be acting as a barrier preventing migration of the contaminant plume). The aim is to be able to intercept and sample the plume, if present, at varying depths; and,

- to further characterise ground conditions within the bedrock aquifer with submission of soil samples for classification of the solid aquifer matrix materials.

3.2.2. Of particular interest is a thin band of coal / seatearth that has been previously identified within the Rough Rock Sandstone which is considered as potentially limiting the vertical mobilisation of the contaminant plume.

3.3. Scope of Works

3.3.1. The intrusive site investigation involved rotary boring (open hole drilling to rock head with coring thereafter using water flush) which is consistent with previous investigation and monitoring works carried out over the wider Phase 2 area. The drilling works were undertaken by Taylor Drilling Services Ltd. (TDS) under the supervision of SGP Environmental Consultants, between the 4th December 2023 and 6th January 2024.

3.3.2. The boreholes have been drilled within:

- the former reservoir (particularly within the western and southwestern areas) to determine the extent and impact of contaminants migrating within groundwater from Phase 2B;

- the area directly south of Phase 2B where an apparent sub-surface feature was hypothesised to be stopping the plume migrating further south; and,

- within Phase 2B located along the boundary of Phase 2A and within the former processing areas where the most contaminant impact within the groundwater of the bedrock aquifer has been recorded.

3.4. Investigation Methodology

3.4.1. The investigation undertaken has included the drilling of fifteen bores using rotary coring within bedrock to depths of between 10m and 15m bgl. Figure 3.1 below shows the approximate locations of the exploratory holes in relation to other exploratory holes already drilled (and installed) on Site. URL Borehole Location drawing '333/12/01/24' is appended which shows the exploratory holes surveyed against the proposed development layout.

3.4.2. The exploratory hole locations were set out as follows:

- RBH602, 604, 605, 606 & 613 – To provide coverage across the former reservoir to assess the extent of contaminant plume migration over this area (particularly with emphasis on the western boundary of the former reservoir to establish the extent of any impact from Phase 2B);

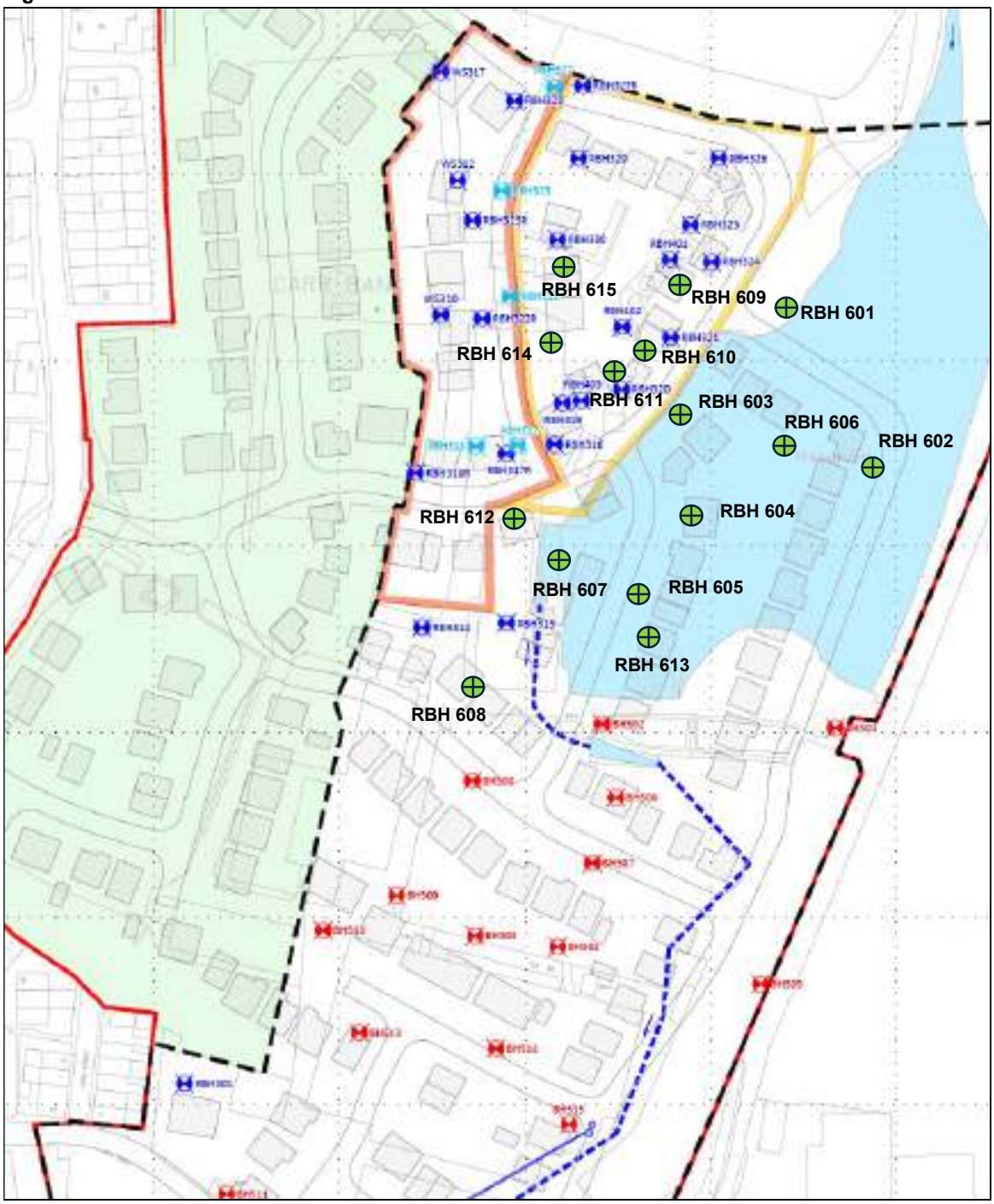
- RBH614 & 615 – To provide additional information regarding the contaminant plume fringe between Phases 2A and 2B;

- RBH609, 610 & 611 – To provide further information in relation to the vertical extent of the contaminant plume source zone in Phase 2B;

- RBH601 & 603 – To provide further information in relation to the lateral extent of the contaminant plume source zone directly to the east of Phase 2B.

- RBH607, 608 & 612 – To provide further information with respect to any southern migration of contaminant impacted groundwater from Phase 2B to other areas of Phase 2.

Figure 3.1. Borehole Location Plan



Please note that the '6 series' wells in addition to RBH320 and RBH321) relate to those monitored and sampled as part of this investigation

3.4.3. All rotary bores have been installed with 50mm diameter monitoring wells to allow for groundwater monitoring and sampling. Nine of the boreholes were also installed with secondary, 19mm diameter, monitoring wells. This was to allow monitoring and sampling of groundwater from two different response depths within the sandstone aquifer and to assess the thickness of the plume – these include RBH601, RBH603-604, RBH606, RBH609-611, RBH614 and 615.

3.4.4. The response zones of each monitoring well (comprising slotted sections of pipe surrounded by filter sock and pea gravel) were generally 2m in length to help pinpoint the depth of the contamination source. The areas surrounding the plain sections of pipe were sealed using expanding bentonite clay pellets which were also used to partially backfill the boreholes / seal the base of the installations.

3.4.5. Details of the borehole installations are included in the SGP Borehole Logs provided in Appendix B. Table 3.1 summarises the strata and recorded depths within which each of the response zones have been installed.

Table 3.1: Summary of Borehole Response Zones

Borehole reference	Response Zone Depth (m bgl)	Response Zone Depth (m AOD)	Response Zone Strata
RBH601	(S) 5.0-7.0	143.924-141.924	Sandstone (The Rough Rock) – above mudstone layer at 7.15-7.5m
	(D) 9.0-11.0	139.924-137.924	Sandstone (The Rough Rock) – below mudstone layer at 7.15-7.5m
RBH602	7.5-10.5	140.531-137.531	Sandstone (The Rough Rock) – above coal layer at 10.5-11.2m*
RBH603	(S) 3.0-5.0	144.304-142.304	Sandstone (The Rough Rock) – above coal / seatearth at 5.0-6.55m*
	(D) 7.0-9.0	140.304-137.924	Sandstone (The Rough Rock) – below coal / seatearth at 5.0-6.55m
RBH604	(S) 5.5-7.5	142.396-140.396	Sandstone (The Rough Rock) – above coal / seatearth at 8.1-9.2m
	(D) 9.5-11.5	137.896-135.896	Sandstone (The Rough Rock) – below coal / seatearth at 8.1-9.2m
RBH605	5.5-7.5	142.259-140.259	Sandstone (The Rough Rock) – above coal / seatearth at 7.9-8.3m
RBH606	(S) 7.0-9.0	140.318-138.318	Sandstone (The Rough Rock) – above coal layer at 9.1-9.9m*
	(D) 9.5-11.5	137.818-135.818	Straddles coal / siltstone / sandstone (The Rough Rock)*
RBH607	4.0-6.0	144.007-142.007	Sandstone (The Rough Rock) – below coal layer at 3.2-3.6m
RBH608	3.0-5.0	140.909-138.909	Sandstone (The Rough Rock) – above coal / mudstone at 6.0-10m
RBH609	(S) 3.0-5.0	148.201-146.201	Sandstone (The Rough Rock) – above coal layer at 5.0-5.8m*
	(D) 6.5-8.5	144.701-142.701	Sandstone (The Rough Rock) – below coal layer at 5.0-5.8m
RBH610	(S) 1.0-3.0	149.415-147.415	Made ground / sandstone (The Rough Rock)
	(D) 6.5-8.5	143.915-141.915	Sandstone (The Rough Rock) – below coal / seatearth at 5.4-6.2m
RBH611	(S) 1.0-3.0	148.679-146.679	Made ground / sandstone (The Rough Rock)
	(D) 6.5-8.5	143.179-141.179	Sandstone (The Rough Rock) – below coal layer at 5.0-5.8m
RBH612	4.0-6.0	144.421-142.421	Sandstone (The Rough Rock) – no coal / mudstone layers encountered
RBH613	9.0-11.0	138.550-136.550	Sandstone (The Rough Rock) – no coal / mudstone layers encountered
RBH614	(S) 4.0-6.0	146.108-144.108	Sandstone (The Rough Rock) – below coal / seatearth at 2.7-3.8m
	(D) 9.0-12.0	141.108-138.108	Sandstone (The Rough Rock) – installed to mirror RBH615
RBH615	(S) 3.0-5.0	148.078-146.078	Sandstone (The Rough Rock) and partially within suspected coal / seatearth layer at 2.6-3.4m
	(D) 9.0-12.0	142.078-139.078	Sandstone (The Rough Rock) – below suspected coal / seatearth layer at 2.6-3.4m*

**contamination indicators noted during drilling works (see Section 4)*

3.4.6. During the investigation, bedrock samples were collected and submitted for testing of particle density, bulk density, particle size distribution, pH and total organic carbon (TOC).

3.4.7. During drilling, select rock cores were collected by Geochem Ltd and snap frozen on Site (to ensure preservation of the contamination within). These were then transported to their laboratory for specialist analysis to assist with plume modelling. The findings of this assessment will be reported separately, although detailed logs of the rock cores taken are provided alongside SGP borehole records within Appendix B.

3.5. Groundwater Monitoring, Sampling and Analysis

3.5.1. Following completion of the rotary drilling works, SGP consultants attended site on the 10-11th January 2024 to develop the installed monitoring wells by means of removing drill fines via agitation and ensuring a free flow of groundwater from the surrounding formation. All water removed during this exercise was captured within an IBC and will be treated on site during remediation or disposed of offsite to a suitably licensed treatment facility.

3.5.2. SGP consultants returned to site on the 24-25th January 2024 to carry out the first groundwater monitoring and sampling round on all of the installed wells. The exceptions to this were the shallow wells installed in both RBH610 and RBH611 as these were both deemed to be unusable. In substitute of these, nearby historic wells RBH320 and RBH321 were utilised (logs provided in Appendix B) which had response zones targeted to the desired stratum (i.e. the Rough Rock sandstone located above the coal / seatearth). The deep well in RBH611 was also not sampled as this was blocked; however, given the proximity of this entry to RBH610, the deeper well of which was targeted to the same stratum, this is not considered a significant hindrance to the assessment.

3.5.3. Each of the wells were purged and simultaneously monitored for the following parameters:

- pH
- dissolved oxygen (DO) as mg/l & %,
- temperature (degrees Celsius),
- redox potential (ORP).
- electrical conductivity (SPC).
- Total dissolved solids (mg/l); and,
- Observations (visual and olfactory).

3.5.4. Purging of each monitoring standpipe was deemed complete once stabilisation of the parameters to within acceptable ranges was achieved. All purged water was captured and stored on-site within an IBC for future treatment during the remedial phase. SGP Groundwater Fieldwork Data Records are provided in Appendix C.

3.5.5. Groundwater samples (total no. 23) were then collected from all of the wells installed as part of this investigation (with exception of those mentioned above in entries RBH610 and RBH611 whereby historic boreholes RBH320 and RBH321 were instead sampled). Samples were placed into containers as advised by the laboratory (Element Materials Technology, Deeside

(EMT)), stored in chilled cooled boxes, and transported to the laboratory within 36 hours of collection. SGP retains chain of custody documentation. The samples were then scheduled for the following analysis of the contaminants of concern:

- TPH CWG hydrocarbons (C5-C35 carbon bandings with aromatic and aliphatic split)
- Benzene, xylene, ethylbenzene & xylenes (M/P & O) (BTEX);
- Methyl-tert-butyl ether (MTBE);
- Volatile Organic Compounds (VOCs) including Tentatively Identified Compounds (TICs);
- Semi-Volatile Organic Compounds (SVOCs) including TICs;
- Speciated Polyaromatic Hydrocarbons (PAHs) (USEPA 16 species);
- Speciated phenols; and,
- Speciated Glycols (monoethylene glycol, propylene glycol, diethylene glycol, tri-ethylene glycol & thiodiglycol).

3.5.6. The following analysis was also scheduled on the groundwater samples for the purposes of determining geochemical conditions within the aquifer:

- pH;
- sulphur;
- sulphide;
- sulphate;
- dissolved and total iron (ferrous & ferric);
- Dissolved organic carbon (DOC);
- Total organic carbon (TOC);
- Nitrate and nitrite;
- Dissolved and total Manganese (II and total);
- Chemical oxygen demand (COD);
- Biochemical oxygen demand (BOD);
- Dissolved gases: ethene, carbon dioxide and methane
- Sodium, potassium and chloride; and,
- Alkalinity.

3.5.7. A second round of monitoring was undertaken on 3rd and 4th April 2024 which repeated that previously completed to provide a more comprehensive dataset.

4. Results of Fieldwork

Drilling Investigation (4th December 2023 – 6th January 2024)

4.1. Ground Conditions Encountered During Drilling

4.1.1. The following descriptions of the ground conditions are summarised from the SGP and GeoChem Ltd. Borehole logs provided in Appendix B. Photographs showing the borehole locations and the recovered cores are provided in Appendix D.

Superficial Deposits - Made Ground

4.1.2. Made ground was identified in all of the boreholes drilled as part of this investigation with exception of RBH608.

4.1.3. The made ground was consistently described as reworked superficial deposits comprising a brown, slightly sandy, gravelly clay to depths of between 0.8m (RBH607) and 5.8m bgl (RBH603). The only exceptions to this were: 1) a very soft, greyish brown, slightly gravelly, sandy silt described in entry RBH604 (2.8-3.5m bgl), and 2) made ground boulders described in entries RBH602 (3.5-3.8m bgl) and RBH613 (5.8-6m bgl).

4.1.4. Soft strata was also encountered beneath the boulders in entries RBH602 and RBH613 to depths of 6.9m and 7.6m bgl, respectively. It is, however, unclear whether the material was made ground or natural superficial strata and, if both strata types are present, where the interface between these are as no recovery of these soils was achieved (likely due to saturation of the soils).

4.1.5. The depth of the made ground in the area of the former reservoir (entries RBH602, 604-606 & 613) was deeper than that recorded within the other entries with depths confirmed at between 3.35m (RBH606) and 6m bgl (RBH613). Potentially deeper deposits of made ground may also have been present to 6.9m bgl in RBH602 and 7.6m bgl in RBH613, however this is unconfirmed due to the limited recovery of soils at the interface of the natural and made ground strata in these entries. It is understood that the deeper made ground in this area is the result of reprofiling works undertaken by URL which involved filling the former reservoir area with recovered clay soils after it was drained and the reservoir silts were dredged and removed.

4.1.6. The depth of the made ground to the southwest of the extents of the former reservoir was typically between 2.5m and 3.2m bgl; however, shallower deposits were recorded in RBH608 to 0.8m bgl. Made ground was also absent in RBH607 as this entry was located in an area where a reduced level dig has been carried out and where sandstone is present at the site surface.

Superficial Deposits - Natural

4.1.7. Natural superficial deposits were only confirmed in three of the borehole entries, all of which, were located within the extent of the former reservoir as follows:

- RBH601 (2.5-3.2m) – Brown clay (no detailed description as no soil recovery);
- RBH602 (6.9-7.5m) – Brown, gravelly, very sandy clay;
- RBH606 (3.35-3.75m) – Very soft, greyish brown, slightly gravelly, sandy silt (possibly reworked); and,
- RBH606 (3.75-4.00m) – Greyish brown, gravelly, very sandy clay with occasional cobbles of sandstone and pockets of brown and green, medium coarse sand (possibly reworked).

Weathered Sandstone

4.1.8. Weathered sandstone was only recorded within a single entry (RBH601) at between 3.2-4.5m bgl, although no recovery of this material was achieved.

4.1.9. In most of the entries, sandstone was described directly underlying the made ground or natural superficial deposits however recovery of the top section of this stratum often wasn't possible. Weathered sandstone could have been present within these entries but this is unconfirmed. The relevant boreholes / depths are listed below:

- RBH603 (3.00-3.25m)
- RBH604 (3.5-5.1m)
- RBH605 (4.0-5.0m)
- RBH606 (4.0-4.6m)
- RBH607 (0.8-2.2m)
- RBH608 (0.0-1.5m)
- RBH609 (2.5-4.0m)
- RBH610 (2.7-3.3m)
- RBH611 (2.8-3.6m)
- RBH612 (3.2-4.7m)

Sandstone (The Rough Rock)

4.1.10. Competent sandstone bedrock of the Rough Rock formation was encountered in every borehole drilled as part of this investigation. This was present from as shallow as the site surface in entry RBH608 at 143.909m AOD (the southernmost entry drilled, also located in an area where a reduced level dig has been carried out), and from as deep as 7.6m in entry RBH613 (139.950m AOD) located in the area of the former reservoir, now infilled.

4.1.11. The Rough Rock was present to unproven depths (max. >15m bgl in entry RBH615) within all but one of the borehole entries – RBH608 – where it was proven to 6m bgl underlain by coal and then mudstone of the Rossendale Formation.

4.1.12. The Rough Rock sandstone was typically described as follows:

- weak, although in some entries it was described locally as very weak or medium strong;
- various colours, however most commonly described as greyish-brown, light grey and light brown. Orange staining was also frequently described;
- variable grain sizes from fine to coarse, with the coarse grain size commonly associated with deeper deposits; and,
- fractures were consistently described as “rough”, typically very closely to medium spaced (although local descriptions of extremely closely and widely spaced fractures were also recorded), usually sub-horizontal / horizontal but also with some sub-vertical fracturing, and often with orange, red and/or black staining present along the fractures.

4.1.13. Other noteworthy descriptions include that the sandstone was locally described as micaceous, thin laminations of coal or suspected coal were locally present, and clay was occasionally described as either infill within fractures or as discrete pockets within the sandstone.

Coal / Seatearth

4.1.14. A distinct band of coal was described in most the entries with the exception of boreholes RBH612, RHB613 and RBH615. However, it should be noted that the presence of coal and/or seatearth was suspected in RBH615 between the strata of made ground and sandstone at 2.6-3.4m bgl, although no recovery was achieved from this depth so this is unconfirmed. The coal deposits ranged in thickness from between 0.1m (RBH605) to 1.0m (RBH602, RBH603 & RBH604) and was typically encapsulated within the Rough Rock sandstone. The only exceptions to this being 1) entry RBH608 where the coal was situated between the Rough Rock and the underlying mudstone of the Rossendale Formation, and 2) RBH614 where the coal was present at rockhead.

4.1.15. Where recovered, the coal was either described as a black gravel (RBH604 & RBH605) or, where intact, an extremely weak or very weak black coal (RBH606, RBH607 & RBH610).

4.1.16. The depths of the coal layer or suspected coal layer within each of the boreholes drilled as part of this investigation (where encountered) is indicated in m AOD on drawing 333/12/01/24.

4.1.17. In half of the boreholes where coal was identified, an associated underlying layer of seatearth clay (or suspected seatearth where recovery was not possible) was recorded (RBH603, RBH604, RBH605, RBH609, RBH610 & RBH614). This stratum ranged in thickness from

0.1m (RBH604) to 0.6m (RBH614) and was described as a slightly gravelly / gravelly, locally slightly sandy, clay.

Mudstone / The Rossendale Formation

4.1.18. Mudstone was described within two entries as follows:

1) RBH601 – present as a thin layer encapsulated between the Rough Rock sandstone from 7.15m to 7.5m bgl described as an extremely weak grey mudstone;

2) RBH608 – present from 6.5m bgl underlying the Rough Rock sandstone / coal to an unproven depth of >10m bgl, described as an extremely weak, locally very weak, thinly laminated dark grey mudstone with slika mineralisation (the Rossendale Formation).

Siltstone

4.1.19. Siltstone was described within a single entry (RBH606) between 9.9m and 10.8m bgl situated between an overlying layer of coal and the Rough Rock sandstone. This was described as a very weak brownish grey sandy siltstone with sub-horizontal very closely to medium spaced fractures.

4.2. Groundwater Conditions Encountered During Drilling

4.2.1. Due to the use of casing and recirculated water flush during the drilling process it wasn't possible to determine the depth of the groundwater strikes for most of the borehole locations with exception of the following:

- RBH607: 2.8m bgl
- RBH608: 0.5m bgl
- RBH611: 1.5m bgl

4.2.2. Artesian groundwater conditions were also noted in the following boreholes during or shortly after drilling:

- RBH601: slight outflow noted upon completion of boring. Suspected that the layer of mudstone at between 7.15-7.5m bgl was confining the aquifer in the Rough Rock sandstone, however the flow ceased after a period of several days;

- RBH603: steady outflow recorded following penetration of seatearth clay at 6.55m bgl into the Rough Rock Sandstone with continued flow from deeper well installation (response zone from 7-9m bgl);

- RBH603: steady outflow recorded following penetration of seatearth clay at 9.2m bgl into the Rough Rock Sandstone with continued outflow from both well installations with response zones from 5.5-7.5m bgl and 9.5-11.5m bgl.

4.3. Contamination Indicators During Drilling Works

4.3.1. Indicators of contamination were recorded in eight of the fifteen boreholes drilled as part of these site investigation works consisting either of a sweet chemical odour and/or slightly to significantly elevated VOC readings from the soil / rock arisings when screened with a Photoionisation Detector (PID) with a 10.6ev bulb, as follows:

- RBH602: sweet chemical odour noted during drilling works from 7.5-10.5m bgl, however odours were not apparent in the recovered sandstone core and no elevated PID readings above detection limits were recorded.

- RBH603: sweet chemical odour noted during drilling works at approximately 3m bgl, however odours were not apparent in the recovered sandstone core and no elevated PID readings above detection limits were recorded.

- RBH606: strong, sweet chemical odour noted during drilling works as well as a slight, sweet chemical odour from the recovered sandstone / coal / siltstone core from 8-12.5m bgl, however no elevated PID readings recorded.

- RBH609: strong, sweet chemical odour noted during drilling works from 2.5-6m bgl and a strong, sweet chemical odour also recorded from the recovered sandstone core from 4-4.2m bgl associated with a slightly elevated PID reading of 13.6ppm.

- RBH610: strong, sweet chemical odour noted during drilling works from 3-6m bgl and a strong, sweet chemical odour also recorded from the recovered sandstone core from 3.3-5.4m bgl associated with elevated PID readings of 118.4ppm (3.3-4m), 12.6ppm (4-5m) and 7.6ppm (5-6m – includes stratum of coal underlying sandstone).

- RBH611: slight, sweet chemical odour recorded from the recovered sandstone core from 3.6-5m bgl associated with slightly elevated PID readings of 0.2ppm (3.6-4.7m) and 2.3ppm (4.7-5m).

- RBH612: slightly elevated PID readings of 2.6ppm (4.7-5m) and 0.2ppm (5-5.7m) from recovered sandstone core, however no associated odours.

- RBH615: strong, sweet chemical odour and sheen on water flush noted during drilling works from 9-12m bgl, however odours were not apparent in the recovered sandstone core and no elevated PID readings above detection limits were recorded.

4.3.2. A plan showing the contamination indicators encountered during the drilling works is appended to the report (Drawing ref: 001).

Groundwater Monitoring and Sampling: January 2024

4.4. Well Development (10-11th January 2024)

4.4.1. Following completion of the drilling works, an SGP Environmental Consultant attended site on the 10th and 11th January 2024 to prepare the wells for groundwater sampling via the method described in Section 3.5.1.

4.5. Water Quality Monitoring (24th & 25th January 2024)

4.5.1. During the groundwater sampling exercise carried out by SGP consultants on the 24th and 25th January 2024, in-situ field monitoring was also carried out using a YSI Quatro Pro water meter (calibration certificate provided in Appendix F) for the following parameters: pH, temperature, dissolved oxygen (DO), specific conductivity (SPC), oxidation / redox potential (ORP) and total dissolved solids. The full set of monitoring records are provided in Appendix C and the readings are summarised in the table below (presented as ranges as several readings were taken from each borehole):

Table 4.1: In-situ Field Monitoring Results (January 2024)

Borehole reference:	pH (units)	Temp (ºC)	DO (mgl^{1})	SPC ($\mu s\ cm^{-1}$)	ORP (mV)	Total Dissolved Solids (mgl^{1})
RBH601 (s)	7.26-7.40	9.3-9.6	5.89-6.06	0.4520-0.4537	66.8-69.3	0.2935-0.2948
RBH601 (d)	7.30-7.47	8.2-9.3	6.24-7.42	0.4548-0.4574	48.9-64.7	0.2965-0.2979
RBH602	8.29-8.37	10.6-10.8	0.20-0.47	1.116-1.128	-77.3(-)-22.1	0.725-0.732
RBH603 (s)	7.19-7.24	9.5-9.9	1.22-4.51	0.3901-0.3974	55.7-58.7	0.2562-0.2593
RBH603 (d)	7.26-7.29	10.0-10.2	2.00-2.06	0.3987-0.4020	43.4-49.1	0.2589-0.2614
RBH604 (s)	7.13-7.14	10.2-10.3	3.34-6.49	0.4161-0.4172	54.4-55.7	0.2705-0.2711
RBH604 (d)	7.20-7.29	10.1	4.06-4.14	0.4195-0.4265	58.9-61.9	0.2728-0.2766
RBH605	7.40-7.45	10.2-10.3	0.91-2.05	0.2907-0.3029	24.1-32.4	0.1835-0.1935
RBH606 (s)	7.56	10.8-10.9	0.27-0.32	0.508-0.513	46.5-50.0	0.3303-0.3315
RBH606 (d)	7.45	10.4-10.5	0.31-0.36	0.4612-0.4620	45.7-46.3	0.2999-0.3303
RBH607	7.81-7.82	9.7-10.4	0.34-1.41	0.509-0.514	10.2-27.2	0.3309-0.3323
RBH608	7.45-7.51	7.4-7.5	1.25-2.03	0.467-0.469	29.2-46.1	0.3036-0.3068
RBH609 (s)	8.38-8.40	9.5-9.6	0.27-0.41	0.798-0.807	-61.1(-)-26.6	0.518-0.524
RBH609 (d)	7.55-7.66	10.0-10.5	0.50-2.50	0.4364-0.4648	52.3-65.1	0.2834-0.3005
RBH610 (d)	7.46-7.53	10.2-10.5	0.25-0.81	0.3419-0.3620	23.9-27.7	0.2235-0.2356
RBH612	8.09-8.30	9.9-10.4	0.35-1.86	0.601-0.602	-15.9(-)-14.7	0.3891-0.3912
RBH613	8.15	10.1-10.3	0.20-0.88	0.839-0.851	-37.5(-)-30.8	0.545-0.553
RBH614 (s)	8.34-8.46	10.0-10.2	0.38-1.45	0.955-0.979	-53.4-3.3	0.619-0.633
RBH614 (d)	8.29	10.1-10.4	0.48-0.54	0.614-0.615	-64.2(-)-51.2	0.4168-0.4172

Borehole reference:	pH (units)	Temp (ºC)	DO (mgl^{1})	SPC ($\mu s\ cm^{-1}$)	ORP (mV)	Total Dissolved Solids (mgl^{1})
RBH615 (s)	7.99-8.00	8.9-9.1	0.35-0.71	1.386-1.398	-8.1-7.9	0.901-0.908
RBH615 (d)	7.87-7.98	10.2-10.3	0.30-1.24	0.4474-0.4572	-22.8(-)-23.5	0.2906-0.2942
RBH320	8.22-8.23	9.0	3.91-4.85	1.207-1.232	-57.2(-)-42.4	0.785-0.826
RBH321	8.14-8.16	9.8	2.02-3.39	1.137-1.152	-73.3(-)-71.8	0.743-0.749

4.5.2. Observations of potential contamination indicators were also made during the groundwater purging and sampling exercise, as follows:

- RBH609 (shallow): Strong, sweet, chemical odour; grey sediment
- RBH615 (shallow): Slight, sweet, chemical odour
- RBH615 (deep): Slight, sweet, chemical odour
- RBH320: Strong, sweet, chemical odour; black sediment
- RBH321: Moderately strong, sweet, chemical odour

4.6. Water Quality Monitoring (03rd & 04th April 2024)

4.6.1. During the groundwater sampling exercise carried out by SGP Consultants on the 3rd and 4th April 2024, in-situ field monitoring was again carried out for the parameters described above. The full set of monitoring records are provided in Appendix C and the readings are summarised in the table below (presented as ranges as several readings were taken from each borehole):

Table 4.2: In-situ Field Monitoring Results (April 2024)

Borehole reference:	pH (units)	Temp (ºC)	DO (mgl^{1})	DO (%)	SPC ($\mu s\ cm^{-1}$)	ORP (mV)	Total Dissolved Solids (mgl^{1})
RBH601 (s)	5.88-6.01	10.2	5.61-9.19	47.2-82.9	0.4201-0.4658	84.6-91.9	0.2990-0.3021
RBH601 (d)	5.95-6.76	10.2-10.4	5.00-6.74	44.7-62.8	0.4608-0.8470	40.5-89.7	0.2980-0.4743
RBH602	7.02	11.7	0.16-0.19	1.5-1.8	1.177-1.178	-88.8(-)-86.6	0.7650-0.7670
RBH603 (s)	5.85-5.88	9.4-9.5	0.47-1.55	4.2-13.6	0.4110-0.4126	50.8-65.0	0.2674-0.2875
RBH603 (d)	5.87-5.95	9.6-10.1	2.80-3.27	25.0-29.1	0.4244-0.4337	60.9-70.1	0.2754-0.2811
RBH604 (s)	5.78	10.9	3.68-3.78	33.1-33.8	0.942-0.943	65.1-65.3	0.605-0.613
RBH604 (d)	5.75-5.85	10.6-11.2	4.22-5.11	34.2-47.9	0.909-0.963	66.0-74.9	0.5920-0.6210
RBH605	5.47-6.55	10.3-10.4	1.15-4.08	10.8-38.4	0.2799-0.2937	2.2-25.4	0.1814-0.2039
RBH606 (s)	6.54-6.55	10.5	0.57-1.00	5.2-9.0	0.758-0.767	-41.8(-)-40.3	0.4920-0.4980
RBH606 (d)	6.3	11	0.75-1.18	6.7-10.7	0.524-0.525	5.2-5.5	0.3407-0.3418
RBH607	6.41-6.45	9.4-10.3	0.43-4.00	3.6-54.9	0.936-0.986	22.7-42.1	0.6250-0.6300
RBH608	6	8.8-9.0	0.49-0.75	4.1-6.4	0.49	68.4-68.5	0.3183-0.3186
RBH609 (s)	6.92	9.2	0.32-0.39	2.7-2.9	1.272-1.278	-91.2(-)-90.6	0.8270-0.8300
RBH609 (d)	6.74-6.94	9.9-10.0	2.74-3.77	18.8-27.7	0.971-1.005	0.7-9.1	0.6280-0.6530
RBH610 (d)	6.14-6.16	10.4	7.06-9.41	67.1-83.2	0.2078-0.3444	1.1-21.8	0.1341-0.2281
RBH612	6.71-6.72	10.0	0.40-0.59	3.3-3.5	1.043-1.053	-19.7(-)-15.7	0.6830-0.6850
RBH613	6.69-6.71	10.2	0.81-1.45	7.1-13.3	0.636-0.643	-40.2(-)-29.7	0.4133-0.4179

Borehole reference:	pH (units)	Temp (ºC)	DO (mgl^{1})	DO (%)	SPC ($\mu s\ cm^{-1}$)	ORP (mV)	Total Dissolved Solids (mgl^{1})
RBH614 (s)	6.89-6.91	9.8	0.51-1.88	4.9-14.5	0.849	-84.7(-)-75.7	0.5520
RBH614 (d)	6.95	10.3	0.40-0.43	2.9-3.7	0.617-0.618	-108.1(-)-107.4	0.4015-0.4022
RBH615 (s)	6.64-6.65	9.4-9.5	0.89-4.01	7.8-35.0	0.899-0.900	-85.2(-)-84.7	0.5850
RBH615 (d)	6.65-6.81	9.8-10.5	1.53-4.04	13.6-36.0	0.566-0.584	-106.1(-)-51.2	0.3680-0.3793
RBH320	6.86-6.87	8.7-8.9	0.75-1.52	6.4-13.3	0.867-0.974	-86.5(-)-77.8	0.5630-0.6340
RBH321	6.22-6.23	9.7-9.8	0.93-1.35	7.7-12	0.3286-0.5150	-79.0(-)-71.2	0.2180-0.3142

4.6.2. Observations of potential contamination indicators were as follows:

- RBH609 (shallow): Strong, sweet, chemical odour; grey sediment
- RBH615 (shallow): Slight, sweet, chemical odour
- RBH615 (deep): Slight, sweet, chemical odour
- RBH320: Strong, sweet, chemical odour; black sediment
- RBH321: Moderately strong, sweet, chemical odour

4.6.3. These wells are all located within the Ph2B and that there was no olfactory evidence of contamination indicators during sampling within the reservoir. A plan showing the contamination indicators encountered during both groundwater sampling exercises is appended to the report (Drawing ref: 002).

4.7. Groundwater Levels

4.7.1. During both the well development works on the 10th/11th January 2024 and the groundwater sampling exercises on the 24th/25th January 2024 and 3rd/4th April 2024, the depths to groundwater were recorded in the viable wells with exception of entry RBH605 which was omitted in error during the first groundwater monitoring round. The groundwater depths were also not measured in the shallow wells of RBH610 and RBH611 during the groundwater sampling exercises as samples were not collected from either of these installations.

4.7.2. The measured depths to groundwater are summarised in Table 4.3 below as well as the groundwater depths above ordnance datum (AOD) which have been calculated using the URL survey data of the ground levels at the various borehole locations. This information is also summarised in the appended Groundwater Levels drawings (drawing refs: 003A & 003B) with reference to the response zones of the monitoring wells and their relative position to the coal layer (where present). RBH320 and RBH321 are not included in the table / drawings due to the absence of ground level data at both locations.

Table 4.3: Groundwater Levels Recorded During Well Development and Sampling Exercises

Borehole reference:	Ground Level at BH Location (M AOD)	Depth to GW 10-11.01.24 (m bgl)	Depth to GW 10-11.01.24 (m AOD)	Depth to GW 24-25.01.24 (m bgl)	Depth to GW 24-25.01.24 (m AOD)	Depth to GW 03-04.04.24 (m bgl)	Depth to GW 03-04.04.24 (m AOD)
RBH601(s)	148.924	0.59	148.334	0.61	148.314	0.34	148.584
RBH601(d)	148.924	0.52	148.404	0.52	148.404	0.82	148.104
RBH602	148.031	2.45	145.581	2.26	145.771	2.44	145.591
RBH603(s)	147.304	0.43	146.874	0.23	147.074	0.53	146.774
RBH603(d)	147.304	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian
RBH604(s)	147.396	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian
RBH604(d)	147.396	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian
RBH605	147.759	2.08	145.679	NR	NR	2.47	145.289
RBH606(s)	147.318	1.54	145.778	2.2	145.118	1.78	145.538
RBH606(d)	147.318	1.77	145.548	1.19	146.128	3.33	143.988
RBH607	148.007	0.98	147.027	1.37	146.637	2.42	145.587
RBH608	143.909	0.68	143.229	0.25	143.659	0.84	143.069
RBH609(s)	151.201	2.82	148.381	2.6	148.601	3.36	147.841
RBH609(d)	151.201	2.53	148.671	2.8	148.401	2.61	148.591
RBH610(s)	150.415	1.93	148.485	NR	NR	NR	NR
RBH610(d)	150.415	1.91	148.505	2.1	148.315	2.23	148.185
RBH611(s)	150.179	1.86	148.319	NR	NR	NR	NR
RBH611(d)	150.415	UTR (Well blocked)	UTR (Well blocked)	UTR (Well blocked)	UTR (Well blocked)	UTR (Well blocked)	UTR (Well blocked)
RBH612	148.421	1.81	146.611	1.75	146.671	1.98	146.441
RBH613	147.55	2.58	144.97	3.16	144.39	1.21	146.340
RBH614(s)	150.108	2.03	148.078	2.21	147.898	2.28	147.828
RBH614(d)	150.108	1.96	148.148	2.13	147.978	2.18	147.928
RBH615(s)	151.078	2.37	148.708	2.61	148.468	2.59	148.488
RBH615(d)	151.078	2.38	148.698	2.59	148.488	2.52	148.558

(s) = Shallow well
(d) = Deep Well
NR = Not recorded
UTR = Unable to record

5. Results of Laboratory Analysis

5.1. Comparison of Contaminant Concentrations Against Corresponding Threshold Criteria

5.1.1. The results of the groundwater sampling are summarised in Table 5.1 below. Where applicable, the results are compared to RTVs. These are draft RTVs values which are subject to regulatory review, however for the purposes of ascertaining the extent of the plume etc. they are considered appropriate. Any requirements to update the RTVs will require this report to be updated accordingly.

5.1.2. Where site-specific criteria are unavailable, other criteria have been utilised where applicable, including:

- the National UK Environmental Quality Standards (EQS): Annual Average (AA) / Maximum Allowable Concentration (MAC) for freshwaters;
- World Health Organization (WHO) drinking standards;
- In the absence of an EQS or WHO standard, reference has been made to standards for drinking water protected areas or from the Water Supply (Water Quality) Regulations 2000, typically referred to as the UK Drinking Water Standards (UK DWS); and,
- criteria provided by the United States Environmental Protection Agency (USEPA) for Glycols.

5.1.3. It is noted that these are particularly conservative and there is no compliance point applied, therefore they are not necessarily directly applicable to risks posed to receptors associated with the Site itself.

5.1.4. Results for speciated phenols, SVOCs and VOCs are only reported where detected above laboratory detection limits and TICs are only reported if they are not hydrocarbons which would be contained within the speciated aliphatic / aromatic hydrocarbon bandings listed below.

5.1.5. Other determinants were also analysed but have not been included in the table as these were scheduled for GeoChem Ltd. to assist in their work to determine aquifer conditions, not to determine contaminant concentrations.

5.1.6. The full set of chemical results (Element Materials Technology report refs: 24/1306 and 24/5682) are provided in Appendix E.

Table 5.1 Summary of Ground Water Monitoring Results

Determinant	Number of samples	Range of Concentrations (µg/l, unless specified)	Quality standard adopted and concentration (µg /l, unless specified)	Exceedances
Polyaromatic Hydrocarbons				
Naphthalene	**46**	**<0.1-33**	**EQS (AA) 2**	**Both rounds: RBH609(S), RBH320 & RBH321 Apr 24 only: RBH614(D)**
			EQS (MAC) 130	None
Acenaphthylene	46	<0.005-0.025	N/A	N/A
Acenaphthene	46	<0.005-1.904	N/A	N/A
Fluorene	46	<0.005-1.145	N/A	N/A
Phenanthrene	46	<0.005-0.359	N/A	N/A
Anthracene	46	<0.005-0.051	EQS (AA/MAC) 0.1	None
Fluoranthene	**46**	**<0.005-0.306**	**EQS (AA) 0.0063**	**Both rounds: RBH605, RBH606(D), RBH609(S), RBH613, RBH614(S), RBH614(D) & RBH615(D) Jan 24 only: RBH615(S) & RBH321 Apr 24 only: RBH602 & RBH612 – Apr 24**
			EQS (MAC) 0.12	**RBH614(S) – Jan 24**
Pyrene	46	<0.005-0.07	N/A	N/A
Benzo(a)anthracene	46	<0.05-0.143	N/A	N/A
Chrysene	46	<0.005-0.200	N/A	N/A
Benzo(b)fluoranthene	**46**	**<0.008-0.215**	**EQS (MAC) 0.017**	**Jan 24 only: RBH613, RBH614(S), & RBH321 Apr 24 only: RBH606(D)**
Benzo(k)fluoranthene	**46**	**<0.008-0.083**	**EQS (MAC) 0.017**	**Jan 24 only: RBH614(S) Apr 24 only RBH606(D)**
Benzo(a)pyrene	**46**	**<0.005-0.181**	**EQS (AA) 0.00017**	**Both rounds: RBH605, RBH606(D), RBH613 Jan 24 only: RBH614(S), RBH615(S) & RBH321 Apr 24 only: RBH612**
			EQS (MAC) 0.27	None
Indeno(123cd)pyrene	46	<0.005-0.109	N/A	N/A
Dibenzo(ah)anthracene	46	<0.005-0.028	N/A	N/A
Benzo(ghi)perylene	**46**	**<0.005-0.115**	**EQS (MAC) 0.0082**	**Both rounds: RBH606(D) Jan 24 only: RBH613, RBH614(S), RBH615(S) & RBH321 Apr 24 only: RBH602 & RBH605**
2-Methylnaphthalene	46	<1-6	N/A	N/A

Determinant	Number of samples	Range of Concentrations (µg/l, unless specified)	Quality standard adopted and concentration (µg /l, unless specified)	Exceedances
Speciated TPH Aliphatic / Aromatic Hydrocarbons				
Aliphatic C5-C6	46	<10-656	WHO 15,000	None
Aliphatic C6-C8	46	<10-17,363	SS 1,620,000	None
Aliphatic C8-C10	46	<10-9,407	No breakthrough at compliance point	None
Aliphatic C10-C12	46	<5-54	No breakthrough at compliance point	None
Aliphatic C12-C16	46	<10	WHO 300	None
Aliphatic C16-C21	46	<10	N/A	N/A
Aliphatic C21-C35	46	<10	N/A	N/A
Aromatic C5-C7	**46**	**<10-74**	**SS 53.3 (benzene marker compound)**	**Apr 24 only: RBH320**
Aromatic C7-C8	**46**	**<10-56,719**	**SS 1,340 (toluene marker compound)**	**Both rounds: RBH609(S), RBH609(D), RBH320 & RBH321 Jan 24 only: RBH603(S)**
Aromatic C8-C10	**46**	**<10-46,625**	**SS 12,600 (Xylene marker compound)**	**Both rounds: RBH609(S) & RBH320 Jan 24 only: RBH321.**
Aromatic C10-C12	46	<5-676	1.16 x 10^7mg/l (i.e. no reasonable breakthrough at compliance point)	None
Aromatic C12-C16	46	<10-50	WHO 90	None
Aromatic C16-C21	46	<10	WHO 90	None
Aromatic C21-C35	46	<10	WHO 90	None
BTEX				
Benzene	**46**	**<0.5-88.5**	**SS 53.3**	**Both rounds: RBH320**
Toluene	**46**	**<5-61,942**	**SS 1,340**	**Both rounds: RBH609(S), RBH320 & RBH321 Jan 24 only: RBH609(D), Apr 24 only: RBH603(S)**
Ethylbenzene	**46**	**<1-8,207**	**SS 5,520**	**Both Rounds: RBH609(S) & RBH320 Jan 24 only: RBH321**
m/p-Xylene	**46**	**<2-29,765**	**EQS (AA) 30**	**Both Rounds: RBH609(S), RBH609(D), RBH614(D), RBH320 & RBH321 Apr 24 only: RBH603(S), RBH614(S) & RBH615(D)**
o-Xylene	**46**	**<1-6,455**	**EQS (AA) 30**	**Both rounds: RBH609(S), RBH609(D), RBH320 & RBH321 Jan 24 only: RBH614(D) Apr 24 only: RBH603(S), RBH614(S) & RBH615(D)**

Total Xylenes	**46**	**<3 – 36,220**	**SS 9,320**	**Both rounds: RBH609(S) & RBH320** **Jan 24 only: RBH321**
Speciated Glycols				
Speciated glycols	23 (Jan only)	<50	USEPA 14,000	None
Phenols				
Phenol	46	<1-20	SS 1.43 x 10^6 mg/l (I.e. no reasonable breakthrough at compliance point)	None
2-Methylphenol	46	<0.5-112.7	N/A	N/A
2,4-Dimethylphenol	46	<1-52	N/A	N/A
4-Methylphenol	46	<1-142	N/A	N/A
Resorcinol	46	<10-20	N/A	N/A
m/p-cresol	46	<20-230	N/A	N/A
o-cresol	46	<10-180	N/A	N/A
Xylenols	46	<60-90	N/A	N/A
Other SVOCs				
Dibenzofuran	46	<0.5-1	N/A	N/A
Carbazole	46	<0.5-0.6	N/A	N/A
SVOC TICs				
Cyclohexanone, 3,3,5-trimethyl	46	636 (1 detect – RBH609(S))	N/A	N/A
VOCs				
Dichlorodifluoromethane	46	<2-871	N/A	N/A
MTBE	46	<0.1-23	SS 60.7	None
Vinyl Chloride	**46**	**<0.1-5.2**	**SS 1.02**	**Both rounds: RBH603(S), RBH609(S), RBH610(D), RBH615(S), RBH320 & RBH321**
Dichloromethane (DCM)	46	<3	SS 27,400	None
cis-1-2-Dichloroethene	46	<3-62	SS 171	None
Chloroform	46	<2-10	SS 76.6	None
1,1,1 - Trichloroethane	46	<2-3	EQS (AA) 100	None
Trichloroethene (TCE)	46	<3-23	SS 55.8	None
Tetrachloroethene (PCE)	46	<3-21	SS 129	None
Chlorobenzene	46	<2-72	WHO 300	None
Isopropylbenzene	46	<3-107	N/A	N/A
Propylbenzene	46	<3-181	N/A	N/A
1,3,5-Trimethylbenzene	46	<3-435	N/A	N/A
1,2,4-Trimethylbenzene	46	<3-1,409	N/A	N/A
tert-Butylbenzene	46	<3-21	N/A	N/A
sec-Butylbenzene	46	<3-15	N/A	N/A
n-Butylbenzene	46	<3-10	N/A	N/A
4-Isopropyltoluene	46	<3-13	N/A	N/A
Dichlorobenzene Isomers (total)	46	<3-<6	EQS (AA) 20	None
			EQS (MAC) 200	None
VOC TICs				
Acetone	46	105-154 (2 detects – RBH609(S) x2)	N/A	N/A

Methyl Isobutyl Ketone	46	121-373 (3 detects – RBH615(D) x2 & RBH320 – Apr 24)	N/A	N/A
Diisopropyl ether	46	282 (1 detect – RBH606(S) – Apr 24)	N/A	N/A
Isopropyl Alcohol	46	115 (1 detect – RBH609(S) – Jan 24)	N/A	N/A

Notes:
EQS: National Environmental Quality Standard for inland surface waters, annual average (AA) or maximum allowable concentration (MAC)
SS Site specific derived criteria derived by SGP for Level 3 assessment with a 100m compliance point and applied degradation within dissolved phase only (**draft RTVs generated August 2024)**
DWS UK Drinking Water Standards
WHO World Health Organisation
USEPA US Environmental Protection Agency criteria
* LOD > screening value

5.1.7. Exceedances have been reported for the following contaminants:

Elevated against site specific criteria:

- Aromatic hydrocarbons (C5-7, C7-C8 & C8-C10 bandings)
- Benzene
- Toluene
- Ethylbenzene
- Xylene-Total
- Vinyl Chloride

Elevated against EQS/WHO/DWS (direct values):

- Naphthalene
- Fluoranthene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(a)pyrene
- Benzo(ghi)perylene

5.1.8. With respect to the main contaminants of concern on the site (BTEX, Aromatic C7-10 hydrocarbons and vinyl chloride), the exceedances were typically concentrated in Phase 2B and just to the east of Phase 2B (entry RBH603(S)).

5.1.9. With exception of vinyl chloride which was detected at low levels even where exceedances were reported (max. 5.2µg/l), the highest concentrations of the abovementioned contaminants were consistently reported in entries RBH609 (shallow), RBH320 and RBH321 which have response zones in the Rough Rock sandstone above the coal layer. The most significant exceedances being for aromatic C7-8 hydrocarbons and toluene, with maximum concentrations over 42x the adopted criteria and 46x the adopted criteria, respectively. These contaminants were also identified in three of the deeper wells in the Phase 2B area (RBH609 (deep), RBH614 (deep) & RBH615 (deep)), however the concentrations were significantly lower, by 1 or 2 orders of magnitudes in some instances.

5.1.10. Exceedances of the EQS (AA and/or MAC) were also reported for several PAHs, the most notable of which demonstrating the highest concentrations being for naphthalene with exceedances in entries RBH320, RBH321 and RBH609 (shallow) where the most significant hydrocarbon, BTEX and VOC concentrations were reported. However, the exceedances were only for the EQS annual average (AA) criterion with no exceedances reported for the maximum admissible concentration (EQS (MAC) criterion.

5.1.11. Several exceedances of the EQS criteria as an annual average were also reported for the PAHs fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and benzo(ghi)perylene; however, these were all very low-level (max. concentration of any individual compound = 0.306µg/l) and given their distribution across the site are unlikely to be associated with contamination on the site but as the result of the presence of coal which was described in nearly every entry.

5.1.12. Glycols were consistently below the laboratory limits of detection in all samples (only tested for during the January monitoring round).

6. Conclusions & Recommendations

6.1. Conclusions

6.1.1. With respect to the main contaminants of concern (light-end hydrocarbons, BTEX and VOCs / SVOCs), the groundwater results show that where exceedances for these determinants were reported, they were consistently highest within the shallow sandstone above the coal layer in the eastern part of Phase 2B (entries RBH320, RBH321 and RBH609 (shallow)), showing a strong degree of localisation.

6.1.2. The most significant exceedances reported in the abovementioned entries (where degradation in the dissolved phase has been applied) were for aromatic C7-8 hydrocarbons and toluene with maximum concentrations with maximum concentrations over 42x the adopted criteria and 46x the adopted criteria, respectively.

6.1.3. Some degree of contaminant migration below the coal layer in Phase 2B has been indicated with elevated concentrations of aromatic C7-C8 hydrocarbons, toluene, and vinyl chloride above the adopted criteria in entries RBH609 (deep) and RBH610 (deep). However, these are significantly reduced in comparison to the exceedances detected in the shallow wells of Phase 2B, by an order of 1 or 2 magnitudes in some instances.

6.1.4. The greatest distribution of exceedances for any one of the main chemicals of concern was for vinyl chloride reported in several wells within the Phase 2B area (RBH609 (shallow), RBH610 (deep), RBH320 & RBH321) as well as one entry located on the western edge of the former reservoir (RBH603 (shallow), and along the western edge in RBH615(S). The highest concentration was recorded within the identified plume area (RBH321) with the lowest concentration marginally exceeding the adopted criterion in entry RBH615. The greater distribution of this contaminant above screening criteria is likely the result of the stability of this compound (resulting in greater persistence within the environment), in conjunction with the very low screening value applied.

6.1.5. Exceedances of EQS criteria have been detected for other determinants, namely PAHs; however, given the distribution of these and the very low screening criteria applied, it is considered this is the result of naturally elevated concentrations. These are therefore not considered to be indicative of pollution on the site.

6.1.6. Speciated glycols were consistently below analytical detection limits in all samples collected as part of this investigation.

6.1.7. In summary, it is concluded that the contamination plume is highly localised to the Phase 2B area of the site. The only primary contaminants of concern detected outside of this area above criteria were low-level vinyl chloride, toluene and TPH aromatic C7-C8, on the western fringe of the former reservoir in entry RBH603 (shallow). The contamination appears to be particularly localised to the shallow sandstone above the coal in the eastern part of Phase 2B where the tanks of the former solvent recovery plant were previously located. It is additionally concluded that the results would suggest the band of coal / seatearth within the Rough Rock sandstone aquifer appears to be restricting vertical migration of organic contaminants.

6.2. Recommendations

6.2.1. Remediation of the Phase 2B area of the site to reduce hydrocarbon, BTEX and VOC groundwater concentrations to acceptable levels is required.

6.2.2. Following agreement of the derived RTVs with the EA, a remedial strategy containing an options appraisal will then be required outlining how the proposed treatment option(s) will reduce groundwater contaminant concentrations to the approved levels as detailed in the DQRA.

6.3. Limitations

Stratigraphy

6.3.1. The evidence of stratigraphy is taken from discrete borehole locations, and from factual information provided by other parties. Whilst it is usually reasonable to infer that similar conditions may extend between these locations, caution should be exercised, in particular where conflicting information has been highlighted during review of such information.

Contamination

6.3.2. The site investigation involved sampling at discrete locations, and it should be recognised that further areas or types of contamination may exist between investigation positions. The analyses performed are drawn from a typical suite of tests used to screen potentially contaminated land and specified to fall within the available budget made available for the site investigations. It is always possible that other substances may be present that have not been included within the standard range of tests.

Groundwater

6.3.3. Any comments made on groundwater conditions are based on observations or tests made at the time that the work was carried out. It should be noted that groundwater levels and concentrations of substances may vary according to seasonal or weather-related effects, sometimes in an unpredictable fashion.

General

6.3.4. This report has been prepared by SGP for the sole and exclusive use of Barratt Homes Manchester. Reasonable skill, care and diligence has been exercised within the budget available, and in accordance with the technical requirements of the brief. Notwithstanding the efforts made by the professional team in undertaking the assessment and preparing this report, it is possible that other ground conditions and contamination as yet undetected may exist. Reliance on the findings of this report must therefore be limited accordingly. Such reliance must be based on the whole report and not on extracts which may lead to incomplete or incorrect conclusions when taken out of context.

6.3.5. SGP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

DRAWINGS

WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

Buyers are warned that this is a working drawing and is not intended to be treated as descriptive material describing, in relation to any particular property or development, any of the Specified matters prescribed by any Order made under the above Act. The contents of this drawing may be subject to change at any time and alterations and variations can occur during the progress of the works without revision of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially from those shown. Nor do the contents of this drawing constitute a contract, part of any contract or warranty.

M66 MOTORWAY

Masons Arms (PH)

BENTLEY LANE

The Barn

158.5m

Existing Houses

Existing Houses

WALMERSLEY OLD ROAD

Path (um)

Existing retained public right of way

Proposed link to existing public right of way

Proposed link to existing public right of way

Existing retained public right of way

Existing Public House

Existing Houses

Existing Houses

PHASE 1A

PHASE 2A

PHASE 2B

PHASE 2H

PHASE 2C

PHASE 2G

PHASE 1B

PHASE 2D

PHASE 2F

PHASE 2E

Approximate location of proposed pond

Ecological protection zone

BL:145.70
Pond Area:
1008sqm

SITE ACCESS

Entrance Statement

Sales

Show Home

Show Home

Pedestrian Link onto Walmersley Old Road

Embankment

Embankment

Embankment

Bridleway

Existing Houses

BEVIS GREEN

LUMN STREET

Existing Houses

NOTE
Mill Road to be upgraded - Details to be agreed with Highway Officer

Proposed bollarded emergency link to Mill Road

Indicates line of proposed main watercourse (TBC)

Area to be retained as BOAT for farm access

Existing Houses

Existing Houses

Existing Farm Buildings

EXISTING OPEN SPACE (FARMLAND)

Scale Bar
0m 5m 10m 15m 20m 25m 30m 35m 40m 45m 50m 60m 70m 80m 90m 100m

REV	DESCRIPTION	DATE	DRAWN
G	Remediation phases updated to suit most recent phasing plan.	29.11.23	BJM
F	Remediation phases updated to suit Urban Regen Plan.	12.01.23	BJM
E	Remediation phases updated to suit NHBC comments.	26.10.22	BJM
D	Remediation phases updated to suit Urban Regen plan.	26.05.22	FB
C	Latest planning layout added. Approximate Vent Shaft location added.	18.11.21	RB
B	Amended to suit latest phase 1 remediation boundary & drainage design.	06.12.19	DK
A	Amended to show proposed phasing and new potential drainage outfalls.	15.03.18	DK

BARRATT HOMES

MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

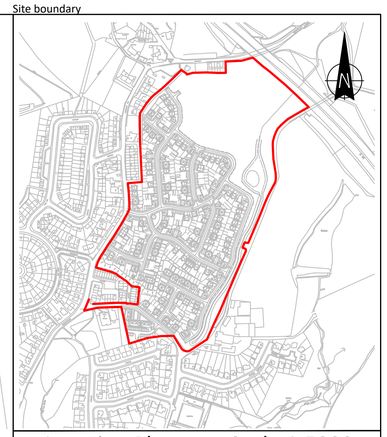
Job
Tetrosyl
Bury

Title
Remediation Phasing Plan

Design By	Date	Drawing Number	Rev
DK	19.02.18	456/ED/05	G
C.A.D By DK	Scale 1:500		



Site boundary



Location Plan Scale 1:5000

Notes:

Site boundary

Borehole Locations

Depth to coal layer (m AOD) 144.424-143.924

Notes

1. This plan is to be read in conjunction with the associated Completion Report.
2. The residential layout depicted on this plan is extracted from drawing ***'491-ED-08'*** supplied digitally by Barrat Homes Manchester.
3. Due to potential live services and issues associated with withdrawal of support; remediation works have been carried out to within circa 1m of the site boundary unless otherwise detailed.
4. All CBR tests were carried out by Murray Rix.

Survey Information:

Co-ord System:	Co-ord Type:	Primary Survey Control:	Secondary Survey Control:
Local Grid	Grid	Leica SmartNet	Site

Rev	Date	Amendment	Drawn	Checked

Urban Regen
ESTABLISHED 2001

Client:
Barratt Homes
Manchester

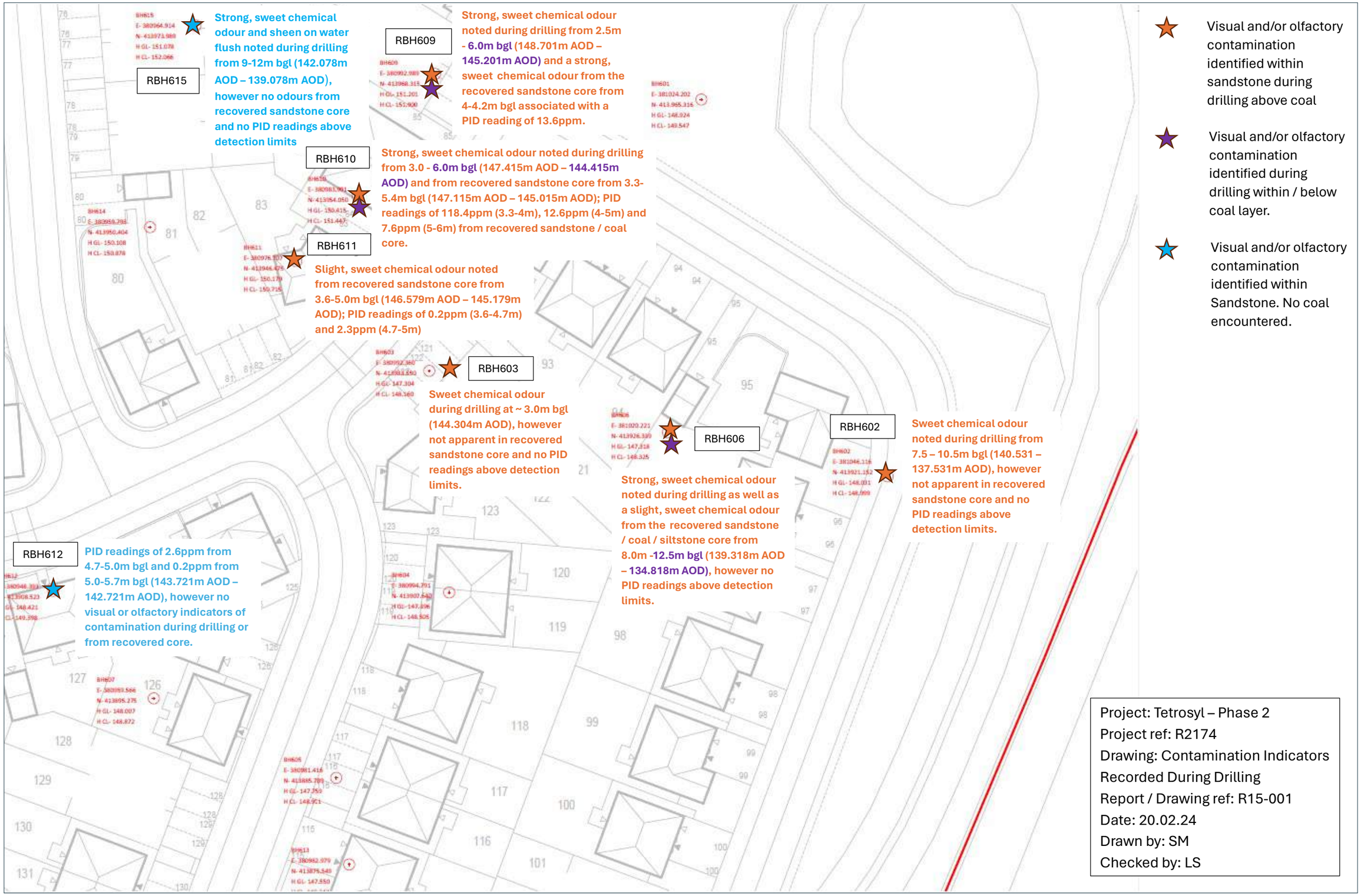
Project:
Waldmers Wood
Former Tetrosyl Works

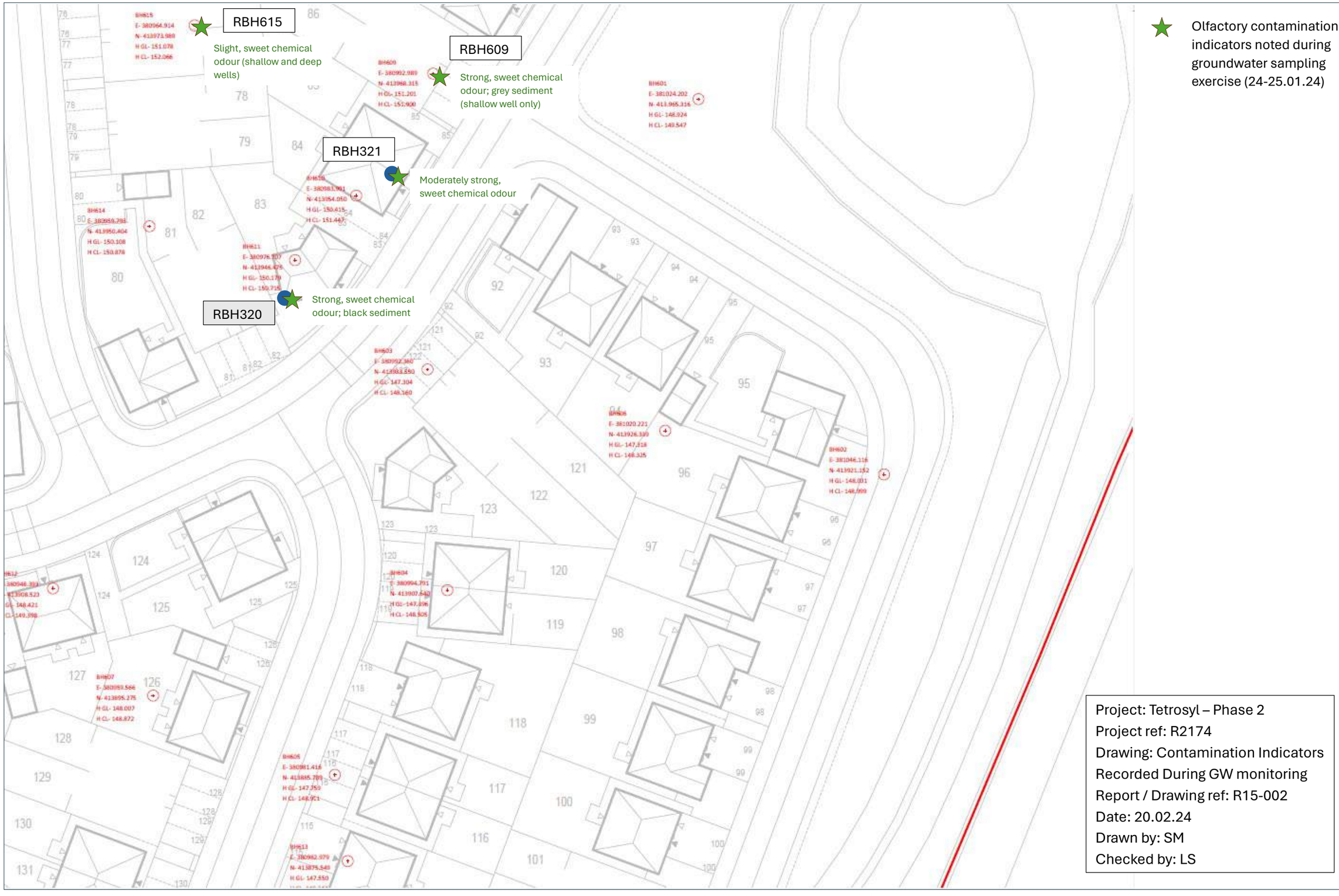
Title:
Borehole Locations

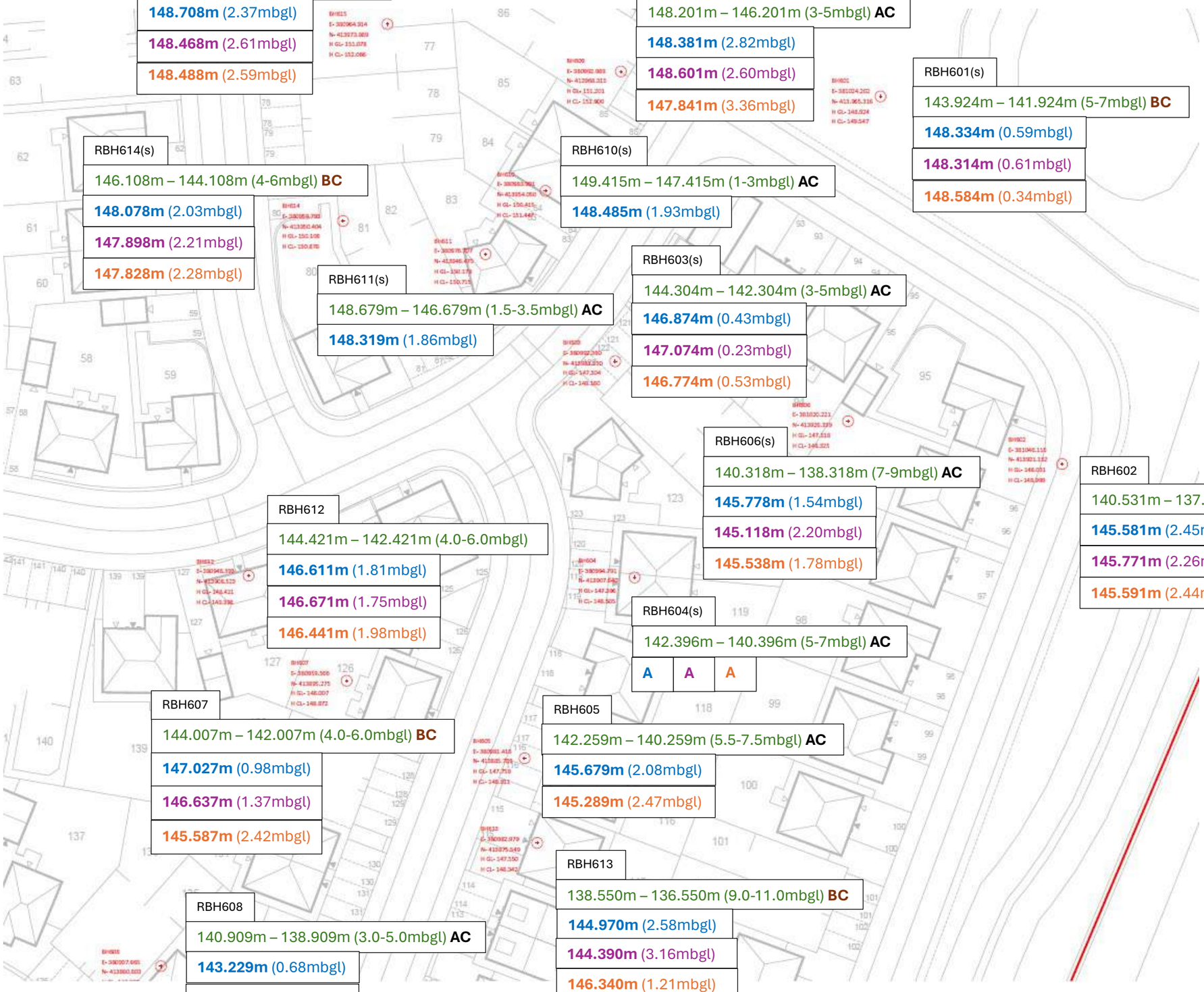
Scale:	First Issue:	Drawn:	Checked:
1:200	12/01/2024	R. Corrigan	G. Bailey

Drawing No: 333/12/01/24

Revision:


RBH615
Strong, sweet chemical odour and sheen on water flush noted during drilling from 9-12m bgl (142.078m AOD – 139.078m AOD), however no odours from recovered sandstone core and no PID readings above detection limits
RBH609
Strong, sweet chemical odour noted during drilling from 2.5m - 6.0m bgl (148.701m AOD – 145.201m AOD) and a strong, sweet chemical odour from the recovered sandstone core from 4-4.2m bgl associated with a PID reading of 13.6ppm.
RBH610
Strong, sweet chemical odour noted during drilling from 3.0 - 6.0m bgl (147.415m AOD – 144.415m AOD) and from recovered sandstone core from 3.3-5.4m bgl (147.115m AOD – 145.015m AOD); PID readings of 118.4ppm (3.3-4m), 12.6ppm (4-5m) and 7.6ppm (5-6m) from recovered sandstone / coal core.
RBH611
Slight, sweet chemical odour noted from recovered sandstone core from 3.6-5.0m bgl (146.579m AOD – 145.179m AOD); PID readings of 0.2ppm (3.6-4.7m) and 2.3ppm (4.7-5m)
RBH603
Sweet chemical odour during drilling at ~ 3.0m bgl (144.304m AOD), however not apparent in recovered sandstone core and no PID readings above detection limits.
RBH606
Strong, sweet chemical odour noted during drilling as well as a slight, sweet chemical odour from the recovered sandstone / coal / siltstone core from 8.0m -12.5m bgl (139.318m AOD – 134.818m AOD), however no PID readings above detection limits.
RBH602
Sweet chemical odour noted during drilling from 7.5 – 10.5m bgl (140.531 – 137.531m AOD), however not apparent in recovered sandstone core and no PID readings above detection limits.
RBH612
PID readings of 2.6ppm from 4.7-5.0m bgl and 0.2ppm from 5.0-5.7m bgl (143.721m AOD – 142.721m AOD), however no visual or olfactory indicators of contamination during drilling or from recovered core.
Visual and/or olfactory contamination identified within sandstone during drilling above coal
Visual and/or olfactory contamination identified during drilling within / below coal layer.
Visual and/or olfactory contamination identified within Sandstone. No coal encountered.
Project: Tetrosyl – Phase 2
Project ref: R2174
Drawing: Contamination Indicators Recorded During Drilling
Report / Drawing ref: R15-001
Date: 20.02.24
Drawn by: SM
Checked by: LS


RBH615
Slight, sweet chemical odour (shallow and deep wells)
RBH609
Strong, sweet chemical odour; grey sediment (shallow well only)
RBH321
Moderately strong, sweet chemical odour
RBH320
Strong, sweet chemical odour; black sediment
Olfactory contamination indicators noted during groundwater sampling exercise (24-25.01.24)
Project: Tetrosyl – Phase 2
Project ref: R2174
Drawing: Contamination Indicators Recorded During GW monitoring
Report / Drawing ref: R15-002
Date: 20.02.24
Drawn by: SM
Checked by: LS



Key

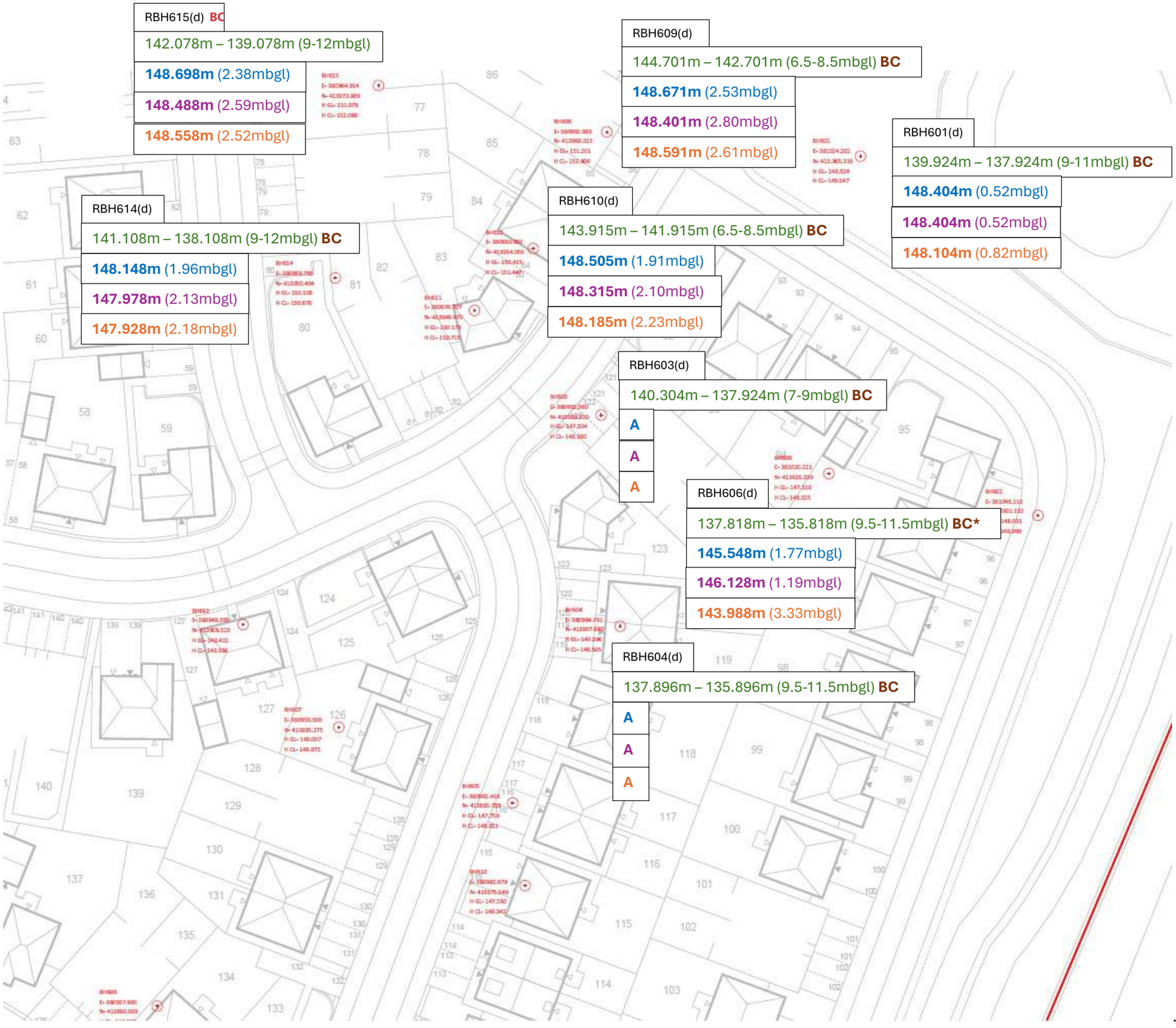
143.924m	Well response zone mAOD
148.334m	Groundwater level mAOD (11-12.01.24)
148.314m	Groundwater level mAOD (24-25.01.24)
148.314m	Groundwater level mAOD (03-04.04.24)
A / A	Groundwater artesian
AC	Response zone of well installation above coal
BC	Response zone of well installation below coal

Notes

No coal identified within RBH612 & RBH615, however suspected at between 2.6-3.4m bgl in RH615 (no recovery)

Coal within RBH613 comprises thin bands through sandstone

Project: Tetrosyl – Phase 2
Project ref: R2174
Drawing: Groundwater Levels (Single / Shallow Wells)
Report / Drawing ref: R15-003A
Date: 26.04.24
Drawn by: SM
Checked by: LS



Key

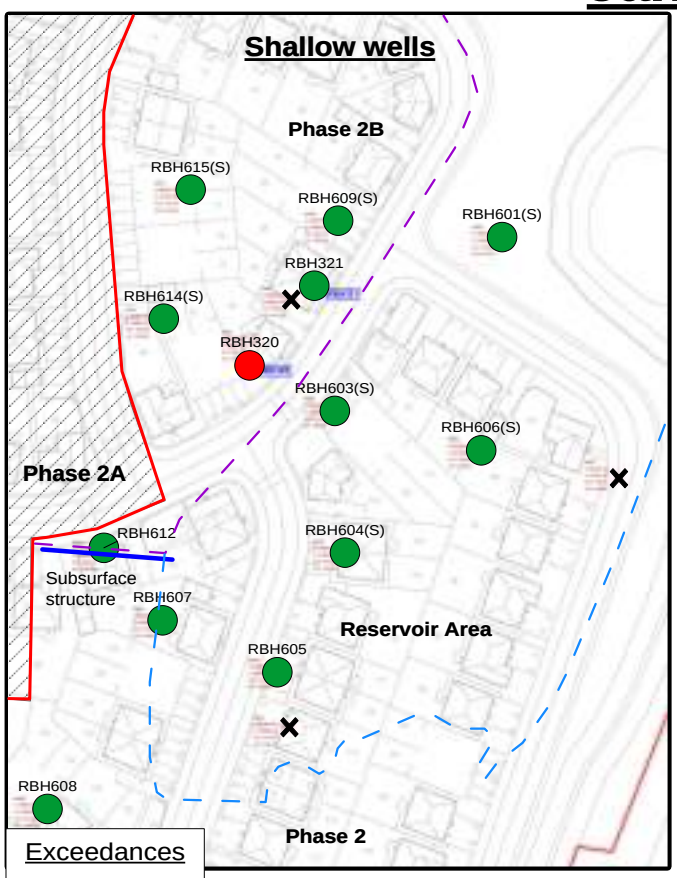
143.924m	Well response zone mAOD
148.334m	Groundwater level mAOD (11-12.01.24)
148.314m	Groundwater level mAOD (24-25.01.24)
148.314m	Groundwater level mAOD (03-04.04.24)
A / A	Groundwater artesian
BC	Response zone of well installation below coal
BC*	Response zone of well installation partially through & below coal

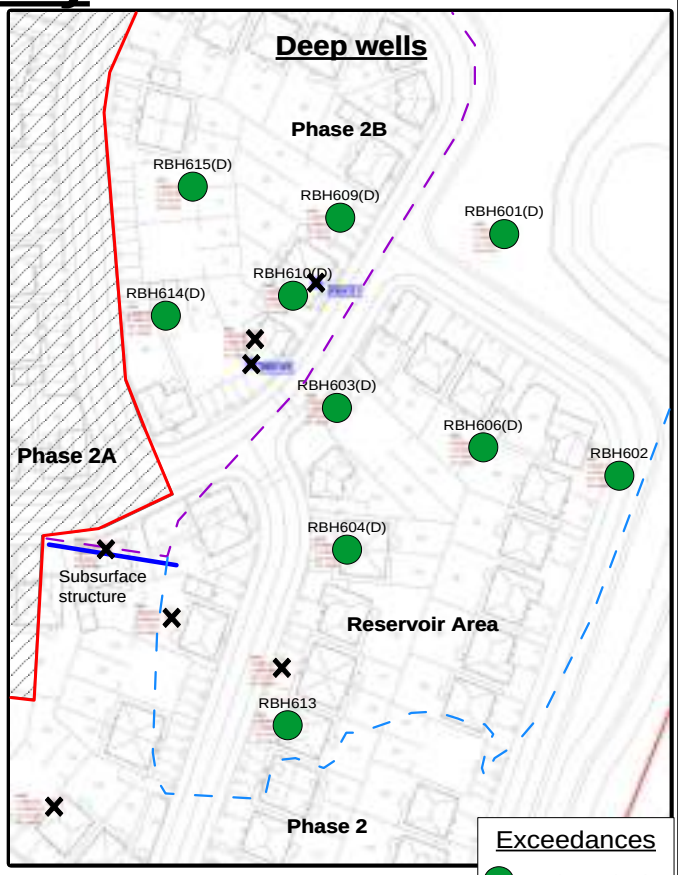
Notes

No coal confirmed within RBH615, however suspected at between 2.6-3.4m bgl (no recovery)

Project: Tetrosyl – Phase 2
Project ref: R2174
Drawing: Groundwater Levels (Deep Wells)
Report / Drawing ref: R15-003B
Date: 26.04.24
Drawn by: SM
Checked by: LS

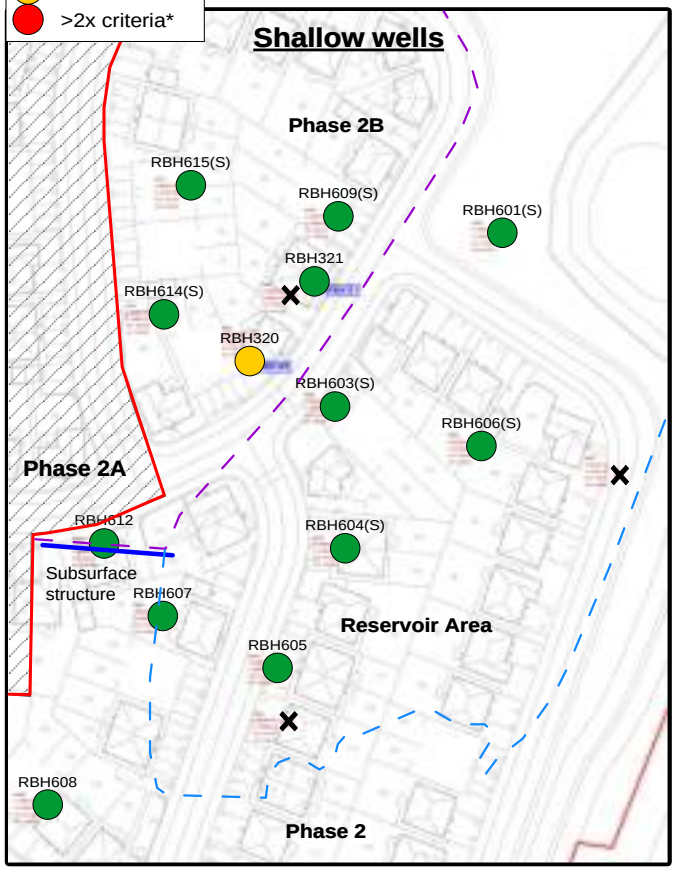
January

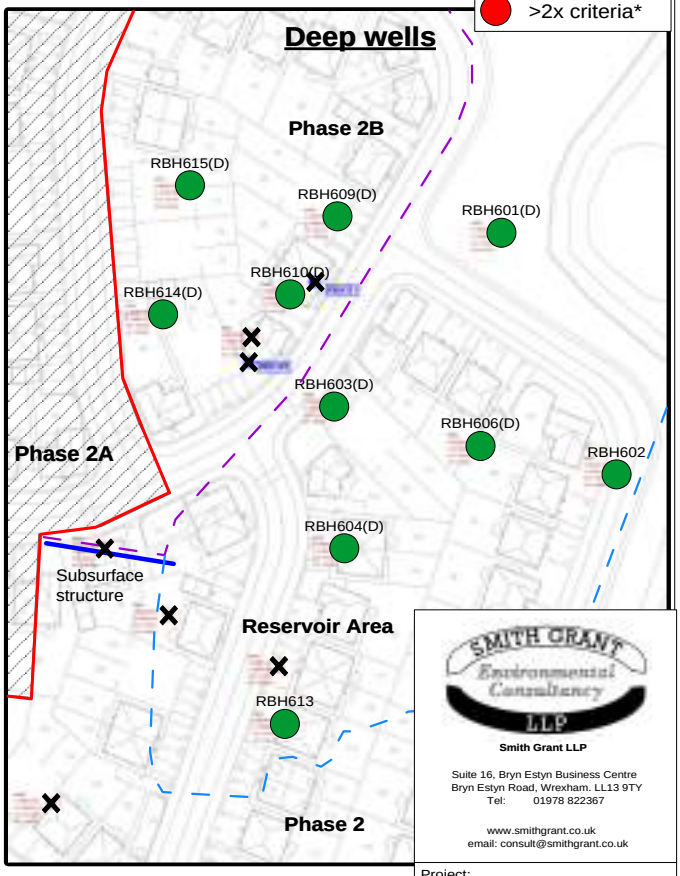




Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

April





Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

- Phase 2A Boundary
- Reservoir Boundary
- Phase 2B Boundary
- No shallow/deep well

***Criteria value = 53.3 ug/L**

("Tier 3" criteria with degradation applied to dissolved pollutants only) Produced by Smith Grant LLP in their Hydrogeological Detailed Quantitative Risk Assessment (DQRA) (report ref: R2174-R16; July 2024)

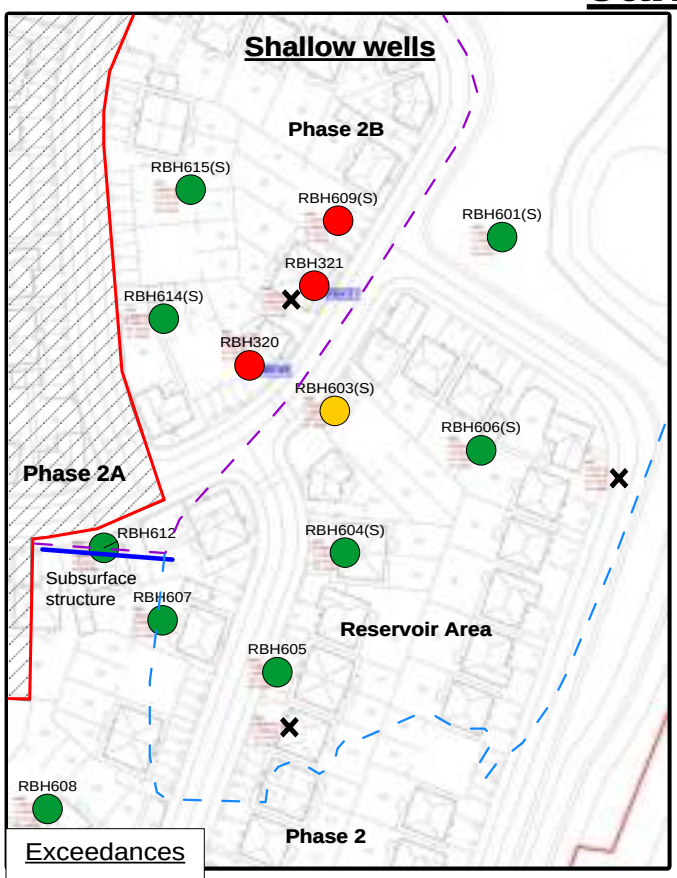
Smith Grant LLP

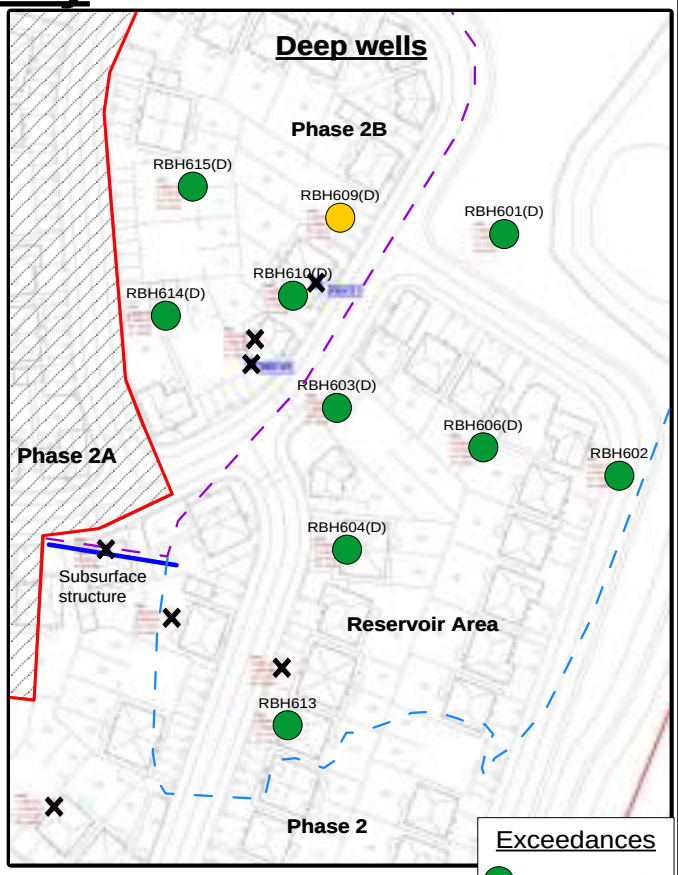
Suite 16, Bryn Estyn Business Centre
Bryn Estyn Road, Wrexham. LL13 9TY
Tel: 01978 822367

www.smithgrant.co.uk
email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Benzene exceedances (with degradation)	
Drawn by: MJ	Checked: LS
Date: 13.08.24	Report no: R15
Job No: R2174	Drg No: 004

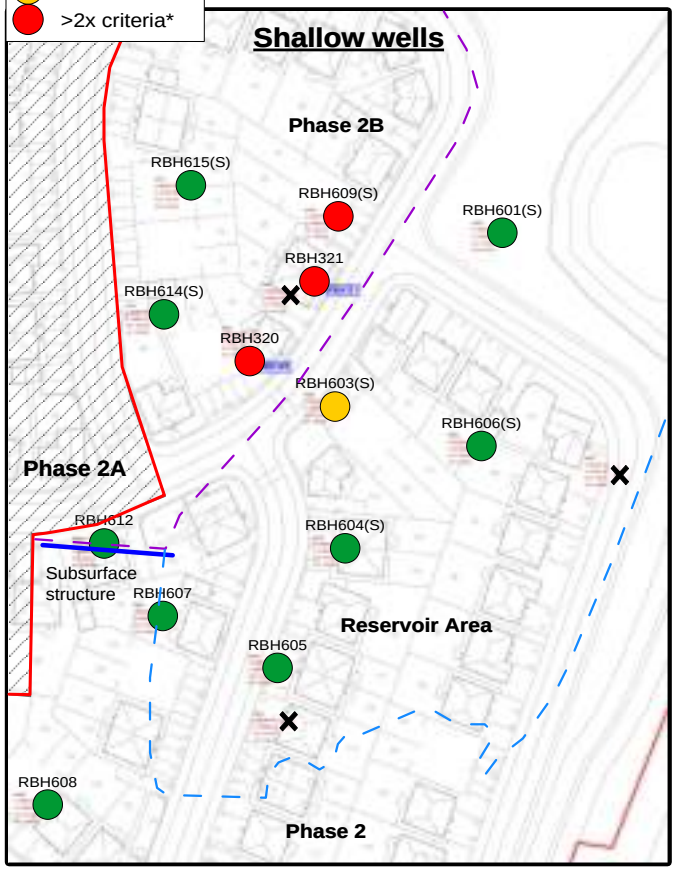
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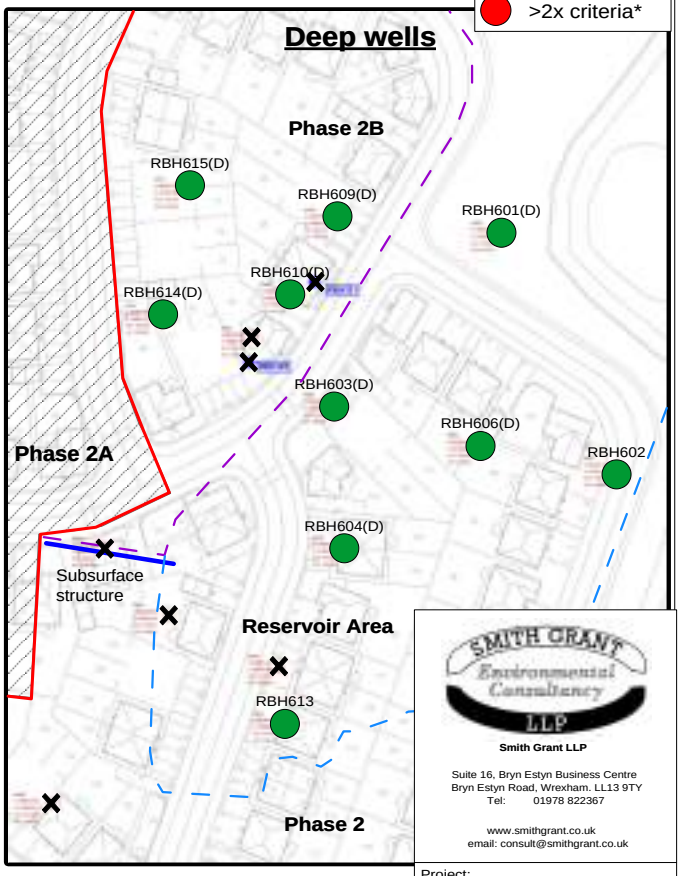




Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

April





Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

- Phase 2A Boundary
- Reservoir Boundary
- Phase 2B Boundary
- No shallow/deep well

***Criteria value = 1,340 ug/L**

("Tier 3" criteria with degradation applied to dissolved pollutants only) Produced by Smith Grant LLP in their Hydrogeological Detailed Quantitative Risk Assessment (DQRA) (report ref: R2174-R16; July 2024)

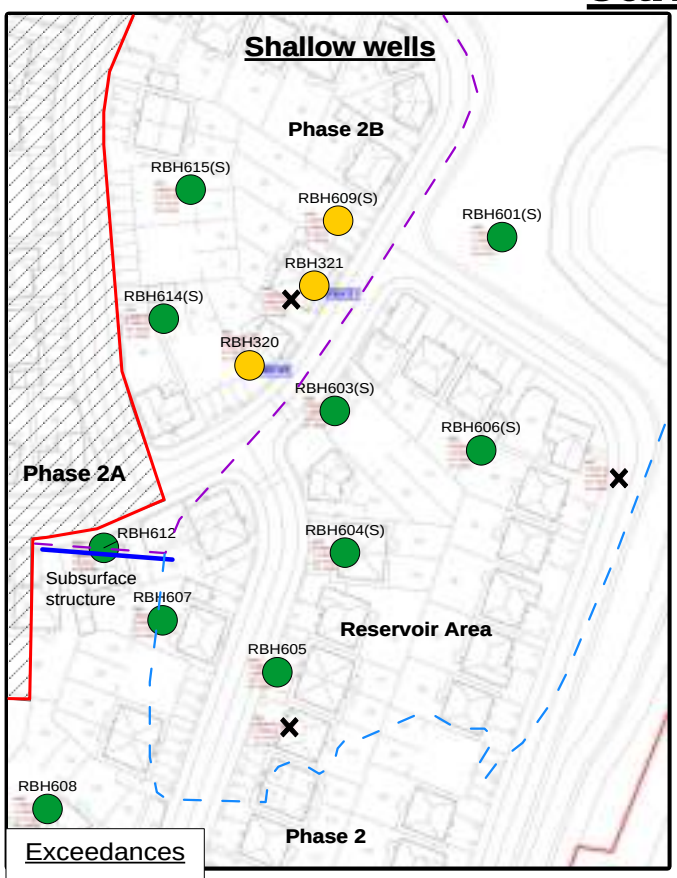
Smith Grant LLP

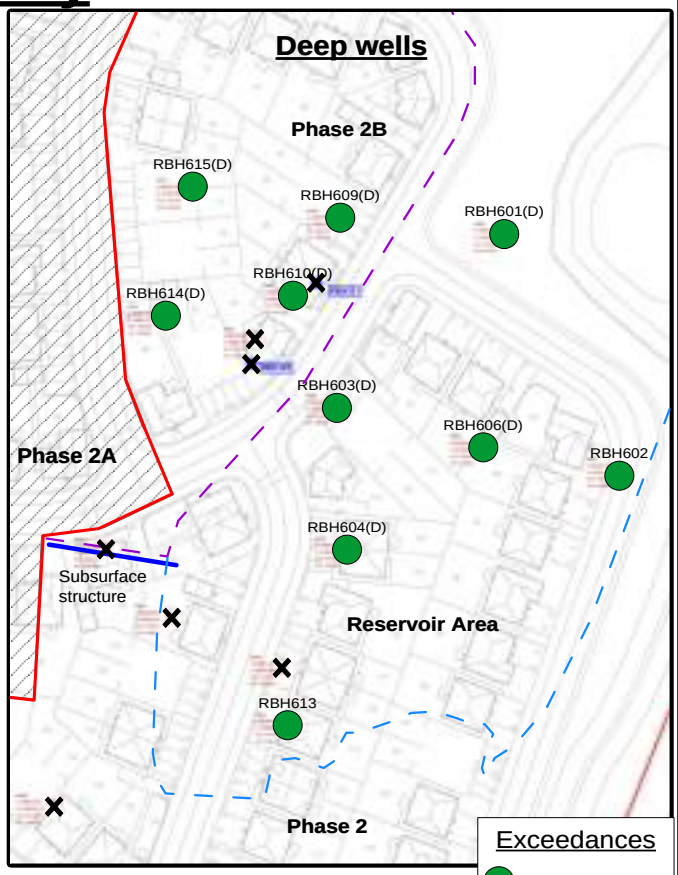
Suite 16, Bryn Estyn Business Centre
Bryn Estyn Road, Wrexham. LL13 9TY
Tel: 01978 822367

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email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Toluene exceedances (with degradation)	
Drawn by: MJ	Checked: LS
Date: 13.08.24	Report no: R15
Job No: R2174	Drg No: 005

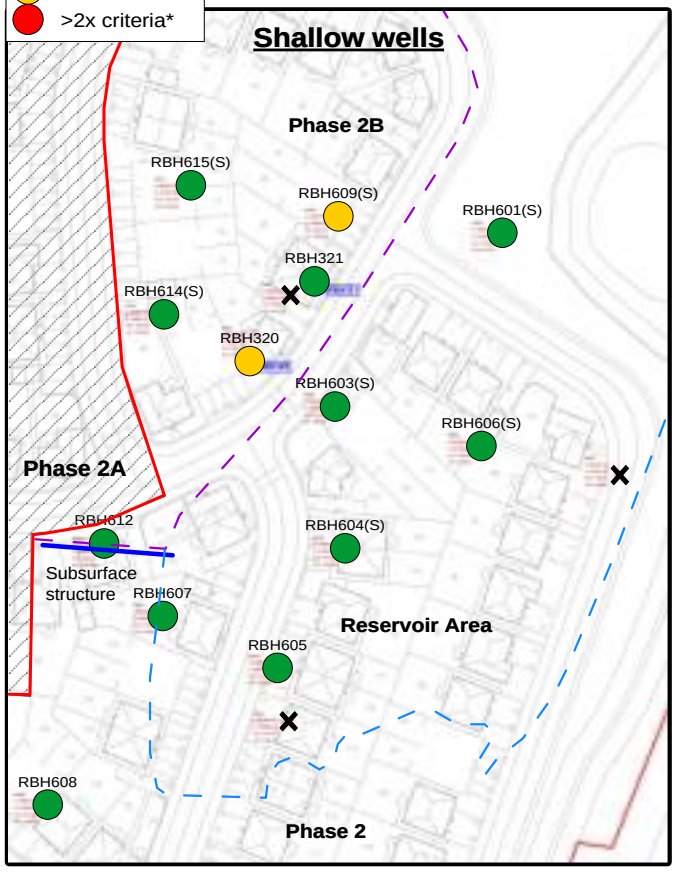
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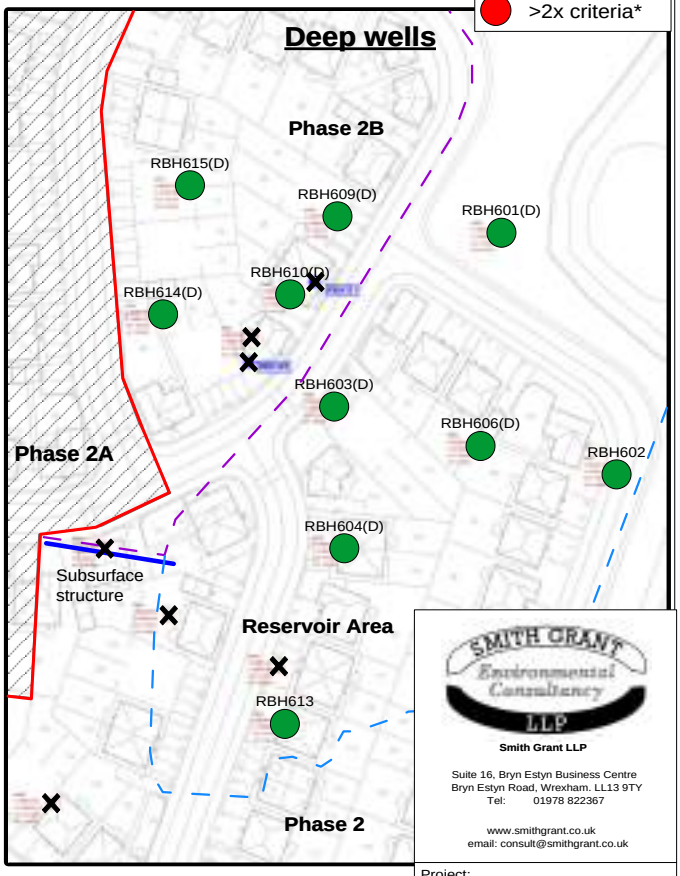




Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

April





Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

- Phase 2A Boundary
- Reservoir Boundary
- Phase 2B Boundary
- ✕ No shallow/deep well

***Criteria value = 5,520 ug/L**

("Tier 3" criteria with degradation applied to dissolved pollutants only) Produced by Smith Grant LLP in their Hydrogeological Detailed Quantitative Risk Assessment (DQRA) (report ref: R2174-R16; July 2024)

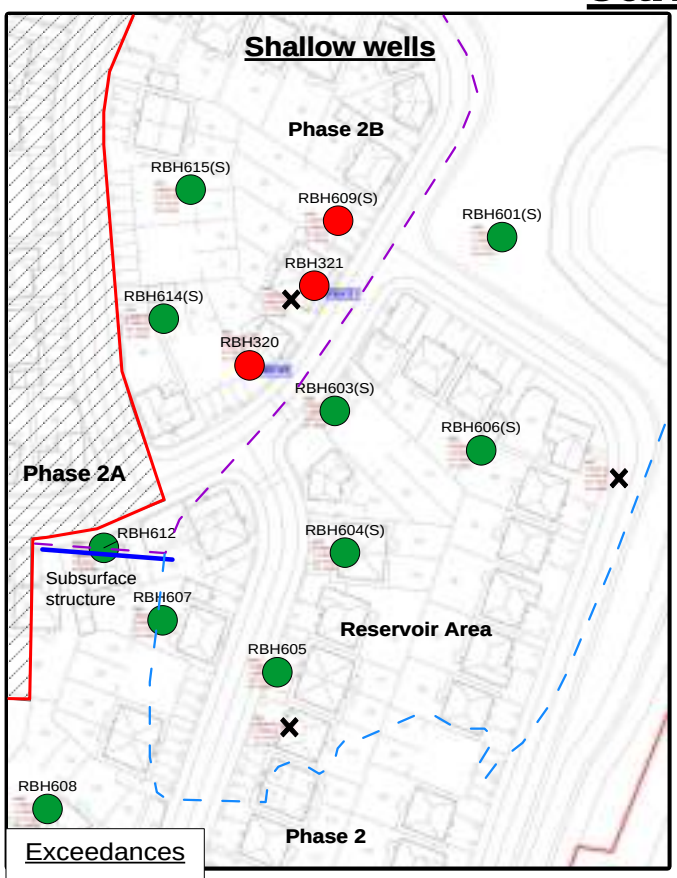
Smith Grant LLP

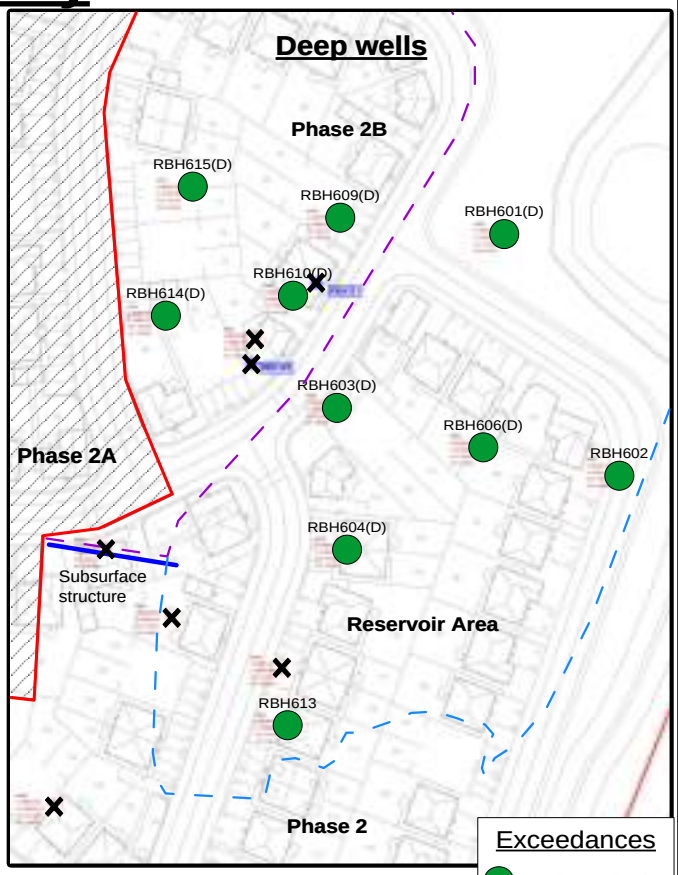
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Tel: 01978 822367

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email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Ethylbenzene exceedances (with degradation)	
Drawn by: MJ	Checked: LS
Date: 13.08.24	Report no: R15
Job No: R2174	Drg No: 006

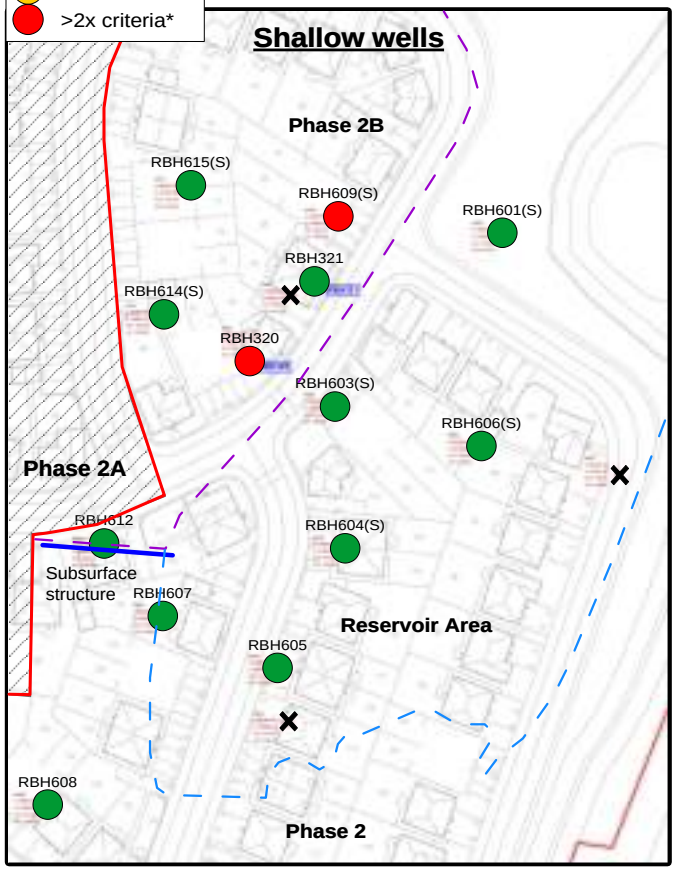
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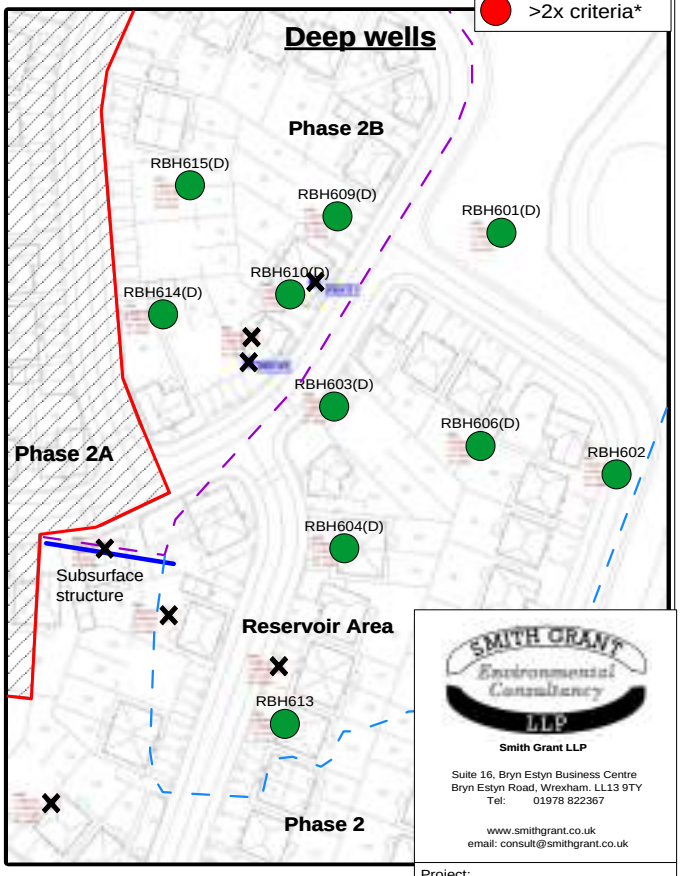




Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

April





Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

- Phase 2A Boundary
- Reservoir Boundary
- Phase 2B Boundary
- No shallow/deep well

***Criteria value = 9,320 ug/L**

("Tier 3" criteria with degradation applied to dissolved pollutants only) Produced by Smith Grant LLP in their Hydrogeological Detailed Quantitative Risk Assessment (DQRA) (report ref: R2174-R16; July 2024)

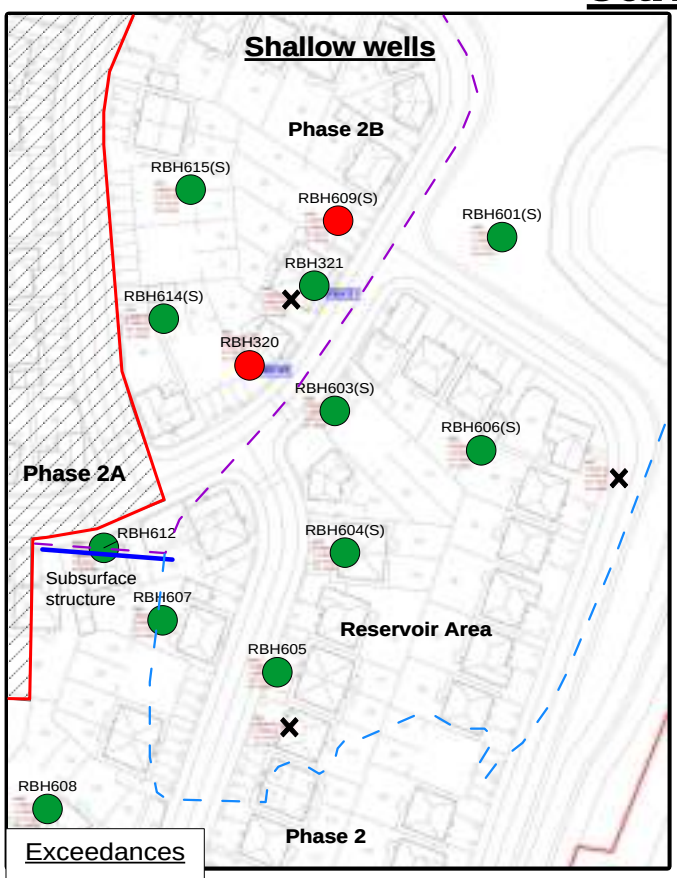
Smith Grant LLP

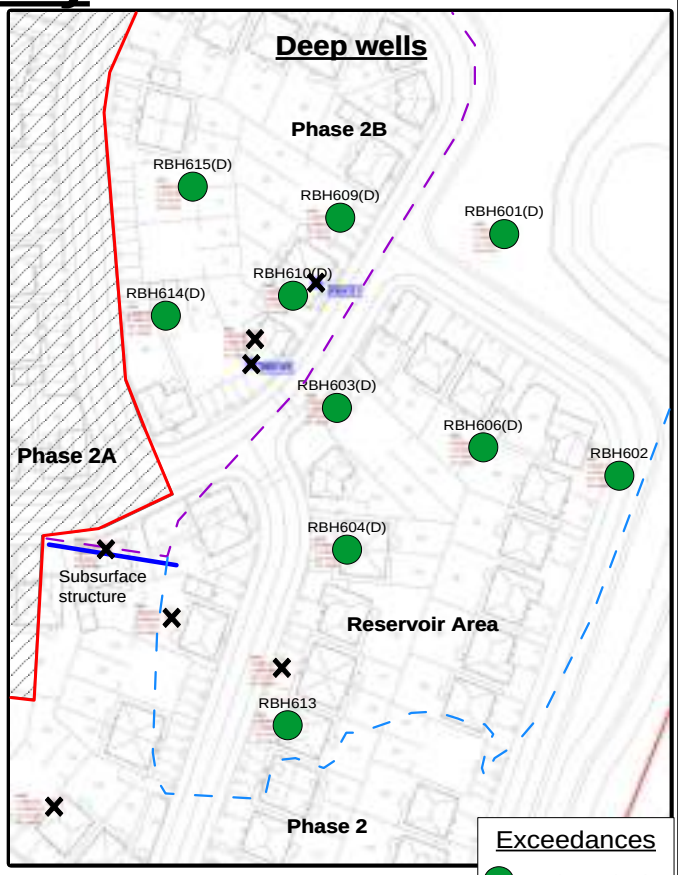
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Bryn Estyn Road, Wrexham. LL13 9TY
Tel: 01978 822367

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email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Total xylene exceedances (with degradation)	
Drawn by: MJ	Checked: LS
Date: 13.08.24	Report no: R15
Job No: R2174	Drg No: 007

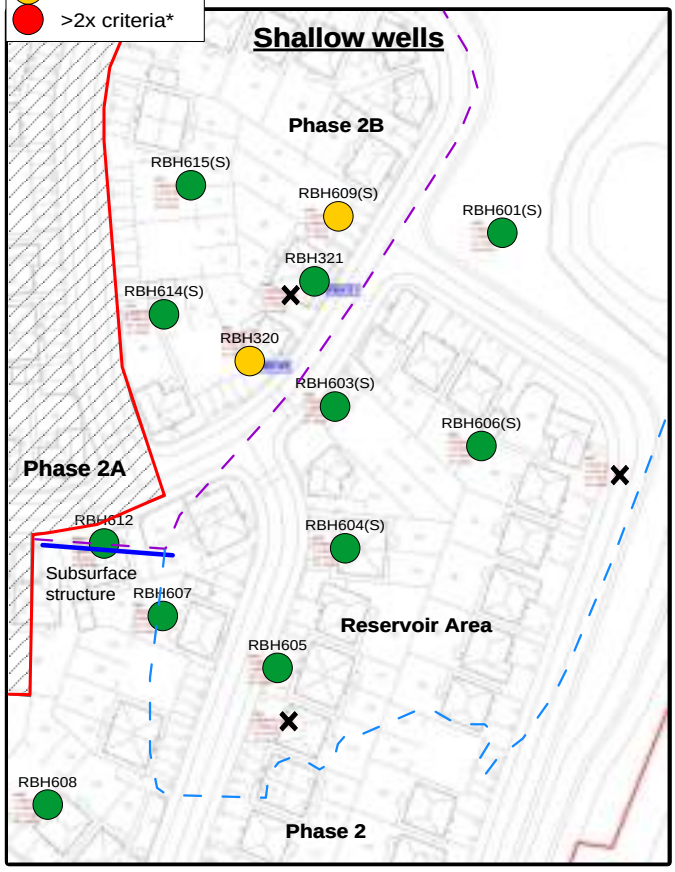
January

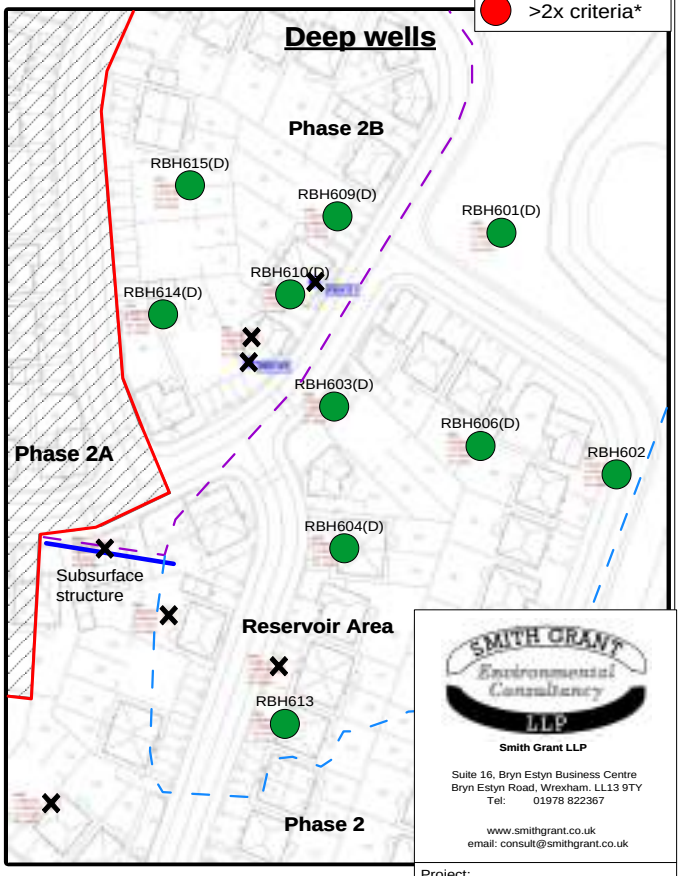




Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

April





Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

- Phase 2A Boundary
- Reservoir Boundary
- Phase 2B Boundary
- No shallow/deep well

***Criteria value = 53.3 ug/L**

("Tier 3" criteria with degradation applied to dissolved pollutants only) Produced by Smith Grant LLP in their Hydrogeological Detailed Quantitative Risk Assessment (DQRA) (report ref: R2174-R16; July 2024)

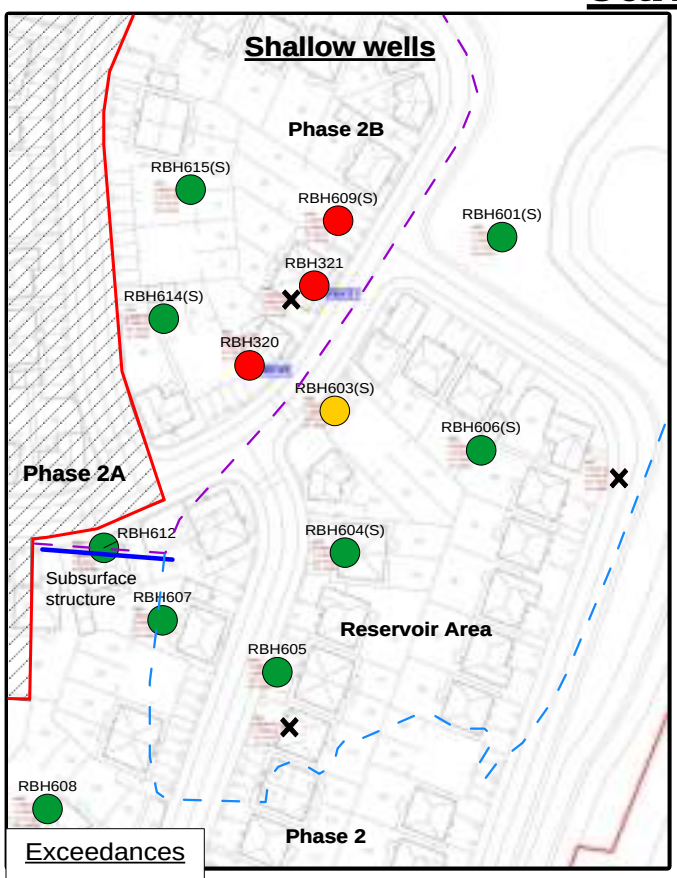
Smith Grant LLP

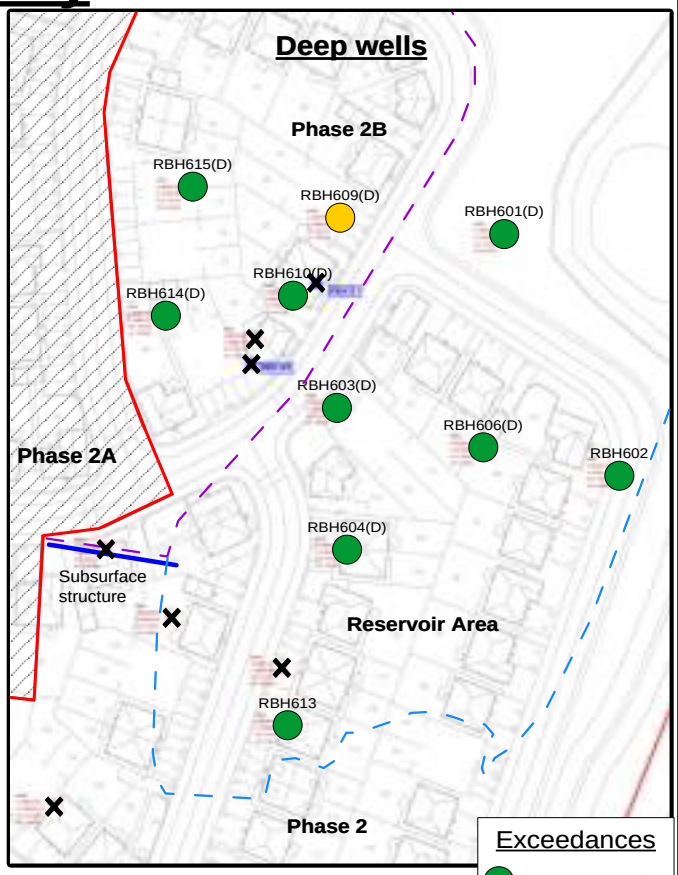
Suite 16, Bryn Estyn Business Centre
Bryn Estyn Road, Wrexham. LL13 9TY
Tel: 01978 822367

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email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Aromatic (EC5-EC7) exceedances (with degradation)	
Drawn by: MJ	Checked: LS
Date: 13.08.24	Report no: R15
Job No: R2174	Drg No: 008

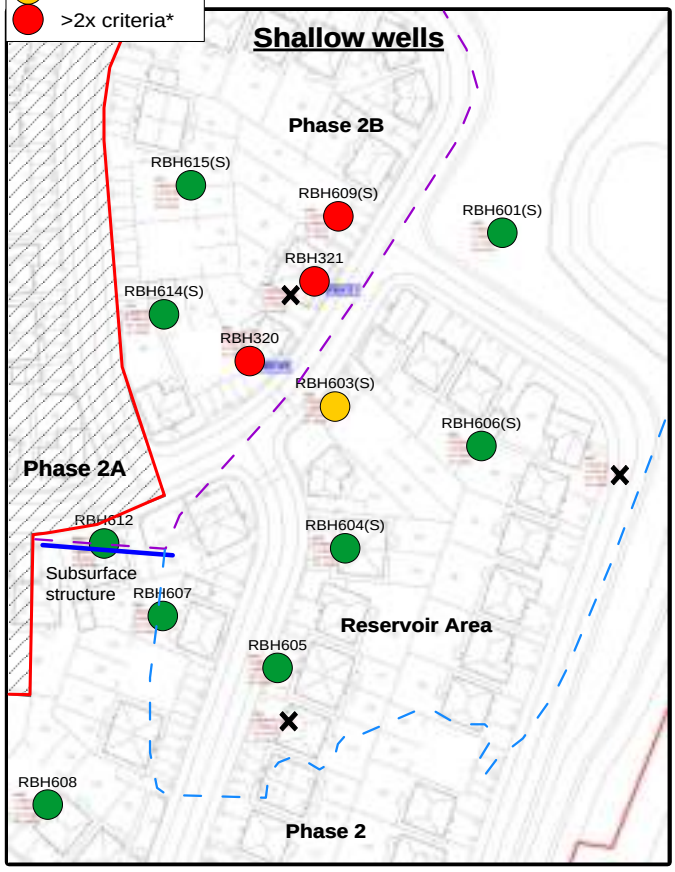
January

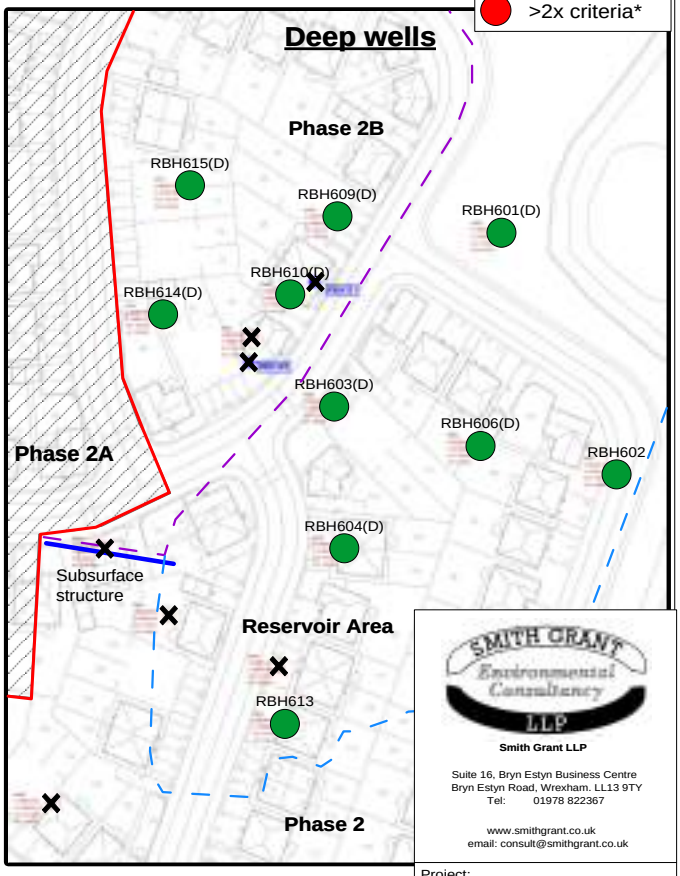




Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

April





Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

- Phase 2A Boundary
- Reservoir Boundary
- Phase 2B Boundary
- ✕ No shallow/deep well

***Criteria value = 1,340 ug/L**

("Tier 3" criteria with degradation applied to dissolved pollutants only) Produced by Smith Grant LLP in their Hydrogeological Detailed Quantitative Risk Assessment (DQRA) (report ref: R2174-R16; July 2024)

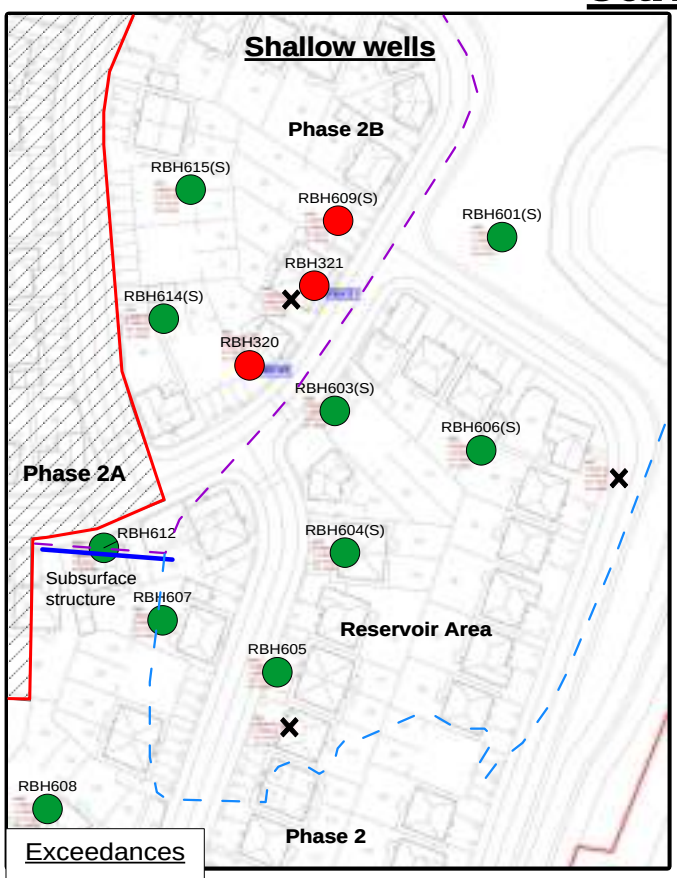
Smith Grant LLP

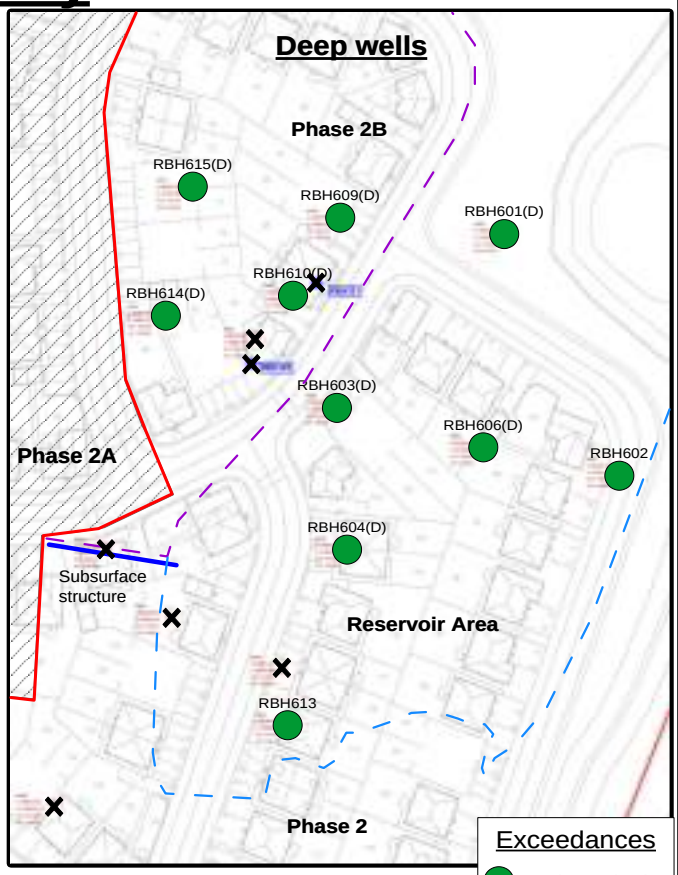
Suite 16, Bryn Estyn Business Centre
Bryn Estyn Road, Wrexham. LL13 9TY
Tel: 01978 822367

www.smithgrant.co.uk
email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Aromatic (EC7-EC8) exceedances (with degradation)	
Drawn by: MJ	Checked: LS
Date: 13.08.24	Report no: R15
Job No: R2174	Drg No: 009

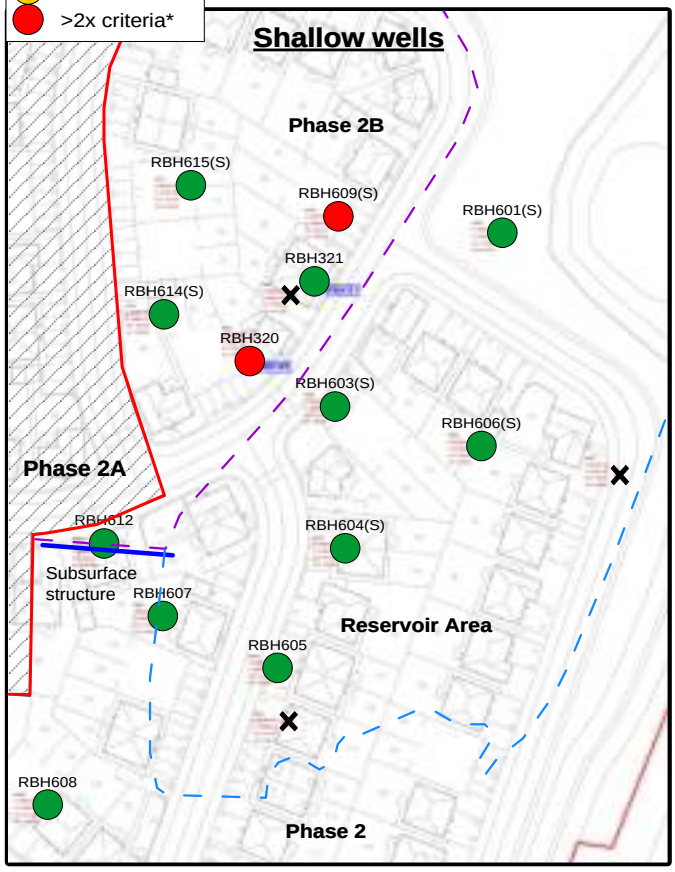
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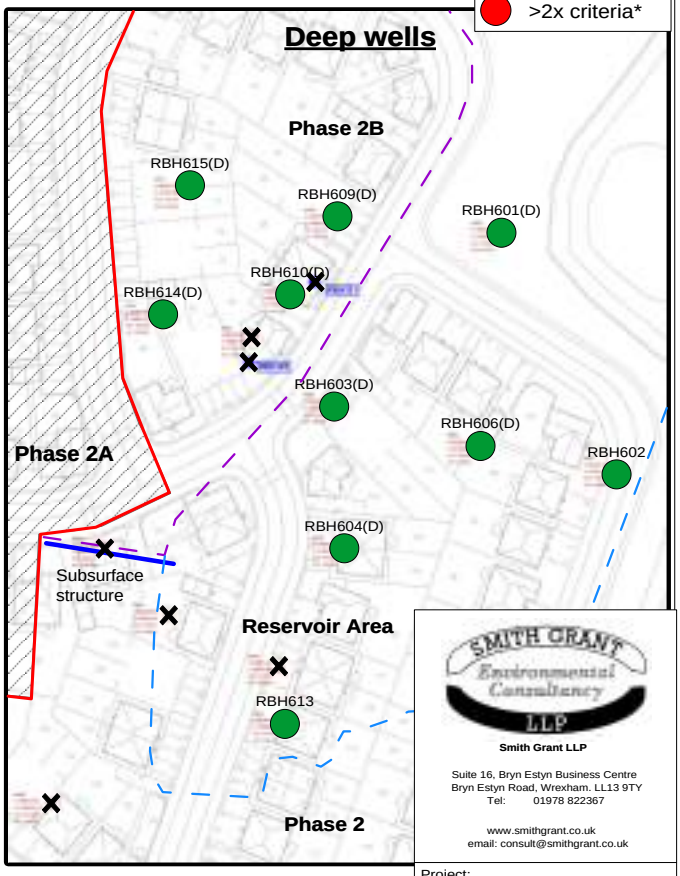




Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

April





Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

- Phase 2A Boundary
- Reservoir Boundary
- Phase 2B Boundary
- No shallow/deep well

***Criteria value = 12,600 ug/L**

("Tier 3" criteria with degradation applied to dissolved pollutants only) Produced by Smith Grant LLP in their Hydrogeological Detailed Quantitative Risk Assessment (DQRA) (report ref: R2174-R16; July 2024)

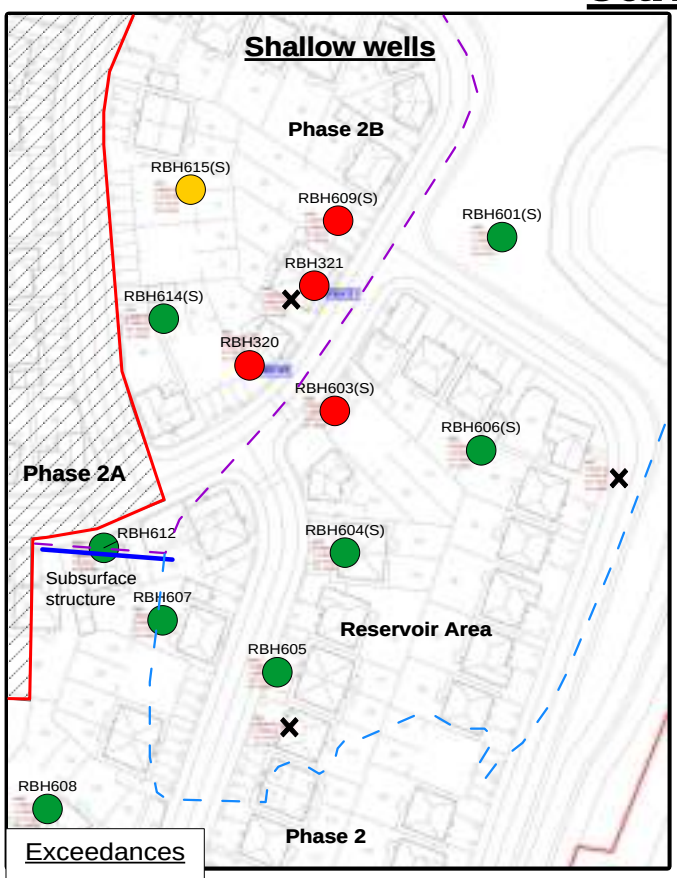
Smith Grant LLP

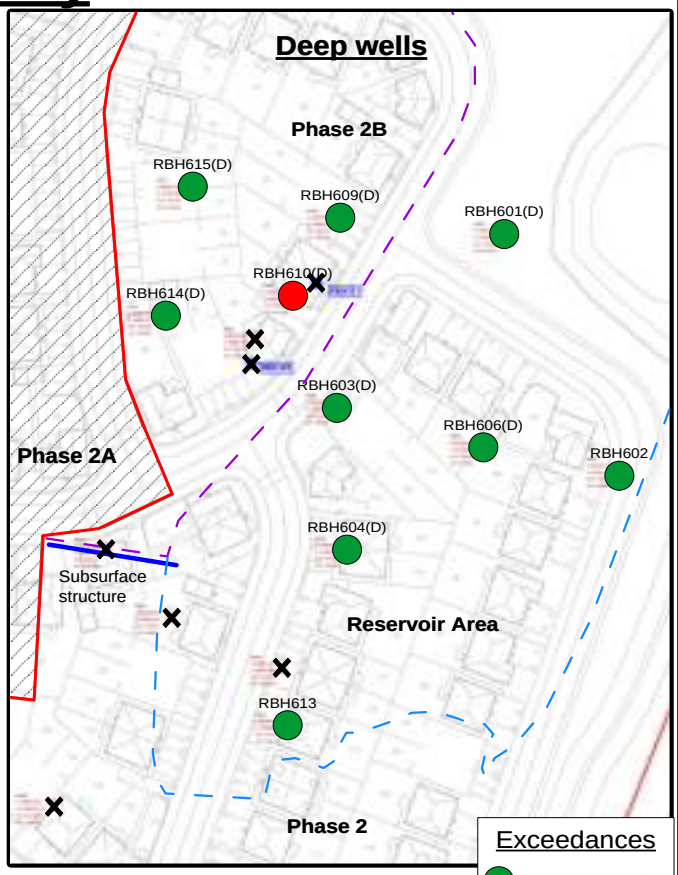
Suite 16, Bryn Estyn Business Centre
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Tel: 01978 822367

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email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Aromatic (EC8-EC10) exceedances (with degradation)	
Drawn by: MJ	Checked: LS
Date: 13.08.24	Report no: R15
Job No: R2174	Drg No: 010

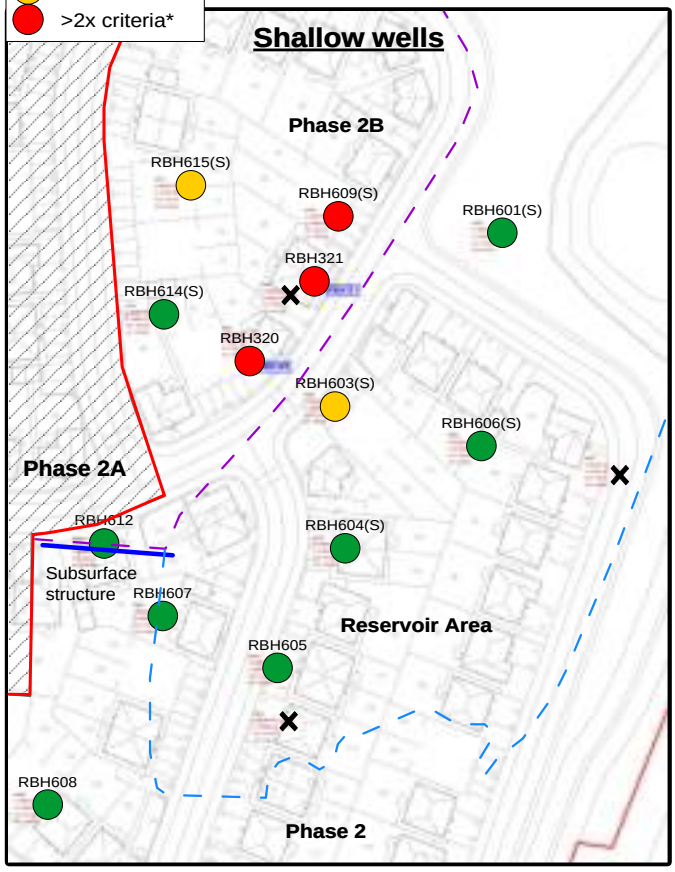
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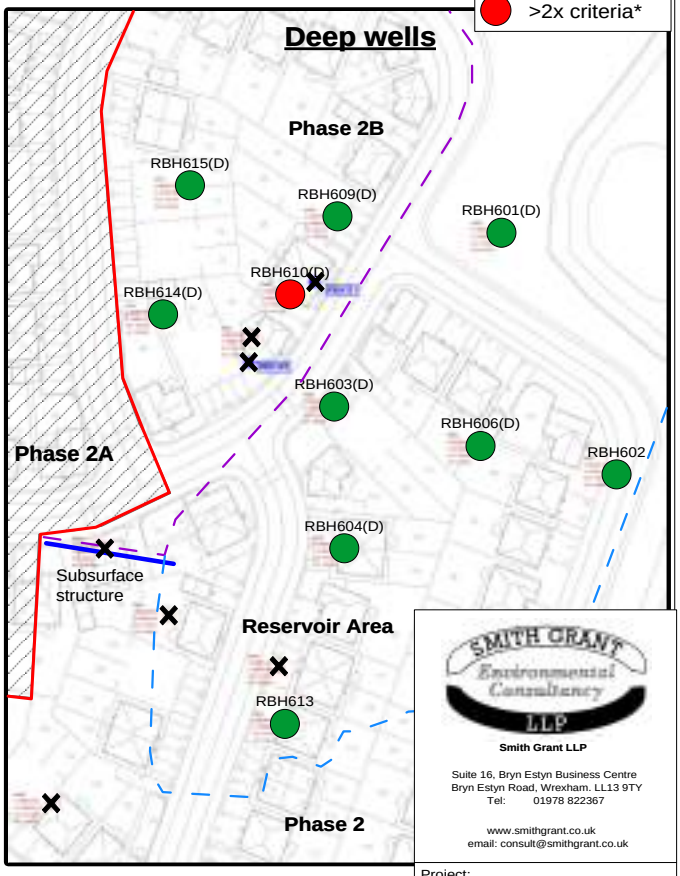




Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

April





Exceedances
- Below criteria*
- 1-2x criteria*
- >2x criteria*

- Phase 2A Boundary
- Reservoir Boundary
- Phase 2B Boundary
- No shallow/deep well

***Criteria value = 1.02 ug/L**

("Tier 3" criteria with degradation applied to dissolved pollutants only) Produced by Smith Grant LLP in their Hydrogeological Detailed Quantitative Risk Assessment (DQRA) (report ref: R2174-R16; July 2024)

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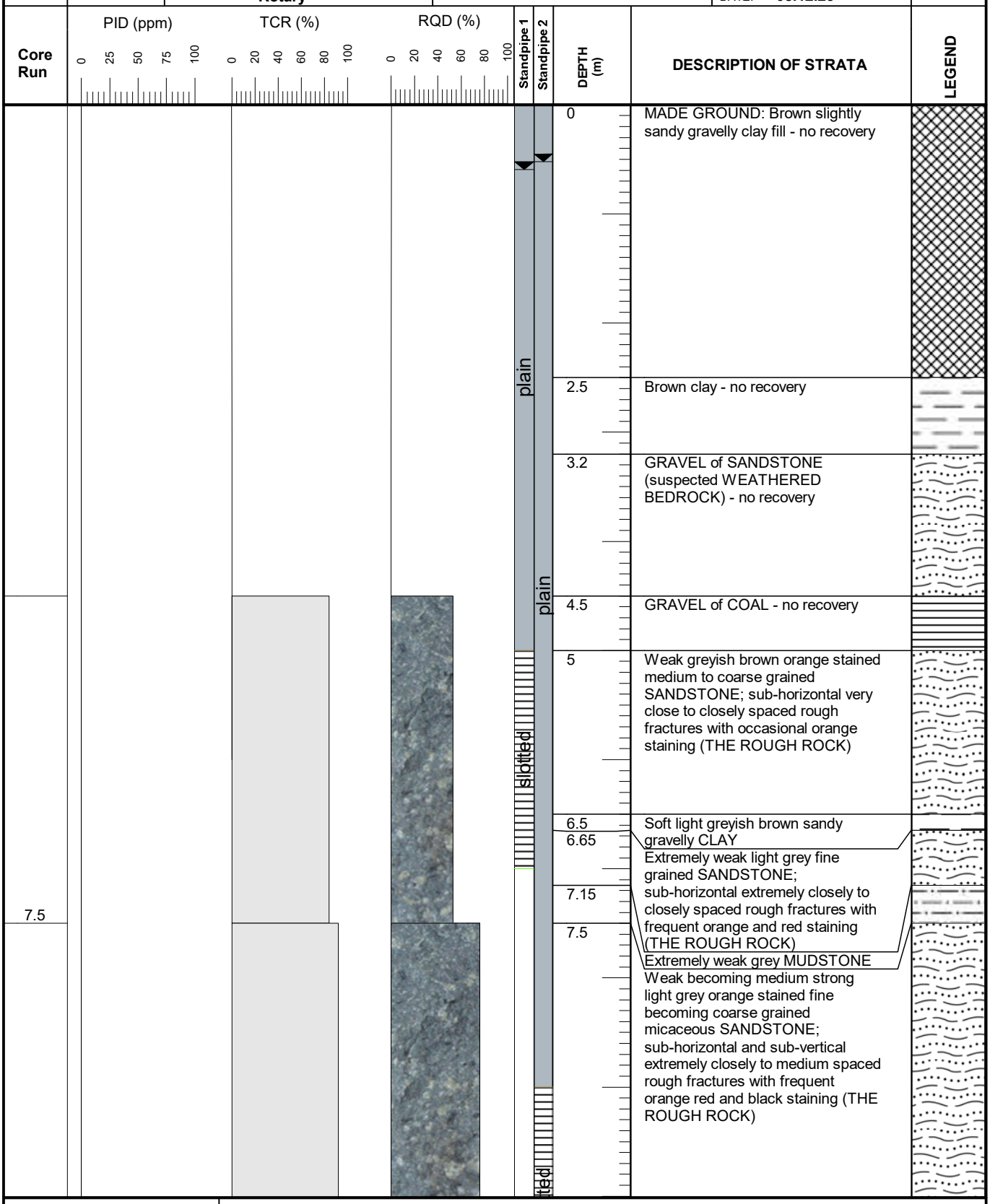
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email: consult@smithgrant.co.uk

Project: Tetrosyl-Phase 2	
Drawing: Vinyl chloride exceedances (with degradation)	
Drawn by: MJ	Checked: LS
Date: 13.08.24	Report no: R15
Job No: R2174	Drg No: 011

APPENDIX A

BOREHOLE LOGS

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH601
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 08.12.23	



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GROUND WATER: Artesian conditions encountered (noted following completion of boring)

▼ Groundwater depths measured on 10.01.24: 0.59m (shallow well) / 0.52m (deep well)

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

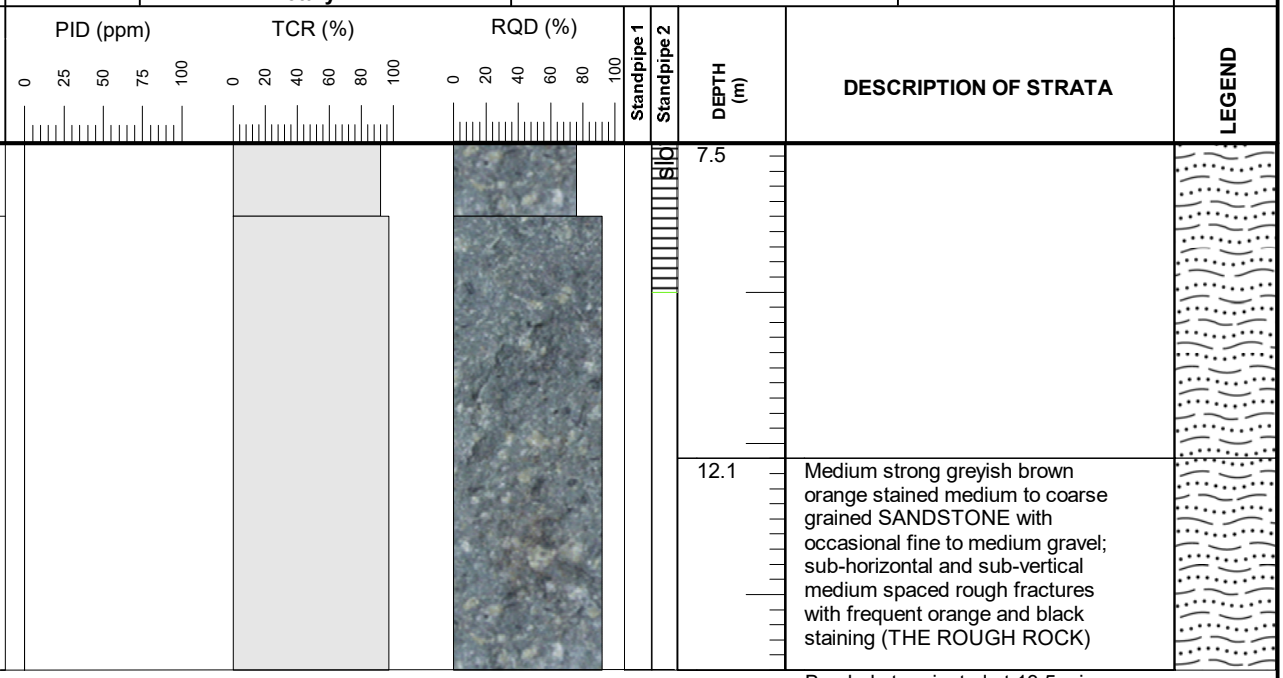
Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3.2m; coring using recirculated water flush from 3.2m to 13.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH601
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 08.12.23	



Core Run

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GROUND WATER: Artesian conditions encountered (noted following completion of boring)

▼ Groundwater depths measured on 10.01.24: 0.59m (shallow well) / 0.52m (deep well)

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3.2m; coring using recirculated water flush from 3.2m to 13.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH602
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 05-06.01.24	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Installation	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
					0	MADE GROUND: Brown slightly sandy gravelly clay fill with frequent cobbles - no recovery	
				plain	3.5	Boulder (MADE GROUND)	
				plain	3.8	No recovery in clay soils (unable to distinguish where strata changed from made ground to natural clay / silts as no core recovery)	
				plain	6.9	Brown gravelly very sandy CLAY	
				slotted	7.5	SANDSTONE (THE ROUGH ROCK) (GEOCHEM TO PROVIDE DETAILED LOG)	

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GROUND WATER:

▼ Groundwater depth measured on 11.01.24: 2.45m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

Operator: Taylor Drilling Services Ltd.
Sweet chemical odour noted during drilling from between 7.5-10.5m although not apparent in rock.
All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).
Open hole drilling from ground level to 4m; coring using recirculated water flush from 4m to 13.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH602
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 05-06.01.24	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Installation	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
					7.5		
10.5					10.5	Black COAL recovered as gravel (AZCL 10.5-11.2m)	
					11.5	Weak locally medium strong greyish brown medium to coarse grained SANDSTONE; sub-horizontal and sub-vertical very closely to closely spaced rough fractures with occasional black and orange staining (THE ROUGH ROCK)	
13.5						Borehole terminated at 13.5m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER:

▼ Groundwater depth measured on 11.01.24: 2.45m

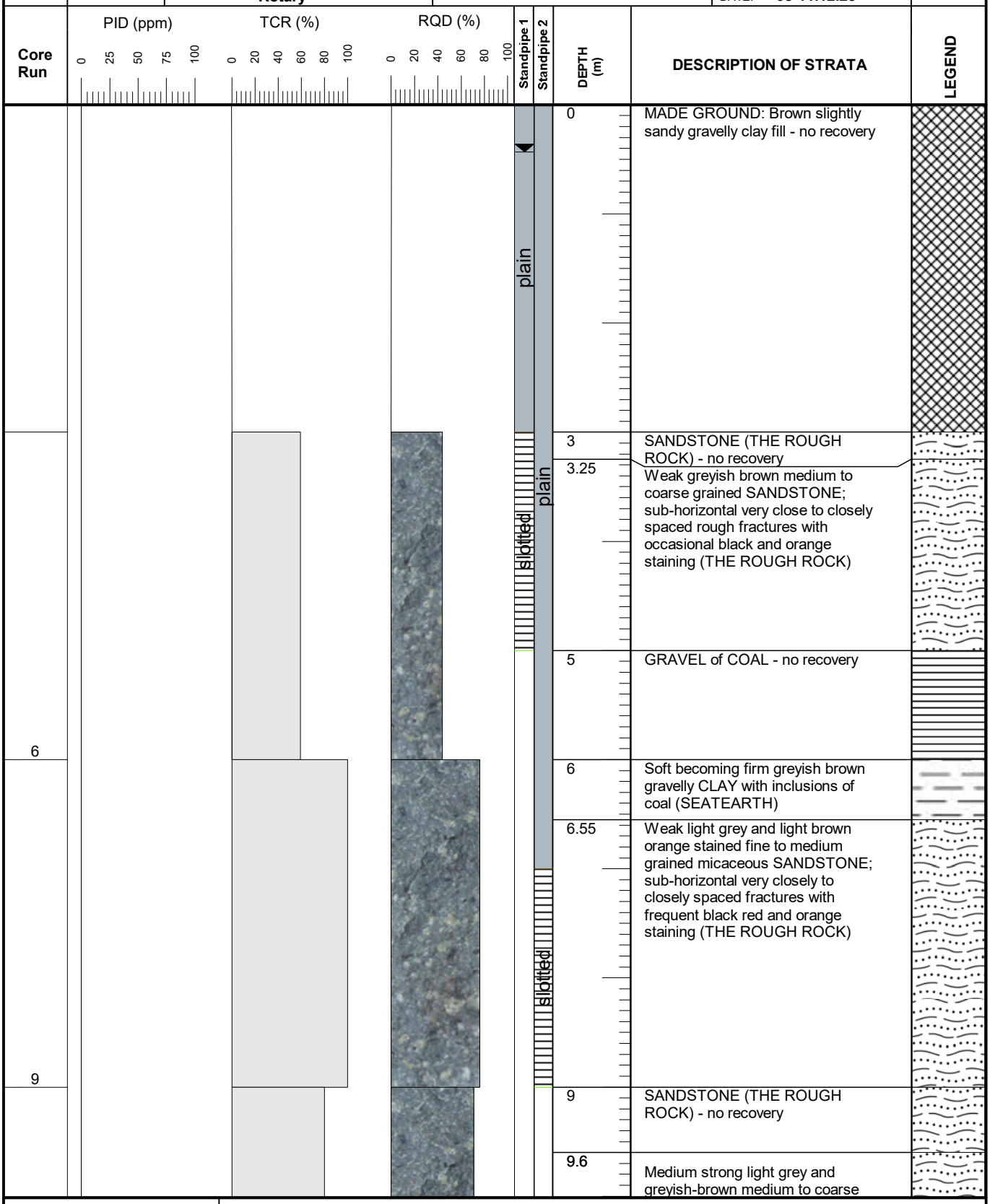
REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

Operator: Taylor Drilling Services Ltd.
Sweet chemical odour noted during drilling from between 7.5-10.5m although not apparent in rock.
All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).
Open hole drilling from ground level to 4m; coring using recirculated water flush from 4m to 13.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH603
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 08-11.12.23	



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GROUND WATER: Artesian conditions following penetration of Seatearth clay @ 6.55m

▼ Groundwater depths measured on 10.01.24: 0.43m (shallow well) / artesian (deep well)

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

Operator: Taylor Drilling Services Ltd.

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

All PID readings <0.1ppm along recovered shale however sweet chemical odour noted during drilling @ ~3m

PID had 10.6ev bulb calibrated to isobutylene.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH603
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 08-11.12.23	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Standpipe 1	Standpipe 2	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
12							grained SANDSTONE; sub-horizontal and sub-vertical closely to medium spaced rough fractures with occasional black and orange staining.	
							Borehole terminated at 12m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER: Artesian conditions following penetration of Seatearth clay @ 6.55m

▼ Groundwater depths measured on 10.01.24: 0.43m (shallow well) / artesian (deep well)

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

Operator: Taylor Drilling Services Ltd.

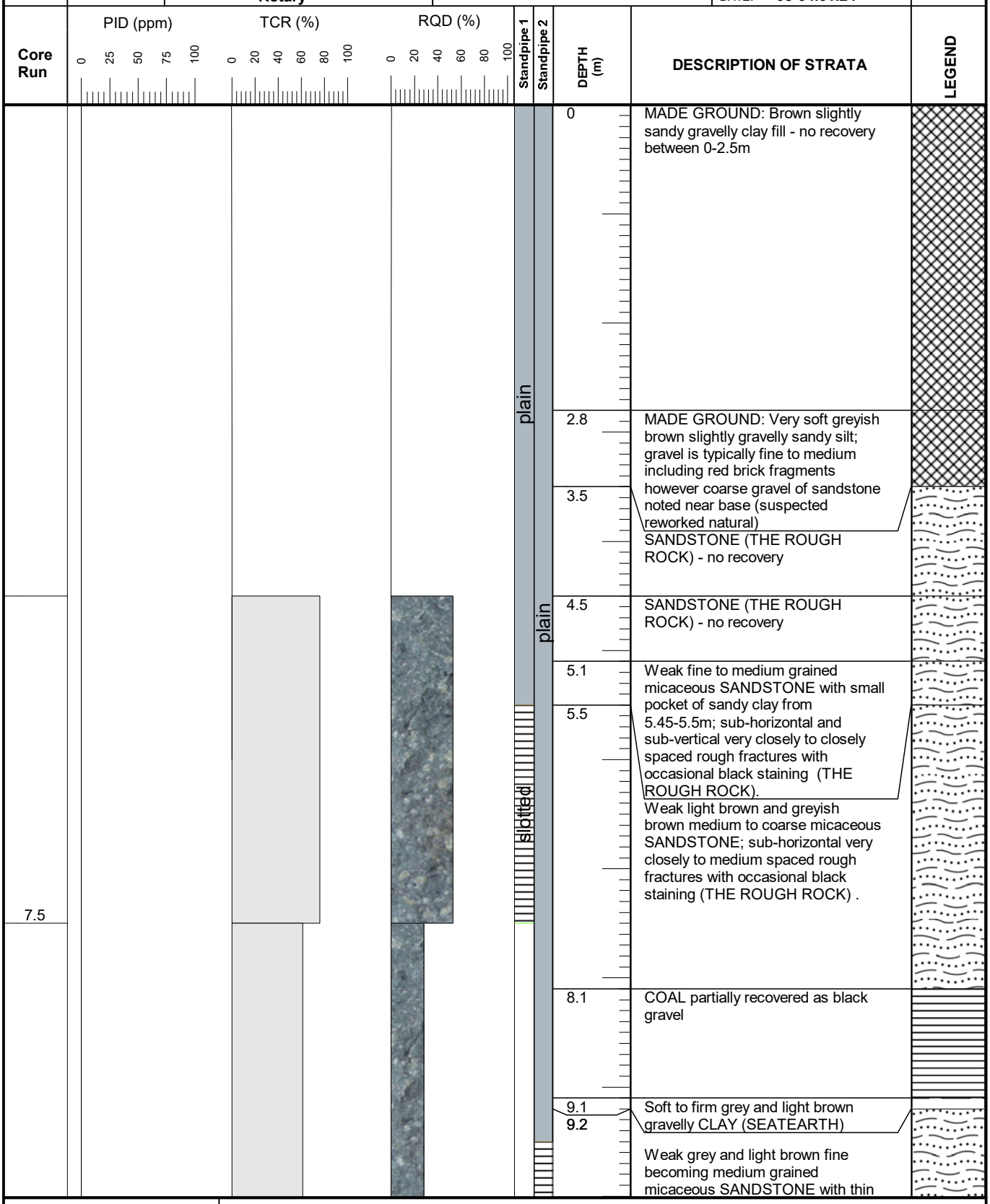
Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

All PID readings <0.1ppm along recovered shale however sweet chemical odour noted during drilling @ ~3m

PID had 10.6ev bulb calibrated to isobutylene.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH604
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 03-04.01.24	



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GROUND WATER: Artesian conditions following penetration of Seatearth clay @ 9.2m
Groundwater depths measured on 11.01.24: both artesian

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 2.5m; coring using recirculated water flush from 2.5m to 12.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH604
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 03-04.01.24	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Standpipe 1	Standpipe 2	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
					slotted	10.5	laminations of coal; sub-horizontal and sub-vertical very closely to medium spaced rough fractures with frequent black red and orange staining (AZCL from 10.05-10.5m) (THE ROUGH ROCK)	
						12.5	Borehole terminated at 12.5m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER: Artesian conditions following penetration of Seatearth clay @ 9.2m
Groundwater depths measured on 11.01.24: both artesian

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

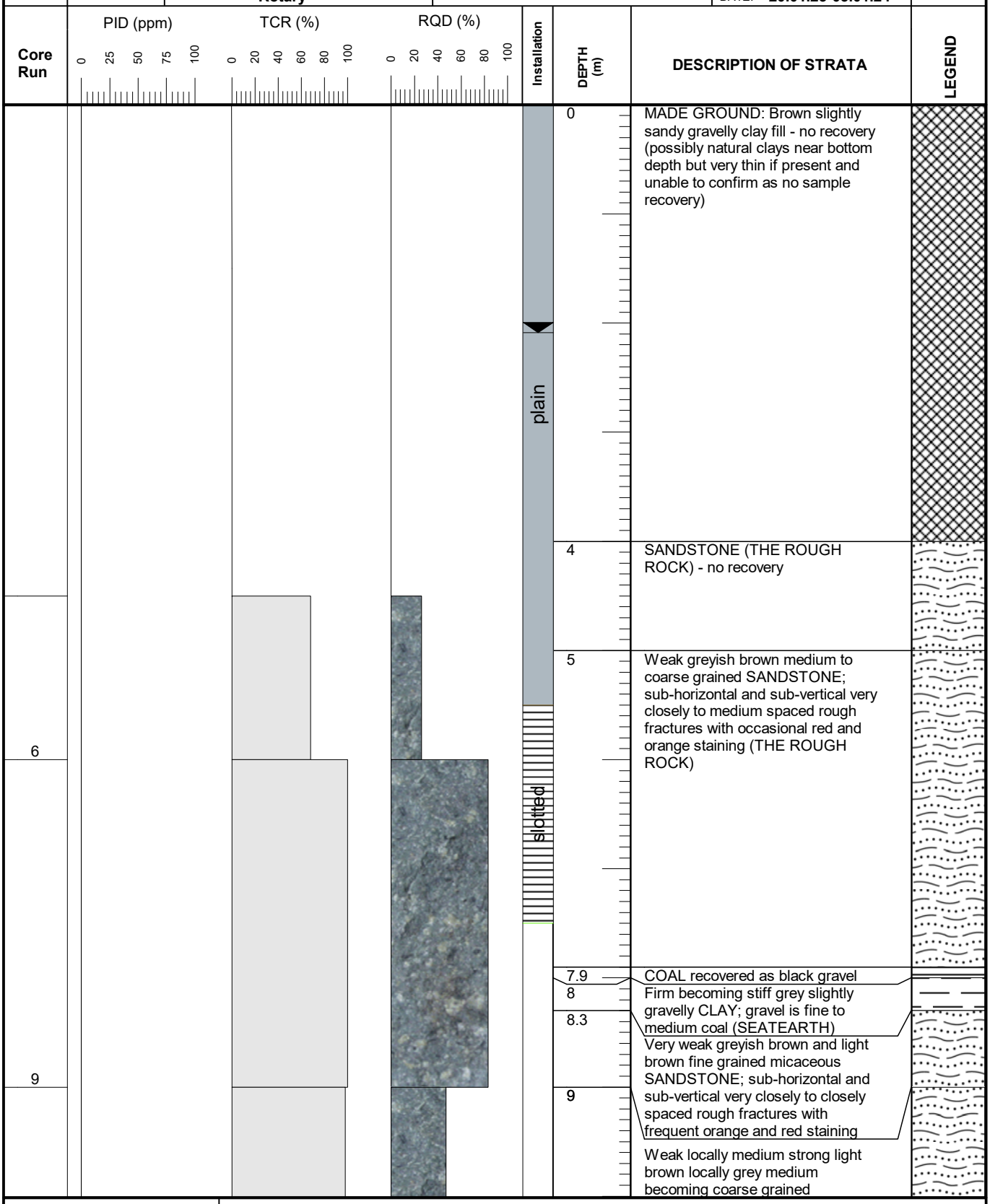
Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 2.5m; coring using recirculated water flush from 2.5m to 12.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH605
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 20.01.23-03.01.24	



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GROUND WATER:

▼ Groundwater depth measured on 11.01.24: 2.08m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene)

Open hole drilling from ground level to 4.5m; coring using recirculated water flush from 4.5m to 12m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH605
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 20.01.23-03.01.24	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Installation	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
10.5						micaceous SANDSTONE with thin laminations of coal; sub-horizontal and sub-vertical extremely closely to medium spaced rough fractures with occasional black red and orange staining	
12						Borehole terminated at 12m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER:

▼ Groundwater depth measured on 11.01.24: 2.08m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

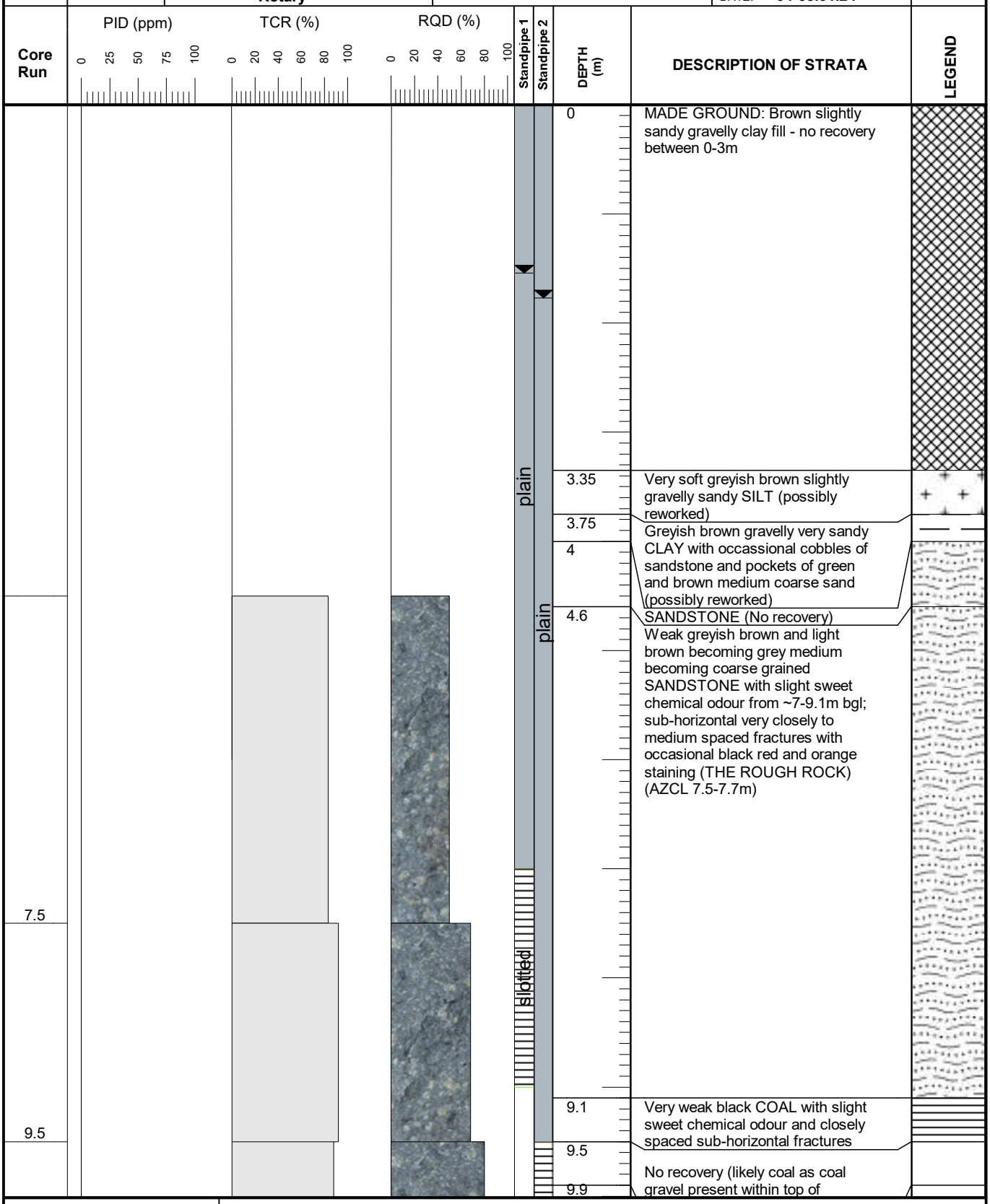
Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene)

Open hole drilling from ground level to 4.5m; coring using recirculated water flush from 4.5m to 12m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH606
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 04-05.01.24	



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GROUND WATER:

▼ Groundwater depths measured on 11.01.24: 1.54m (shallow well) / 1.77m (deep well)

REMARKS:

Operator: Taylor Drilling Services Ltd.

Strong sweet chemical odour noted during drilling from 8-12.5m

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12.5m.

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: Assumed zone of core loss

SCALE:	LOGGED BY:	Rig: Beretta T41 Rotary Drilling Rig
1:500	SM	

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH606
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 04-05.01.24	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Standpipe 1	Standpipe 2	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
					slotted	9.9	underlying siltstone - see below) Very weak brownish grey sandy SILTSTONE with slight sweet chemical odour; sub-horizontal very closely to medium spaced fractures	
						10.8	Weak fine to medium grained SANDSTONE with slight sweet chemical odour; sub-horizontal closely to medium spaced rough fractures with frequent orange red and black staining	
12.5							Borehole terminated at 12.5m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER:

▼ Groundwater depths measured on 11.01.24: 1.54m (shallow well) / 1.77m (deep well)

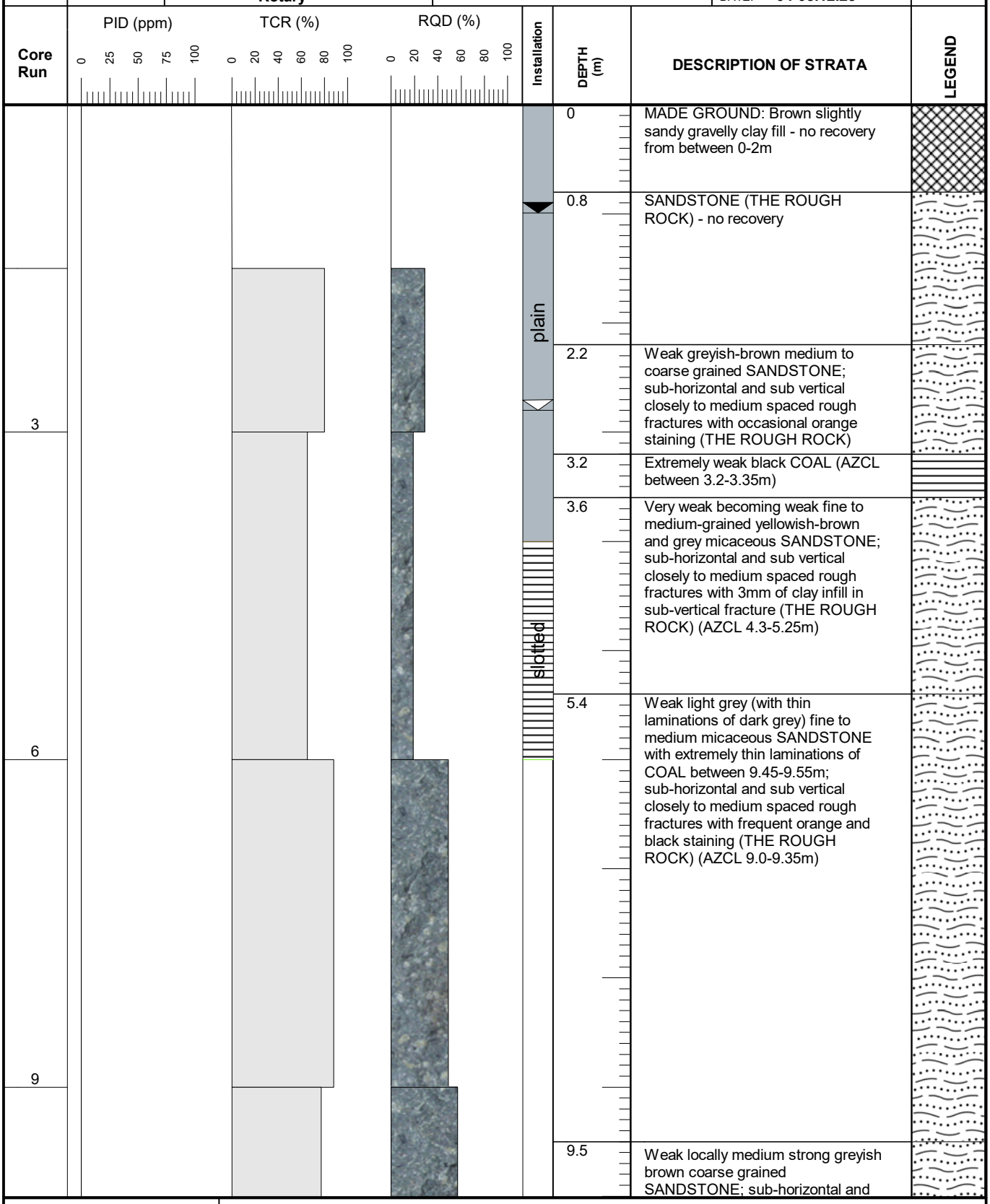
REMARKS:

Operator: Taylor Drilling Services Ltd.
Strong sweet chemical odour noted during drilling from 8-12.5m
All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).
Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12.5m.

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: Assumed zone of core loss

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH607
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 04-05.12.23	



DEPTH (m)	DESCRIPTION OF STRATA
0	MADE GROUND: Brown slightly sandy gravelly clay fill - no recovery from between 0-2m
0.8	SANDSTONE (THE ROUGH ROCK) - no recovery
2.2	Weak greyish-brown medium to coarse grained SANDSTONE; sub-horizontal and sub vertical closely to medium spaced rough fractures with occasional orange staining (THE ROUGH ROCK)
3.2	Extremely weak black COAL (AZCL between 3.2-3.35m)
3.6	Very weak becoming weak fine to medium-grained yellowish-brown and grey micaceous SANDSTONE; sub-horizontal and sub vertical closely to medium spaced rough fractures with 3mm of clay infill in sub-vertical fracture (THE ROUGH ROCK) (AZCL 4.3-5.25m)
5.4	Weak light grey (with thin laminations of dark grey) fine to medium micaceous SANDSTONE with extremely thin laminations of COAL between 9.45-9.55m; sub-horizontal and sub vertical closely to medium spaced rough fractures with frequent orange and black staining (THE ROUGH ROCK) (AZCL 9.0-9.35m)
9.5	Weak locally medium strong greyish brown coarse grained SANDSTONE; sub-horizontal and

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GROUND WATER: Groundwater strike at 2.8m bgl on day of drilling
Groundwater depth measured on 10.01.24: 0.98m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene)

Open hole drilling from ground level to 1.5m; coring using recirculated water flush from 1.5m to 10.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH607
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 04-05.12.23	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Installation	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
10.5					9.5	sub vertical closely spaced rough fractures with occasional orange staining (THE ROUGH ROCK)	
						Borehole terminated at 10.5m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER: ▽ Groundwater strike at 2.8m bgl on day of drilling
▼ Groundwater depth measured on 10.01.24: 0.98m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

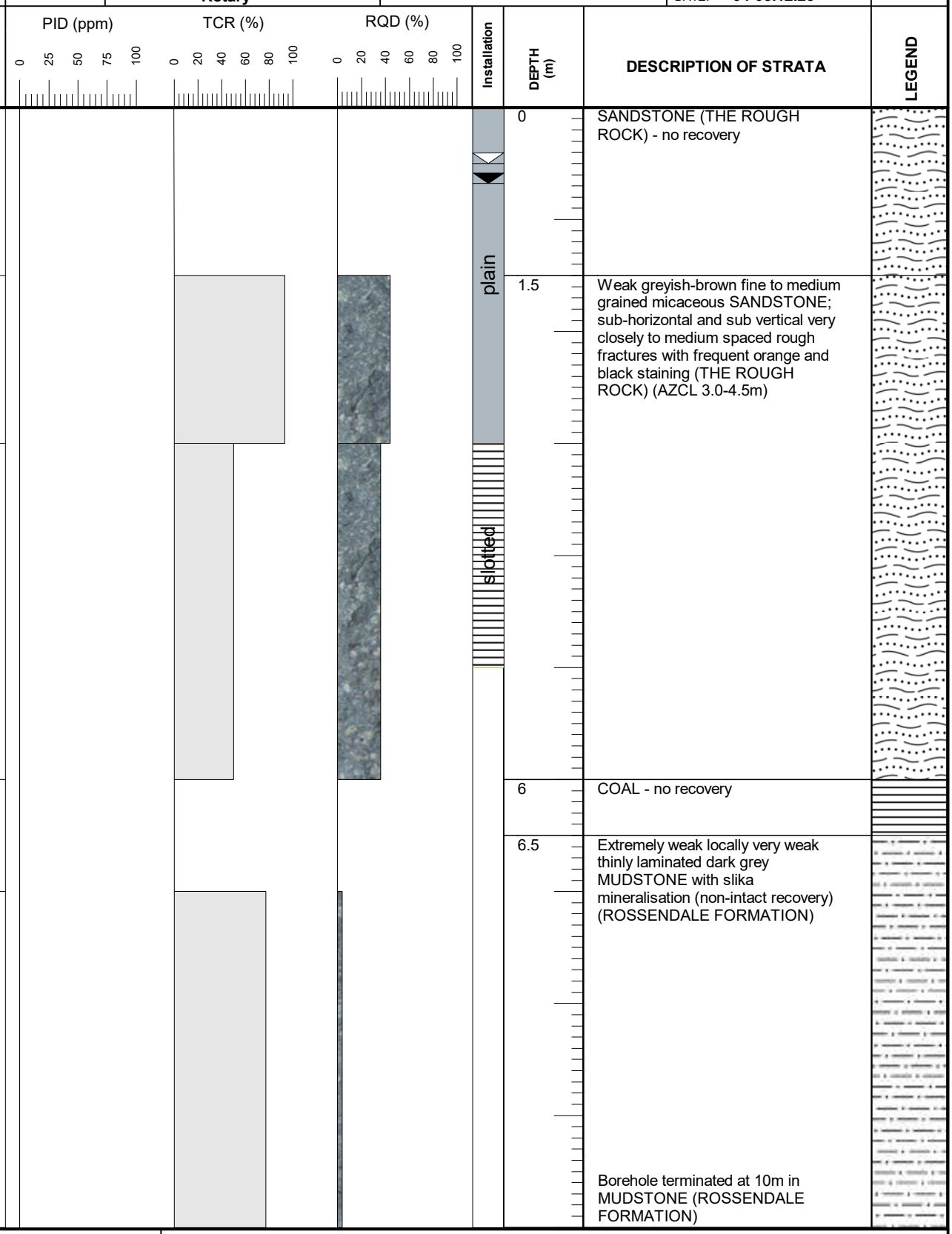
Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene)

Open hole drilling from ground level to 1.5m; coring using recirculated water flush from 1.5m to 10.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH608
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 04-05.12.23	



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GROUND WATER: ▽ Groundwater strike at 0.5m bgl on day of drilling
▼ Groundwater depth measured on 10.01.24: 0.68m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

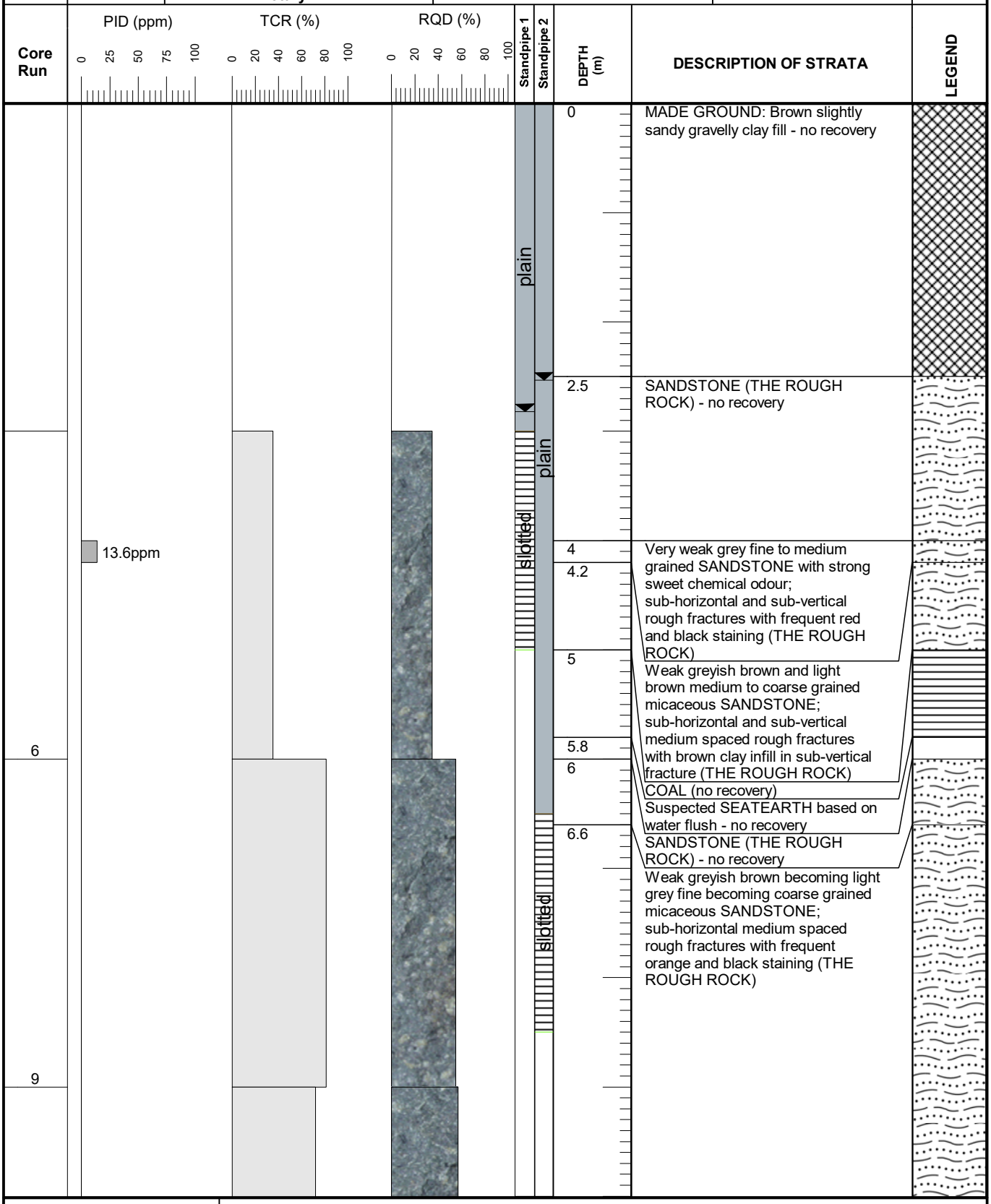
Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 1.5m; coring using recirculated water flush from 1.5m to 10m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH609
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 05.12.23	



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GROUND WATER:

▼ Groundwater depths measured on 10.01.24: 2.82m (shallow well) / 2.53m (deep well)

REMARKS:

Operator: Taylor Drilling Services Ltd.

Strong sweet chemical odour noted during drilling from 2.5-6m bgl

Maximum PID reading of 13.6ppm between 4-4.2m (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH609
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 05.12.23	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Standpipe 1	Standpipe 2	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
12						6.6	Borehole terminated at 12m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER:

▼ Groundwater depths measured on 10.01.24: 2.82m (shallow well) / 2.53m (deep well)

REMARKS:

Operator: Taylor Drilling Services Ltd.

Strong sweet chemical odour noted during drilling from 2.5-6m bgl

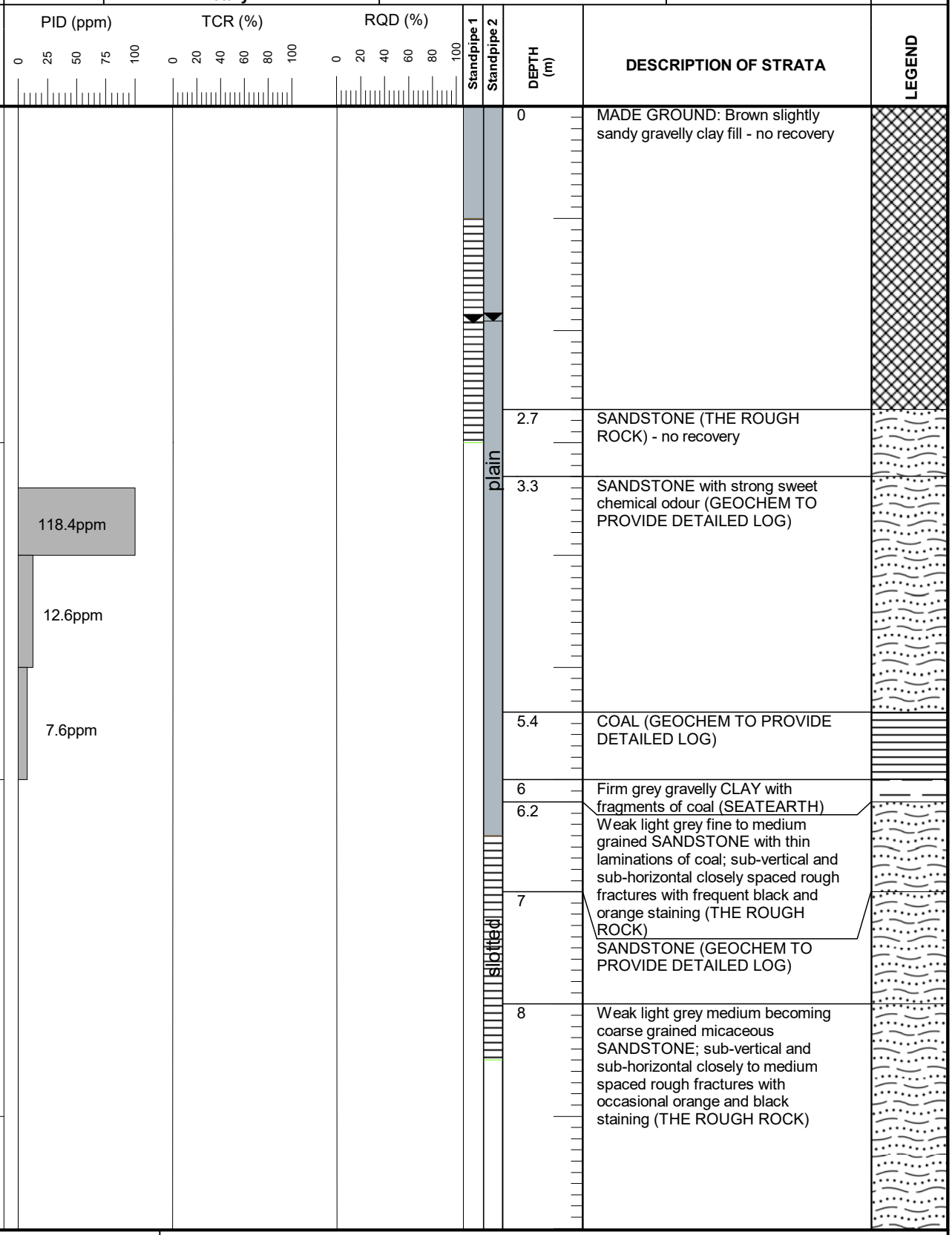
Maximum PID reading of 13.6ppm between 4-4.2m (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH610
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 06.12.23	



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GROUND WATER:

▼ Groundwater depths measured on 10.01.24: 1.93m (shallow well) / 1.91m (deep well)

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

Operator: Taylor Drilling Services Ltd.

Maximum PID reading of 118.4ppm between 3.4-4m (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 13m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH610
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 06.12.23	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Standpipe 1	Standpipe 2	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
						8		
12						11.3	Medium strong greyish-brown coarse grained micaceous SANDSTONE; sub-horizontal and sub-vertical fractures medium spaced rough fractures with black staining (sub-vertical fracture infilled with soft light brown gravelly clay).	
							Borehole terminated at 12m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER:

▼ Groundwater depths measured on 10.01.24: 1.93m (shallow well) / 1.91m (deep well)

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

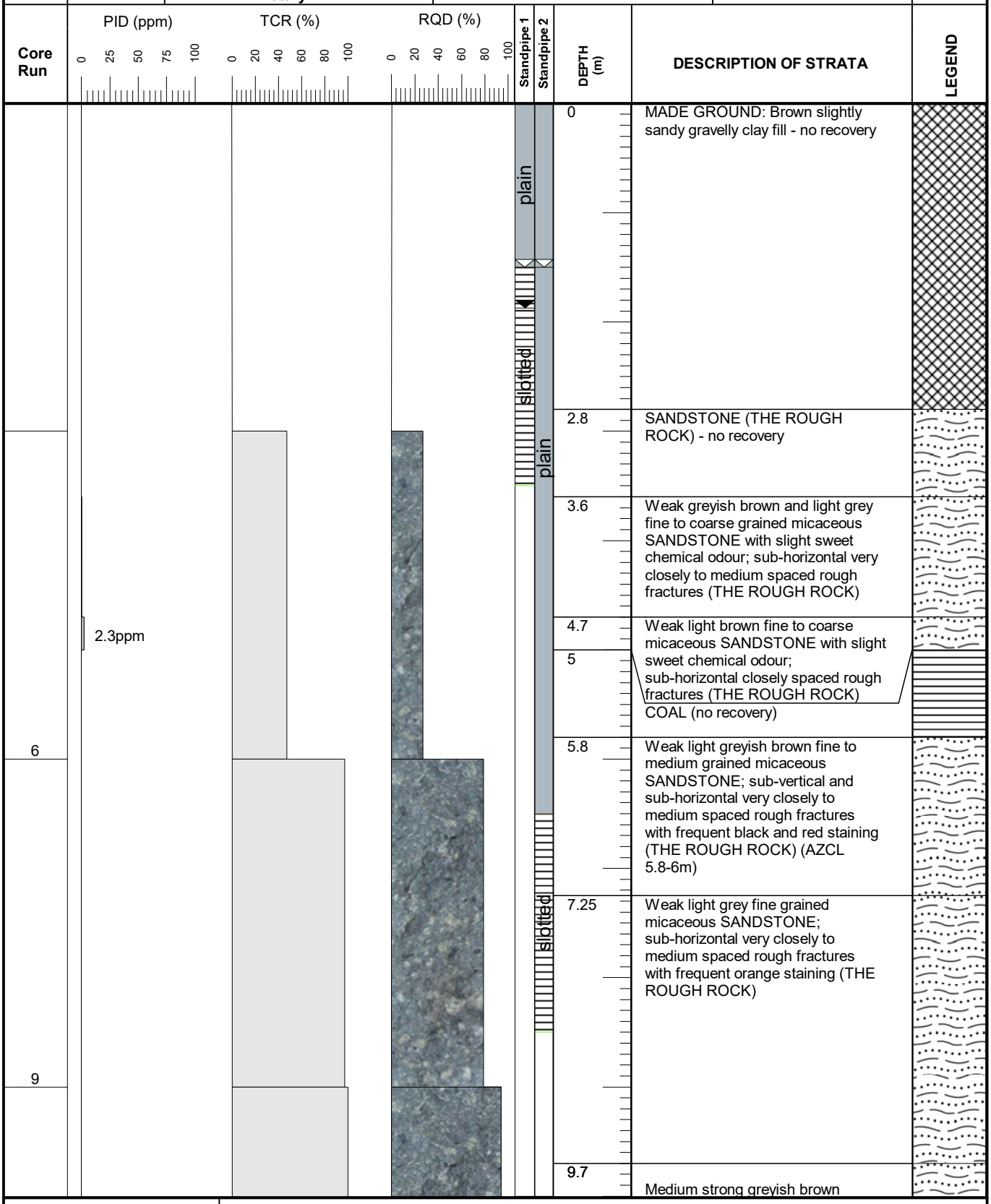
Operator: Taylor Drilling Services Ltd.

Maximum PID reading of 118.4ppm between 3.4-4m (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 13m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH611
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 05.12.23	



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GROUND WATER: Groundwater strike at 1.5m bgl on day of drilling
Groundwater depth measured on 10.01.24: 1.86m (shallow well)
Unable to record groundwater for deeper well: borehole blocked at 0.99m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

Operator: Taylor Drilling Services Ltd.

Maximum PID reading of 2.3ppm between 4.7-5m (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH611
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 05.12.23	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Standpipe 1	Standpipe 2	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
12							medium to coarse grained micaceous SANDSTONE; sub-vertical and sub-horizontal very closely to widely spaced rough fractures with frequent black and orange staining (THE ROUGH ROCK)	
							Borehole terminated at 12m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER: ▽ Groundwater strike at 1.5m bgl on day of drilling
▼ Groundwater depth measured on 10.01.24: 1.86m (shallow well)
Unable to record groundwater for deeper well: borehole blocked at 0.99m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

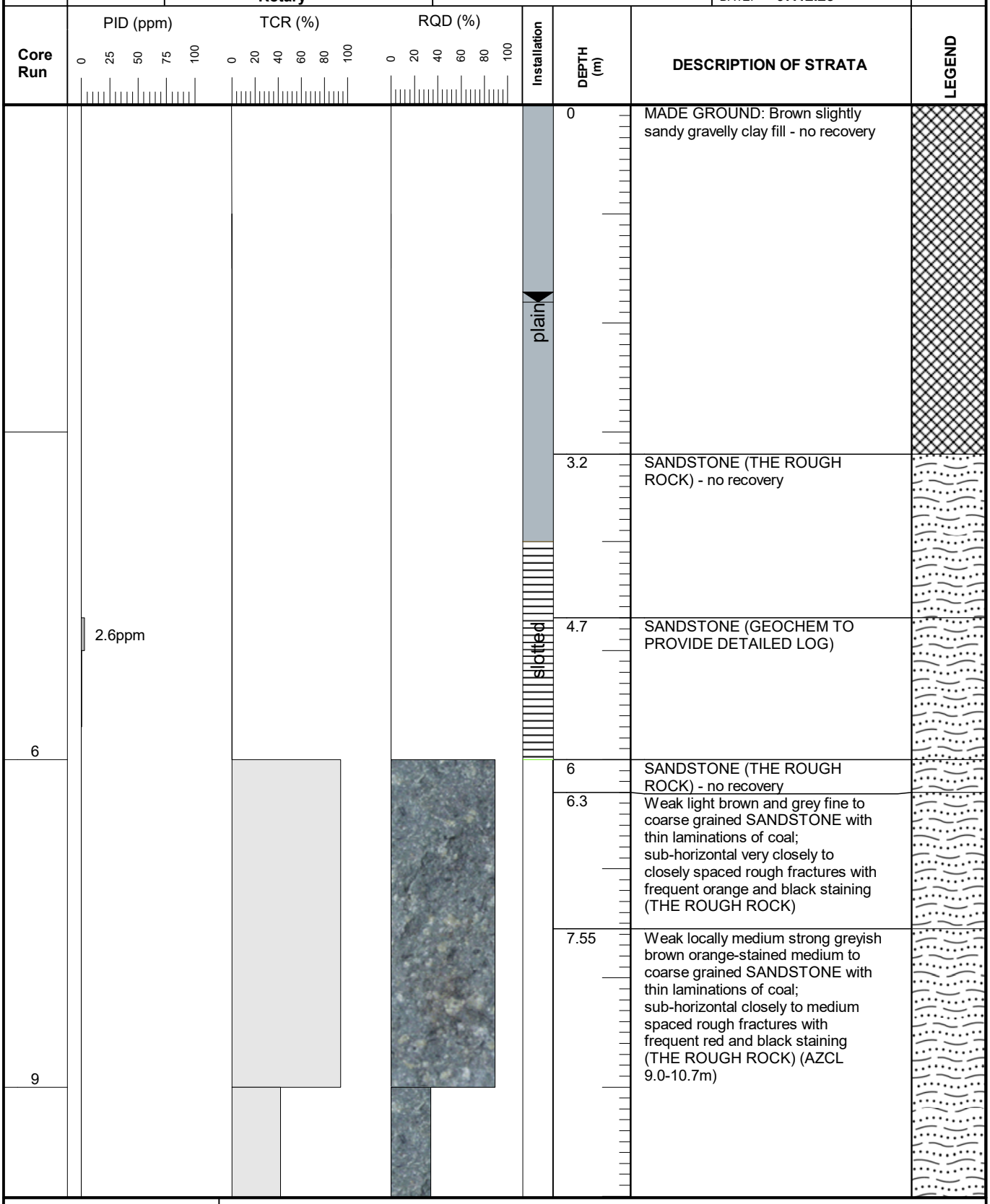
Operator: Taylor Drilling Services Ltd.

Maximum PID reading of 2.3ppm between 4.7-5m (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH612
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 07.12.23	



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GROUND WATER:

▼ Groundwater depth measured on 11.01.24: 1.81m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

Operator: Taylor Drilling Services Ltd.

Maximum PID reading of 2.6ppm between 4.7-5m (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

Unable to record TCR and RQD from 3-6m as 4.7-6m core sample collected by CE Geochem Ltd.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH612
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 07.12.23	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Installation	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
12					7.55	Borehole terminated at 10.5m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER:

▼ Groundwater depth measured on 11.01.24: 1.81m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

Operator: Taylor Drilling Services Ltd.

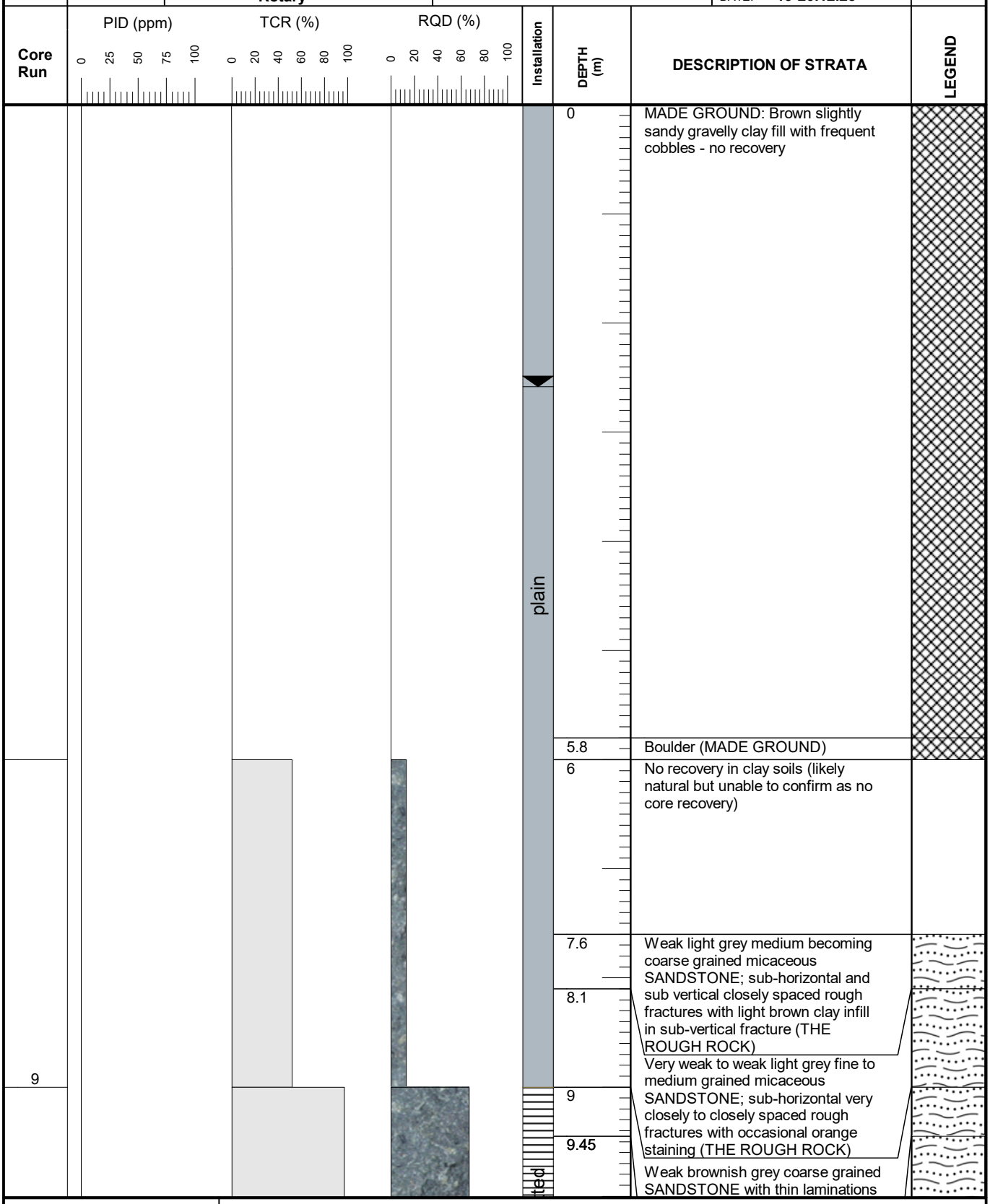
Maximum PID reading of 2.6ppm between 4.7-5m (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

Unable to record TCR and RQD from 3-6m as 4.7-6m core sample collected by CE Geochem Ltd.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH613
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 19-20.12.23	



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GROUND WATER:

▼ Groundwater depth measured on 11.01.24: 2.58m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

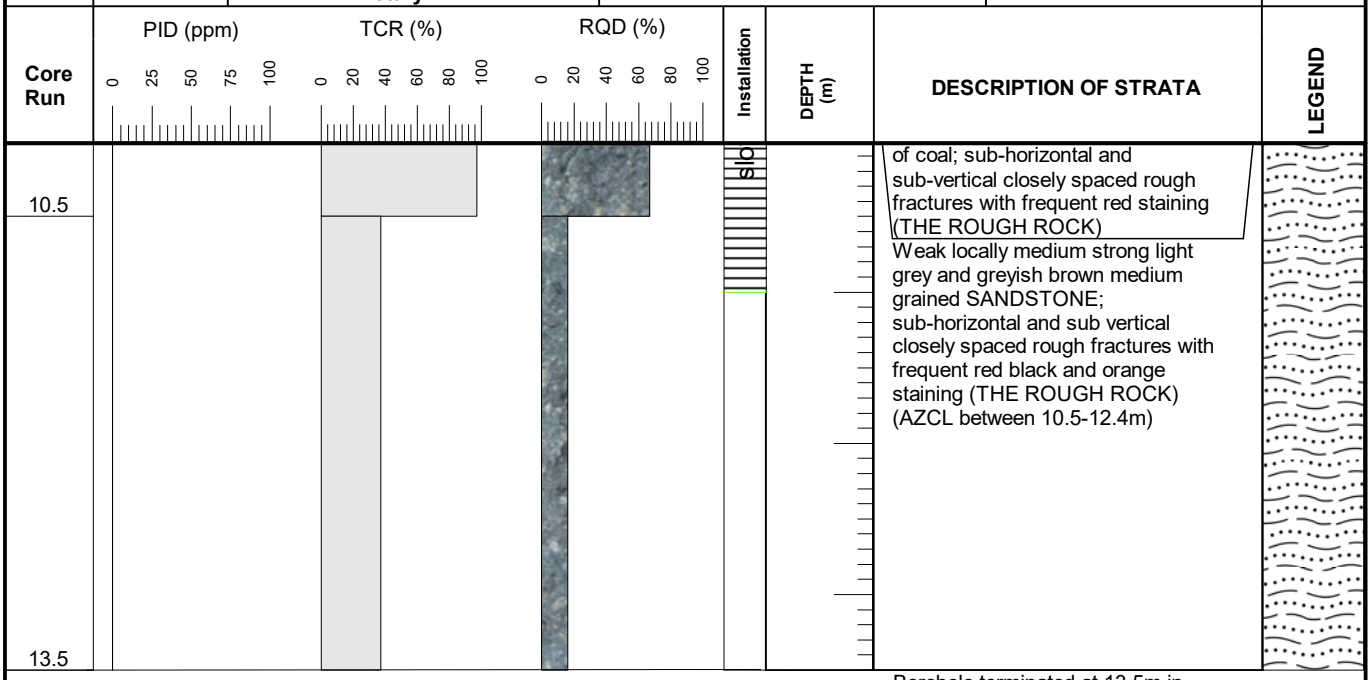
Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 6.2m; coring using recirculated water flush from 6.2m to 13.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH613
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 19-20.12.23	



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GROUND WATER:

▼ Groundwater depth measured on 11.01.24: 2.58m

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

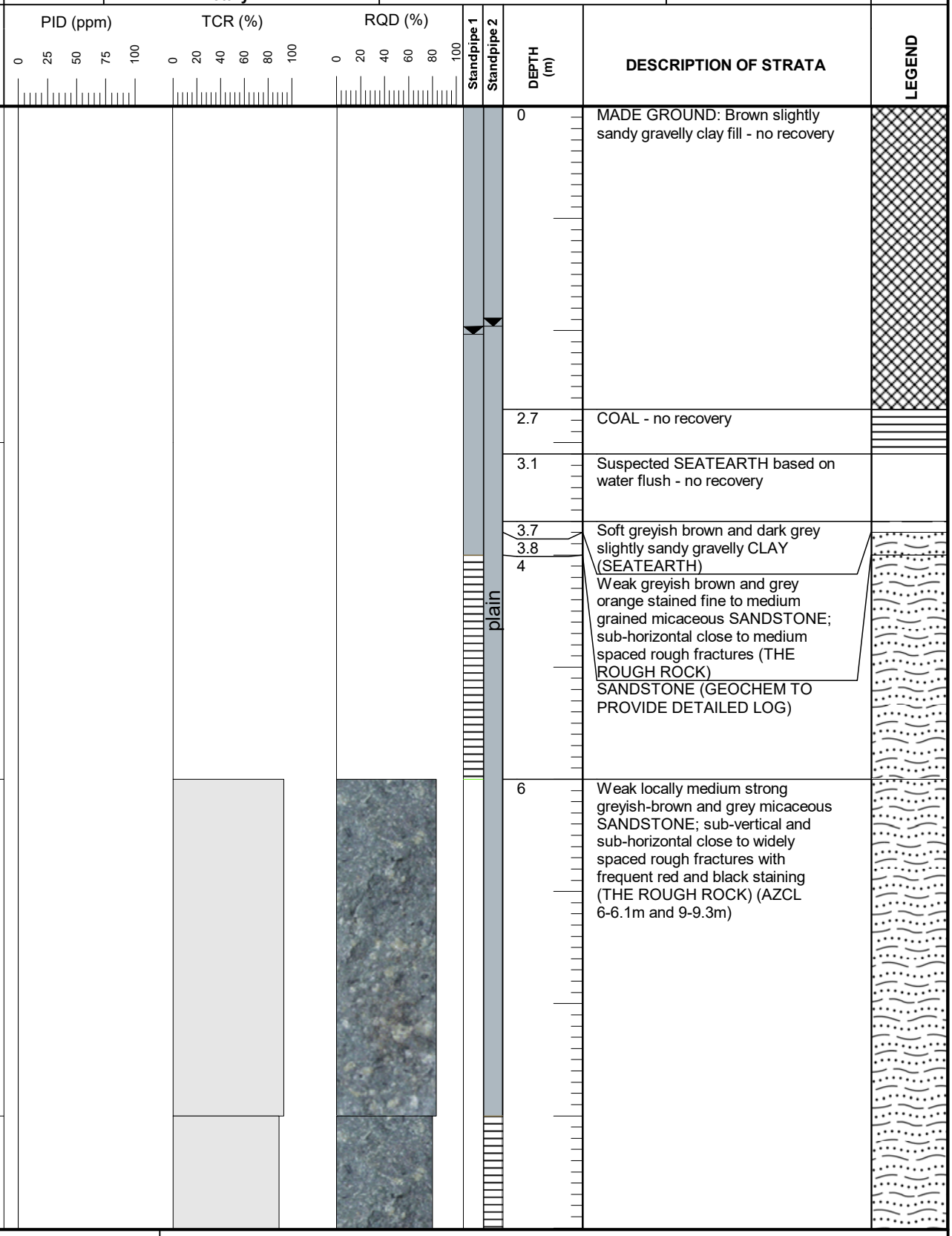
Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 6.2m; coring using recirculated water flush from 6.2m to 13.5m.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH614
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 07.12.23	



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GROUND WATER:

▼ Groundwater depths measured on 10.01.24: 2.03m (shallow well) / 1.96m (deep well)

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

Operator: Taylor Drilling Services Ltd.

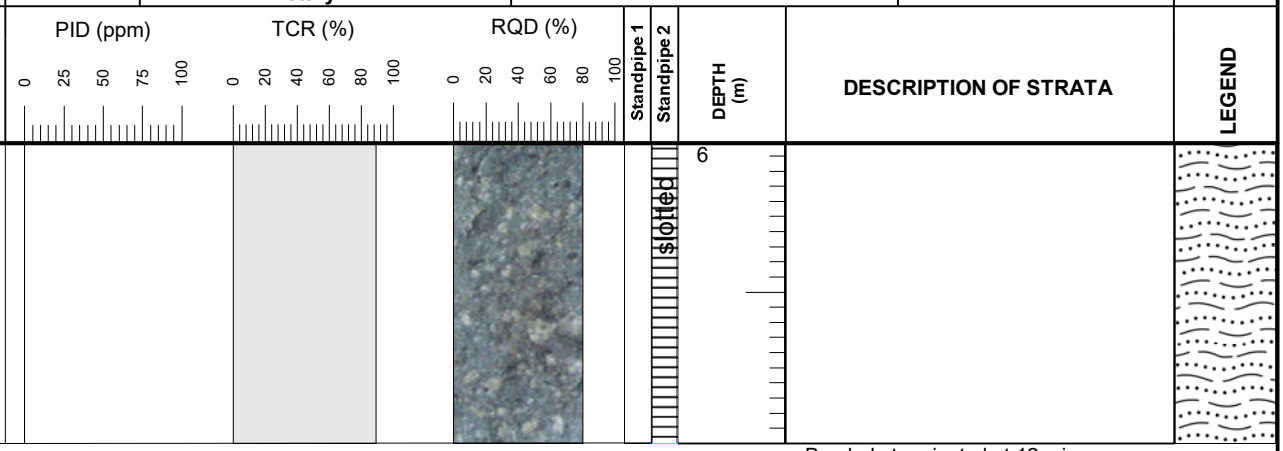
All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

Unable to record TCR and RQD from 3-6m as 4-6m core sample collected by CE Geochem Ltd.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH614
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 07.12.23	



Borehole terminated at 12m in SANDSTONE (THE ROUGH ROCK)

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GROUND WATER:

▼ Groundwater depths measured on 10.01.24: 2.03m (shallow well) / 1.96m (deep well)

REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

Operator: Taylor Drilling Services Ltd.

All PID readings <0.1ppm along recovered strata (PID had 10.6ev bulb calibrated to isobutylene).

Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 12m.

Unable to record TCR and RQD from 3-6m as 4-6m core sample collected by CE Geochem Ltd.

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH615
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 06-07.12.23	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Standpipe 1	Standpipe 2	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
				plain		0	MADE GROUND: Brown slightly sandy gravelly clay fill - no recovery	
						2.6	No recovery - suspected coal / seatearth	
				slotted	plain	3.4	GEOCHEM TO PROVIDE LOG	
6								
9								

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GROUND WATER:

▼ Groundwater depths measured on 10.01.24: 2.37m (shallow well) / 2.38m (deep well)

REMARKS:

Operator: Taylor Drilling Services Ltd.
Sweet chemical odour / sheen on water flush noted during drilling between 9-12m.
All PID readings <0.1ppm from end of liners (PID had 10.6ev bulb calibrated to isobutylene).
Unable to record TCR and RQD from 3-15m as full core sample collected by CE Geochem Ltd.
Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 15m.

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
2 of 2	Bury	Tetrosyl (BH)	SM	R2174	RBH615
		DRILL TYPE: Rotary	CLIENT: Barratt Homes Manchester	DATE: 06-07.12.23	

Core Run	PID (ppm) 0 25 50 75 100	TCR (%) 0 20 40 60 80 100	RQD (%) 0 20 40 60 80 100	Standpipe 1	Standpipe 2	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
					slotted	3.4		
12								
15							Borehole terminated at 15m in SANDSTONE (THE ROUGH ROCK)	

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GROUND WATER:

▼ Groundwater depths measured on 10.01.24: 2.37m (shallow well) / 2.38m (deep well)

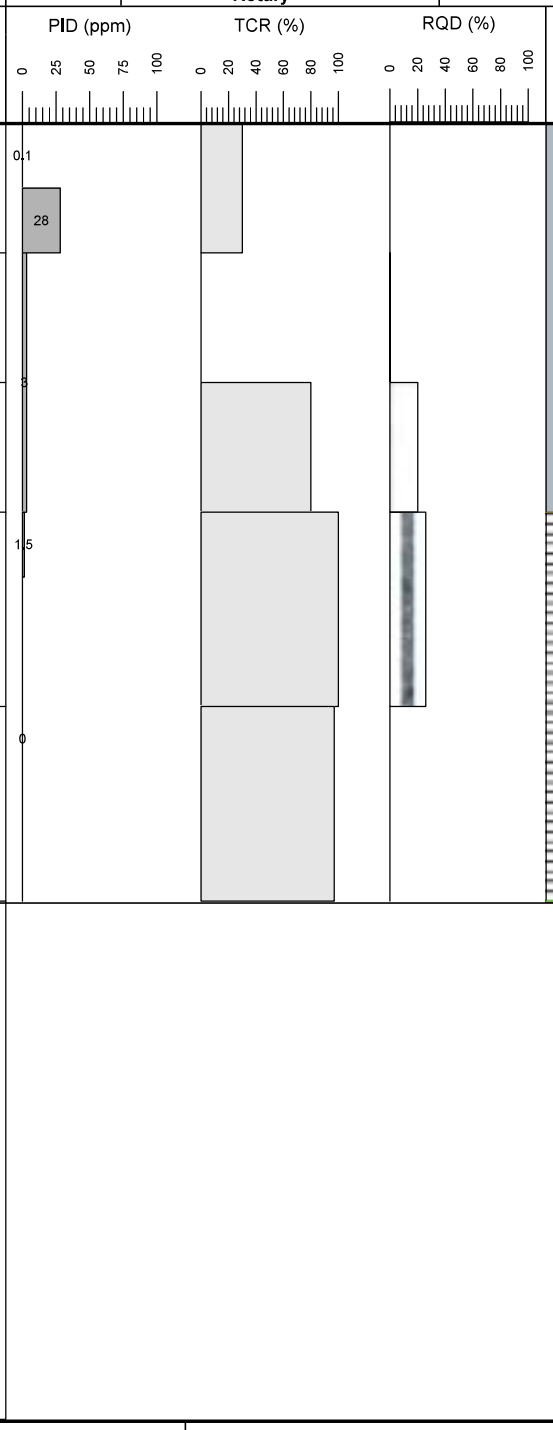
REMARKS:

Operator: Taylor Drilling Services Ltd.
Sweet chemical odour / sheen on water flush noted during drilling between 9-12m.
All PID readings <0.1ppm from end of liners (PID had 10.6ev bulb calibrated to isobutylene).
Unable to record TCR and RQD from 3-15m as full core sample collected by CE Geochem Ltd.
Open hole drilling from ground level to 3m; coring using recirculated water flush from 3m to 15m.

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million
AZCL: assumed zone of core loss

SCALE:	LOGGED BY:	
1:500	SM	Rig: Beretta T41 Rotary Drilling Rig

SHEET:	LOCATION:	PROJECT:	ENGINEER:	JOB NO.	HOLE ID
1 of 1	Bury	Tetrosyl URL	CS	R2174C	RBH320
		DRILL TYPE: Rotary	CLIENT: Urban Regen	DATE: 08/03/2021	



DEPTH (m)	DESCRIPTION OF STRATA
0	MADE GROUND: brown gravelly clay. Gravel is angular brick, concrete and sandstone.
1	No recovery
2	Possibly weathered SANDSTONE. Recovered as light brown gravelly sand (weathered ROUGH ROCK).
2.5	Medium strong locally strong pale locally yellowish brown coarse grained SANDSTONE (THE ROUGH ROCK)
3	Possibly weathered SANDSTONE. Recovered as light brown sandy gravel of sandstone (weathered ROUGH ROCK).
3.4	Medium strong locally strong pale locally yellowish brown coarse grained SANDSTONE (THE ROUGH ROCK)
4.0	
5.0	
5.5	Blackish grey sandy gravel of COAL.
5.7	Light brown slightly sandy CLAY (SEATEARTH)
	Borehole terminated at 6m

Smith Grant LLP
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GROUND WATER:
0.40m bgl 15.03.21

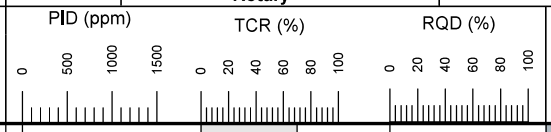
REMARKS:

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

Operator: Borehole Solutions

SCALE:	LOGGED BY:	
1:500	CS	Rig: Eijkelkamp SonicSampDrill

SHEET:	LOCATION: Bury	PROJECT: Tetrosyl URL	ENGINEER: CS	JOB NO. R2174C	HOLE ID RBH321
		DRILL TYPE: Rotary	CLIENT: Urban Regen	DATE: 09/03/2021	



Core Run	Installation	DEPTH (m)	DESCRIPTION OF STRATA	LEGEND
1	plain	0	MADE GROUND: brown gravelly clay. Gravel is angular brick, concrete and sandstone.	
3		2.4	Possibly weathered SANDSTONE. Recovered as light grey gravelly sand (weathered ROUGH ROCK).	
5	slotted	3	Weak to medium strong pale locally yellowish brown coarse grained SANDSTONE. Partially recovered as gravel of sandstone. Lens of clay at 4.8m. (THE ROUGH ROCK)	
		4.0		
		5.0		
6		5.3	Blackish grey sandy gravel of COAL.	
		5.9	Light grey slightly sandy CLAY (SEATEARTH)	
			Borehole terminated at 6m	

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GROUND WATER:

0.56m bgl 15.03.21

REMARKS:

PID readings between 600ppm and 1500ppm between 2.1m and 2.8m.

Operator: Borehole Solutions

TCR: total core recovery (%)
RQD: rock quality designation (%)
PID: Photoionisation Detector
ppm: parts per million

SCALE: 1:500	LOGGED BY: CS	Rig: Eijkelkamp SonicSampDrill

Core Logging

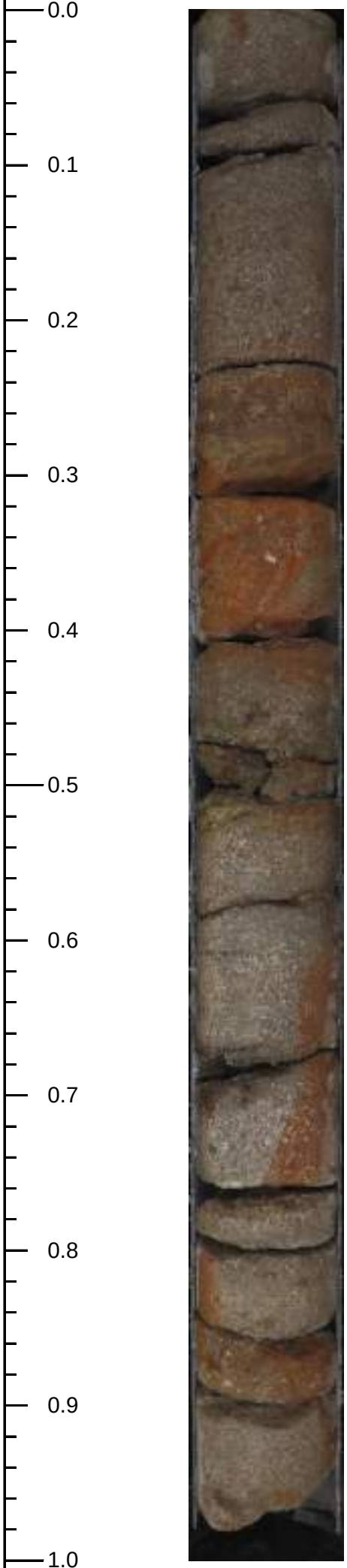
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.031 m (GL)	602
Client	**Barratt Homes**	**Co-ordinates**	E: 381046.116, N: 413921.152	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/01/2024	7.5–8.5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			7.50–7.60	Light greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK)
			7.60–7.66	Light greyish-brown orange stained medium grained SANDSTONE with closely spaced sub-horizontal fractures
			7.66–7.74	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK)
			7.74–7.80	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK) with closely spaced sub-horizontal fractures
			7.80–7.88	Light grey medium grained SANDSTONE with sub-horizontal orange-brown staining (THE ROUGH ROCK)
			7.88–7.94	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with frequent fine, angular dark brown gravel
			7.94–8.01	Greyish brown medium grained SANDSTONE
			8.01–8.50	AZCL 8–8.5 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 51%. Rock Quality Designation = 30%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.031 m (GL)	602
Client	**Barratt Homes**	**Co-ordinates**	E: 381046.116, N: 413921.152	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/01/2024	8.5–9.5 m

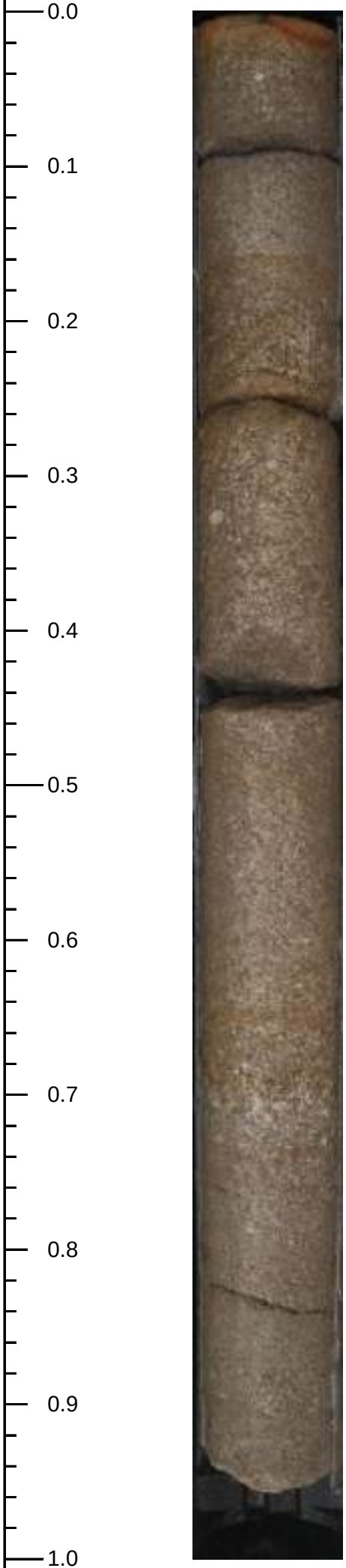
Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
			8.5–8.74	Light grey mottled dark grey medium grained SANDSTONE with rare orange staining (THE ROUGH ROCK); occasional sub-horizontal to horizontal fractures
			8.74–8.90	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with medium space horizontal fractures
			8.90–9.48	Light grey medium grained SANDSTONE with occasional orange staining; close to medium space sub-horizontal fractures
			9.48–9.50	AZCL: 9.48–9.50 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 95%. Rock Quality Designation = 12%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.031 m (GL)	602
Client	**Barratt Homes**	**Co-ordinates**	E: 381046.116, N: 413921.152	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/01/2024	9.5–10.5 m

Core Photography



Sampling Depth (mbgl)	Sampling Results	Depth (mbgl)	Stratum Description
		9.52–9.54	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		9.54–9.66	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK); medium spaced sub-horizontal fractures
		9.66–10.22	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK) with rare orange staining; medium spaced sub-horizontal fractures
		10.22–10.46	Light grey mottled brown medium grained SANDSTONE (THE ROUGH ROCK); medium spaced sub-horizontal fractures
		10.46–10.50	AZCL: 10.46–10.50 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 92%. Rock Quality Designation = 79%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	7.5–8.5 m

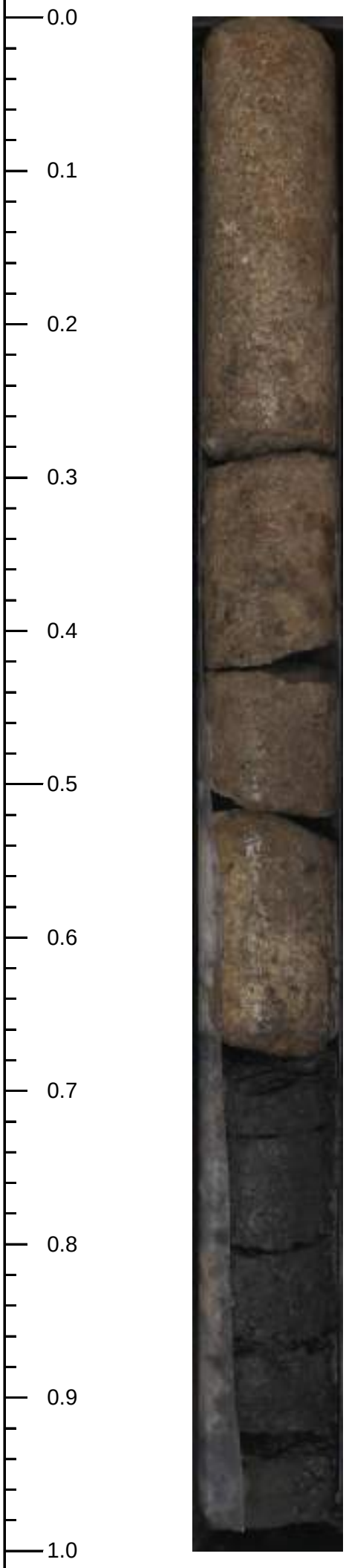
Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 			7.50–8.04	AZCL: 7.5–8.04 m
			8.04–8.08	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with rare black staining
			8.08–8.36	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with medium spaced sub-horizontal fractures
			8.36–8.5	Light grey medium grained SANDSTONE (THE ROUGH ROCK)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 48%. Rock Quality Designation = 30%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	8.5–9.5 m

Core Photography

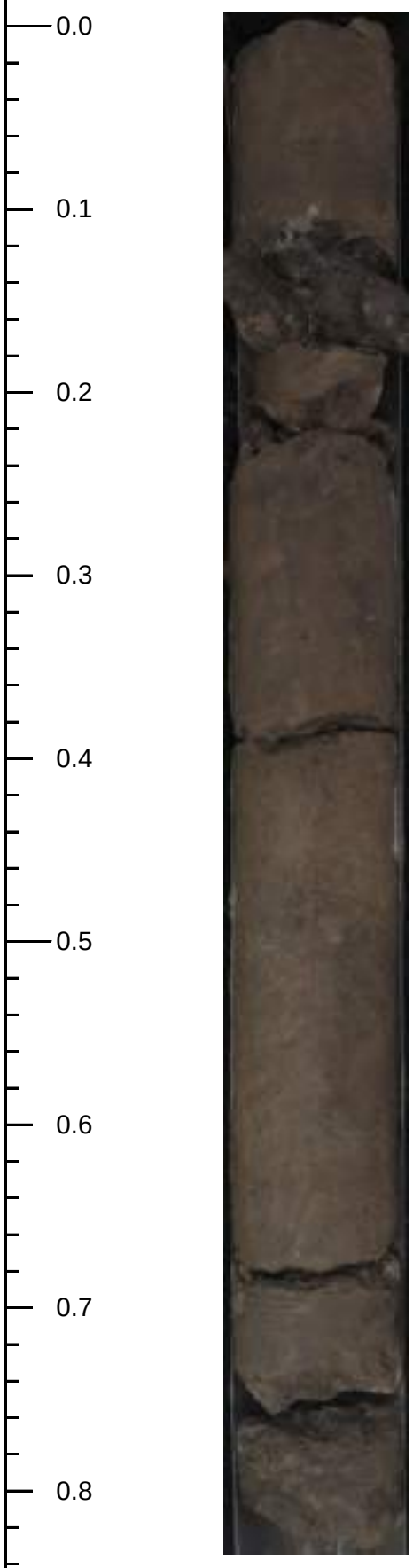


Sampling		Depth (mbgl)	Stratum Description
Depth (mbgl)	Results		
		8.50–8.60	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with occasional orange staining
		8.60–9.18	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with frequent black staining and occasional orange staining
		9.18–9.48	COAL with closely spaced horizontal to sub-horizontal fractures
		9.48–9.50	COAL gravel (No recovery)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 94%. Rock Quality Designation = 51%. COAL gravel (9.48–9.50 m) not received by CE Geochem. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	147.318 (GL)	606
Client	**Barratt Homes**	**Co-ordinates**	E: 381020.221; N: 413926.339	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	05/01/2024	10–10.8 m

Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
			10.00–10.10	Brownish dark grey sandy SILTSTONE
			10.10–10.24	Non-intact brownish dark grey sandy SILTSTONE
			10.24–10.82	Brownish dark grey sandy SILTSTONE with very closely to medium spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 95%. Rock Quality Designation = 60%. TCR and RQD given in reference to a nominal 0.8 m core length. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	3–4 m

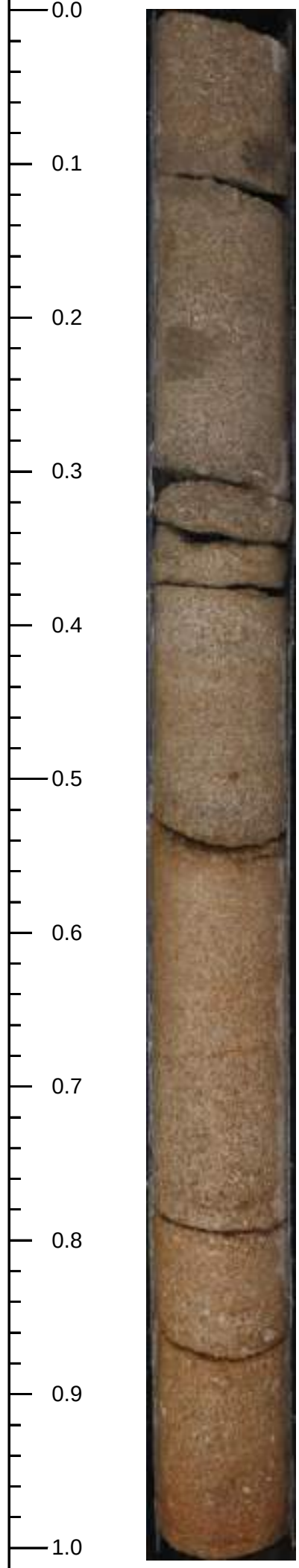
Core Photography	Sampling		Depth (mbgl)		Stratum Description
	Depth (mbgl)	Results			
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0			3.00–3.28		AZCL 3–3.28
			3.28–3.40		Non-intact brown-orange medium grained SANDSTONE (THE ROUGH ROCK) recovered as medium to coarse gravel
			3.40–3.52		Light grey medium grained SANDSTONE (THE ROUGH ROCK); moderately wide horizontal fracture with non-intact SANDSTONE fragments
			3.52–3.58		Orange stained medium grained SANDSTONE (THE ROUGH ROCK) with horizontal fracture
			3.58–4.00		Light grey medium grained SANDSTONE (THE ROUGH ROCK) with very closely to closely spaced horizontal fractures



Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 70%. Rock Quality Designation = 35%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

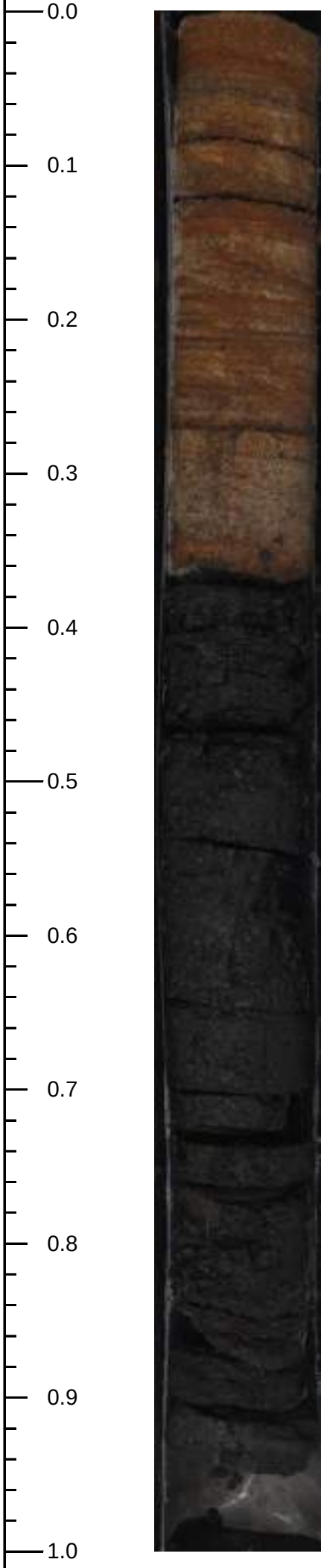
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	4–5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			4.00–4.42	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with very closely to closely spaced fractures
			4.42–5.00	Light grey medium grained SANDSTONE (THE ROUGH ROCK) with light becoming dark orange staining; with very closely to closely spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 76%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	5–6 m

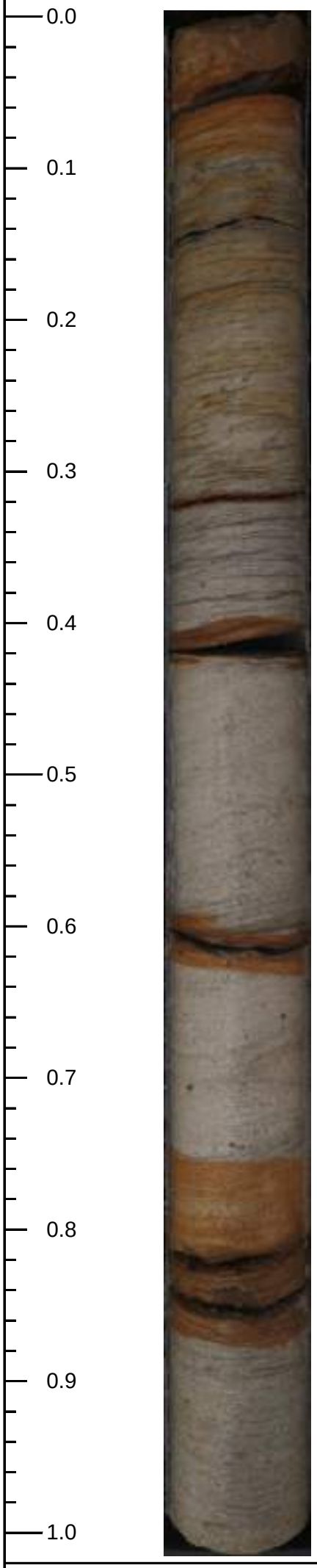
Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
			5.00–5.38	Light grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with very closely to closely spaced sub-horizontal fractures
			5.38–5.94	COAL with rare orange staining; very closely to closely spaced horizontal to sub-horizontal fractures
			5.94–6.00	AZCL 5.94–6.00

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 92%. Rock Quality Designation = 39%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.415 (GL)	610
Client	**Barratt Homes**	**Co-ordinates**	E: 380983.991; N: 413954.050	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	7–8 m

Core Photography



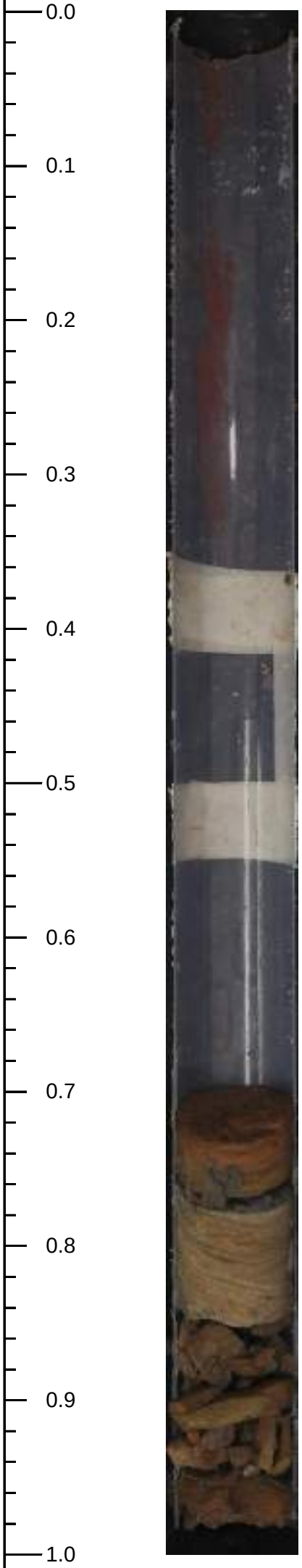
Sampling		Depth (mbgl)	Stratum Description
Depth (mbgl)	Results		
		7.00–7.30	Greyish white with dark orange becoming light orange staining fine grained SANDSTONE (THE ROUGH ROCK) with very closely spaced sub-horizontal dark grey laminations and closely to medium spaced sub-horizontal fractures
		7.30–7.42	Greyish white fine grained SANDSTONE (THE ROUGH ROCK) with very closely spaced sub-horizontal dark grey laminations and dark orange staining around closely spaced sub-horizontal fractures
		7.42–7.60	Greyish white fine grained SANDSTONE (THE ROUGH ROCK) with rare orange staining
		7.60–7.62	Orange stained fine grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal fracture
		7.62–7.74	Greyish white fine grained SANDSTONE (THE ROUGH ROCK), rarely mottled brown
		7.74–7.88	Orange stained fine grained SANDSTONE (THE ROUGH ROCK) with closely spaced sub-horizontal fractures
		7.88–8.00	Greyish white fine grained SANDSTONE (THE ROUGH ROCK)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 68%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.421 (GL)	612
Client	**Barratt Homes**	**Co-ordinates**	E: 380948.393; N: 413908.523	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	4–5 m

Core Photography

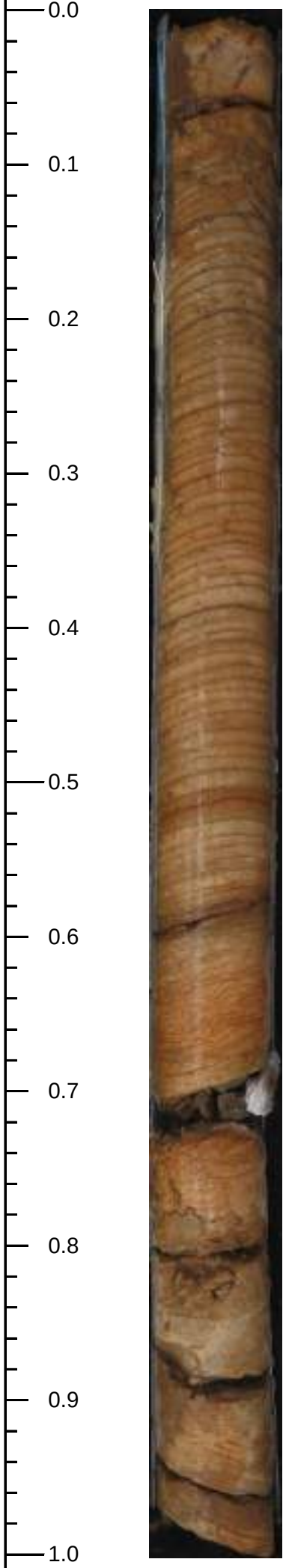


Sampling Depth (mbgl)	Sampling Results	Depth (mbgl)	Stratum Description
		4.00–4.70	AZCL: 4.0–4.7 m
		4.70–4.76	Orange stained medium grained SANDSTONE (THE ROUGH ROCK) with dark horizontal laminations; sub-horizontal fracture
		4.76–4.86	Brownish grey medium grained SANDSTONE (THE ROUGH ROCK with dark sub-horizontal laminations
			Non-intact brownish grey orange-stained medium grained SANDSTONE (THE ROUGH ROCK) recovered as fine to coarse gravel

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 28%. Rock Quality Designation = 0%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	148.421 (GL)	612
Client	**Barratt Homes**	**Co-ordinates**	E: 380948.393; N: 413908.523	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	5–6 m

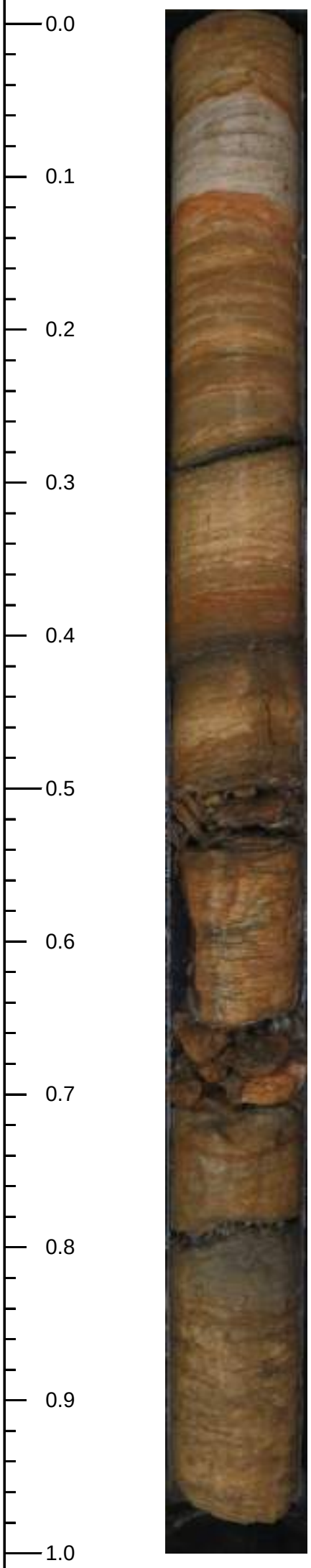
Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
			5.00–5.06	Brownish grey oranged-stained fine grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal fracture
			5.06–5.60	Brownish grey orange-stained fine grained SANDSTONE (THE ROUGH ROCK) with numerous sub-horizontal and sub-vertical cracks and frequent extremely closely spaced dark orange sub-horizontal laminations
			5.60–5.70	Brownish grey orange-stained fine grained SANDSTONE (THE ROUGH ROCK) with abundant extremely closely spaced dark orange sub-horizontal laminations
			5.70–5.72	Dark grey fine sub-angular gravel
			5.72–6.00	Brownish grey orange-stained fine grained SANDSTONE (THE ROUGH ROCK) with frequent extremely closely spaced dark orange sub-horizontal laminations and very closely spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 62%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.108 (GL)	614
Client	**Barratt Homes**	**Co-ordinates**	E: 380959.793; N: 413950.404	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	4–5 m

Core Photography



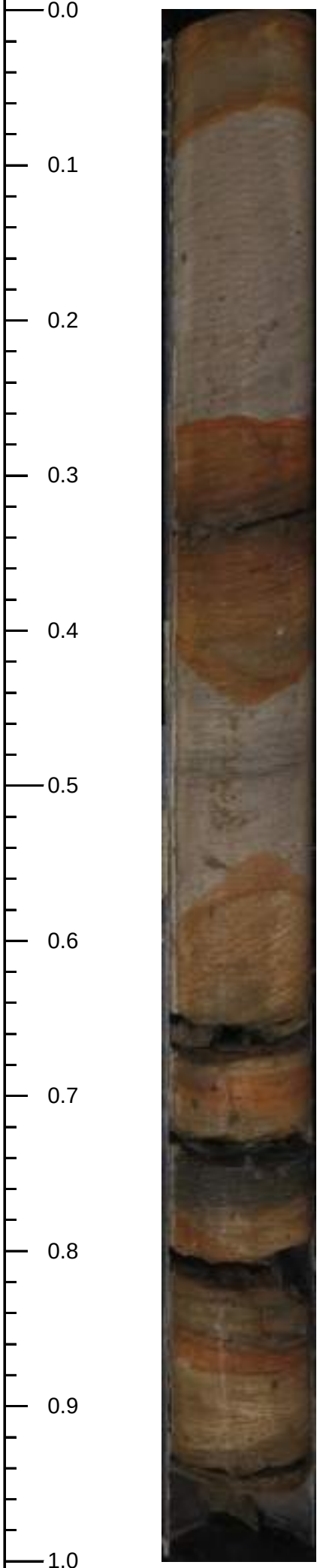
Sampling		Depth (mbgl)	Stratum Description
Depth (mbgl)	Results		
		5.00–5.06	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.06–5.12	Grey medium grained SANDSTONE (THE ROUGH ROCK) with thin dark grey laminations
		5.12–5.40	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal fracture
		5.40–5.50	Brown to grey orange stained SANDSTONE (THE ROUCH ROCK) with sub-horizontal and sub-vertical cracks
		5.50–5.54	Non-intact brownish grey orange stained SANDSTONE (THE ROUCH ROCK) fine angular gravel
		5.54–5.66	Incomplete section. Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK) with dark grey laminations
		5.66–5.72	Non-intact brownish grey orange stained SANDSTONE (THE ROUCH ROCK) fine to medium sub-angular gravel
		5.72–5.98	Grey to dark grey orange medium grained SANDSTONE (THE ROUGH ROCK) with dark grey laminations
		5.98–6.00	AZCL: 5.98–6.00 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 98%. Rock Quality Designation = 66%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	150.108 (GL)	614
Client	**Barratt Homes**	**Co-ordinates**	E: 380959.793; N: 413950.404	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	5–6 m

Core Photography

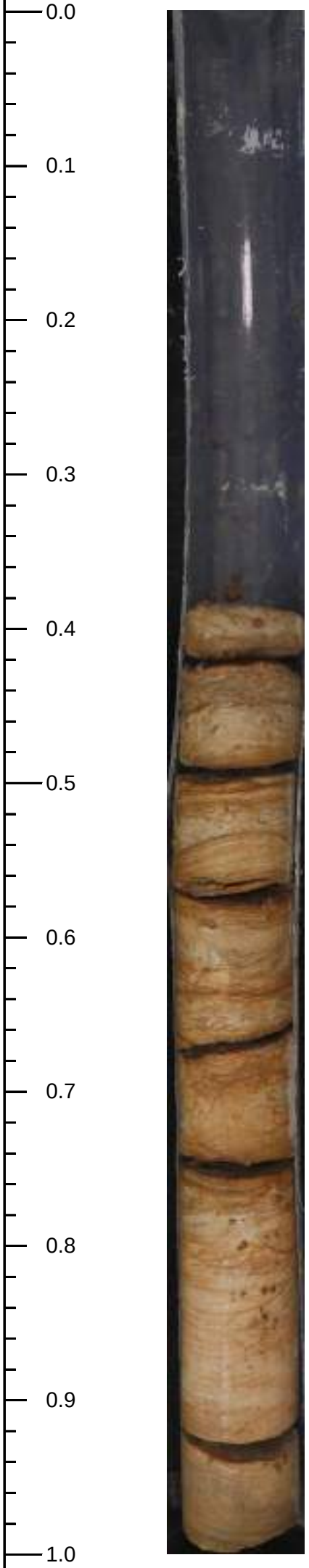


Sampling Depth (mbgl)	Sampling Results	Depth (mbgl)	Stratum Description
		5.00–5.08	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.08–5.26	Grey medium grained SANDSTONE (THE ROUGH ROCK), occasionally mottled brown
		5.26–5.44	Grey orange stained, occasionally brown, medium grained SANDSTONE (THE ROUGH ROCK); sub-horizonal fracture
		5.44–5.56	Grey medium grained SANDSTONE (THE ROUGH ROCK), occasionally mottled brown
		5.56–5.66	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.66–5.68	Horizontal fracture with dark brown sub-angular fine gravel
		5.68–5.72	Grey orange stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.72–5.76	Horizontal fracture; black stained medium grained SANDSTONE (THE ROUGH ROCK)
		5.76–5.92	Brownish grey medium grained SANDSTONE (THE ROUGH ROCK) with occasional sub-horizontal orange stained bands; sub-horizontal fracture
		5.92–5.96	Dark brown medium grained SANDSTONE (THE ROUGH ROCK)
		5.96–6.00	AZCL: 5.96–6.00 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 96%. Rock Quality Designation = 73%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

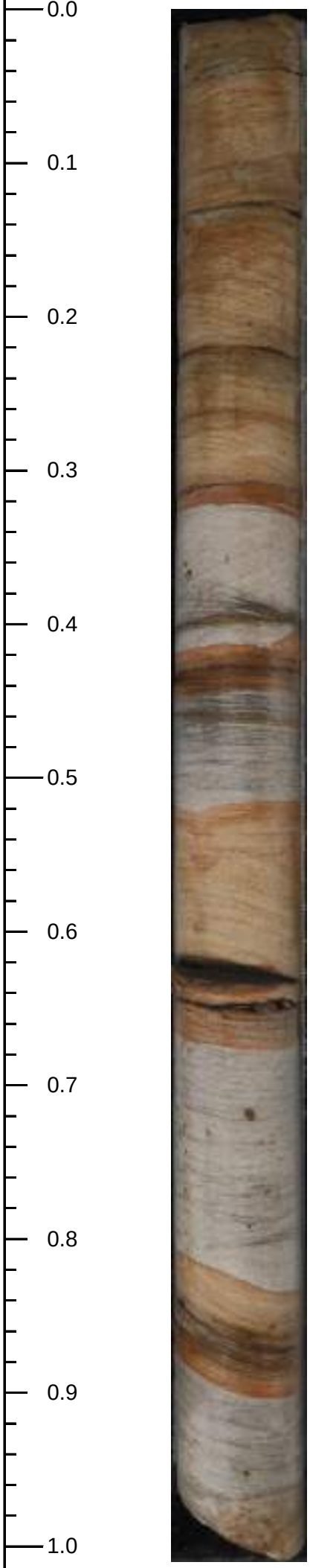
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	3–4 m

Core Photography	**Sampling**		**Depth** (mbgl)	**Stratum Description**
	Depth (mbgl)	Results		
			3.00–3.38	AZCL: 3.00–3.38 m
			3.38–3.82	Greyish-brown SANDSTONE (THE ROUGH ROCK) with frequent orange staining; sub-horizontal closely to medium spaced fractures
			3.82–4.00	Greyish-brown SANDSTONE (THE ROUGH ROCK) with occasional orange staining, occasional mottled brown ; sub-horizontal closely to medium spaced fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 55%. Rock Quality Designation = 17%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

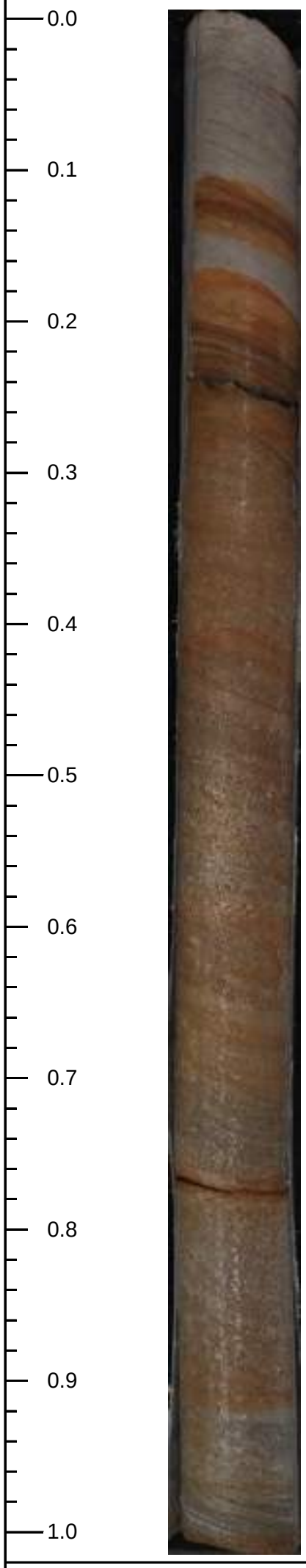
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	4–5 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			4.00–4.32	Greyish-brown orange stained fine grained SANDSTONE (THE ROUGH ROCK); sub-horizontal closely spaced fractures
			4.32–4.40	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			4.40–4.46	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK) with horizontal fracture
			4.46–4.52	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			4.52–4.68	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK); sub-horizontal closely spaced fractures
			4.68–4.82	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			4.82–4.90	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK) with sub-horizontal crack
			4.90–5.00	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 98%. Rock Quality Designation = 62%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	5–6 m

Core Photography	**Sampling**		**Depth** (mbgl)	**Stratum Description**
	Depth (mbgl)	Results		
			5.00–5.10	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			5.10–5.14	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK)
			5.14–5.16	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK)
			5.16–5.28	Greyish-white orange stained fine grained SANDSTONE (THE ROUGH ROCK)
			5.28–6.00	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with widely spaced sub-horizontal fractures

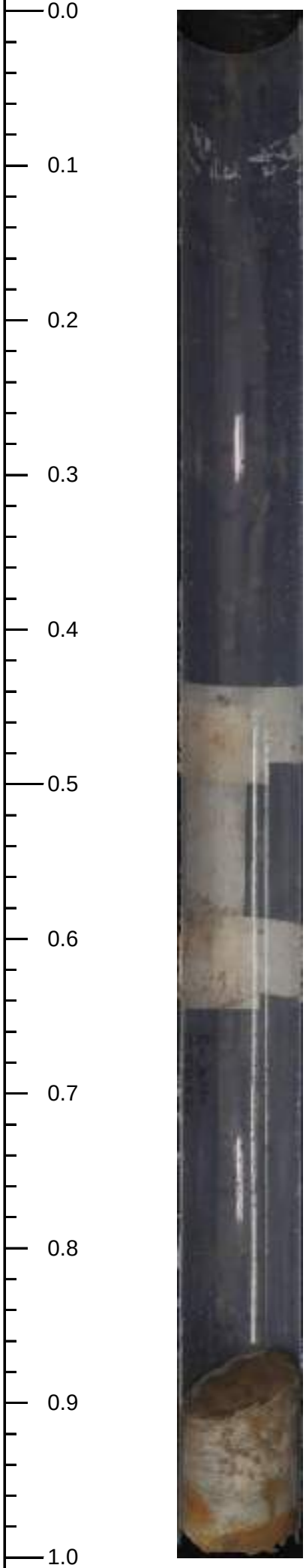
Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 97%. Rock Quality Designation = 96%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

CE Geotech, CEG Laboratories, Matlock Road, S45 0DX, Tel. 01629 584 416

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	6–7 m

Core Photography



Sampling		Depth (mbgl)	Stratum Description
Depth (mbgl)	Results		
		6.00–6.88	AZCL: 6.00–6.88 m
		6.88–7.00	Greyish-white fine grained SANDSTONE (THE ROUGH ROCK) with occasional orange staining

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 11%. Rock Quality Designation = 11%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

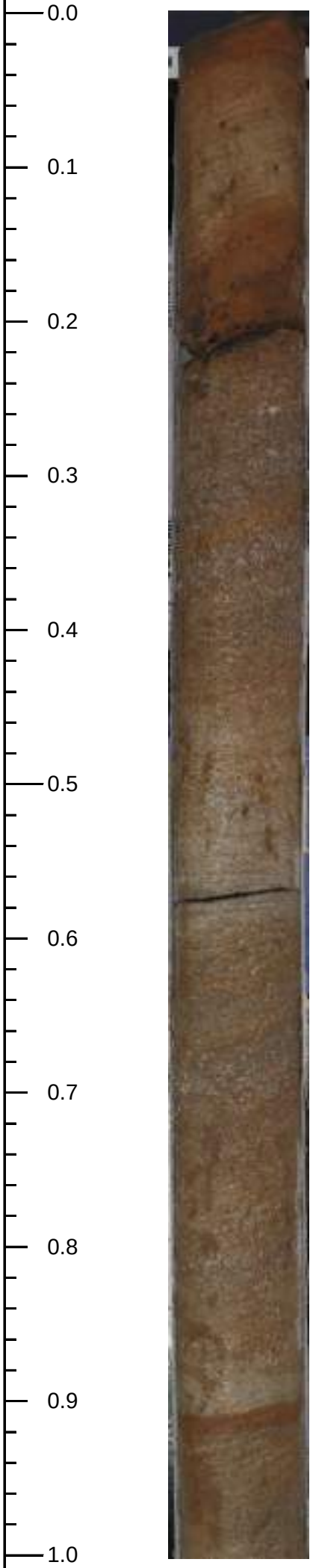
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	7–8 m

Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
			7.00–7.72	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with closely to widely spaced sub-horizontal fractures
			7.72–7.96	Greyish-brown mottled dark brown fine grained SANDSTONE (THE ROUGH ROCK)
			7.96–8.00	AZCL: 7.96–8.00 m

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 94%. Rock Quality Designation = 72%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	8–9 m

Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
			8.00–8.22	Greyish-brown orange stained mottled black medium grained SANDSTONE (THE ROUGH ROCK)
			8.22–9.00	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining and medium space fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 100%. Rock Quality Designation = 96%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

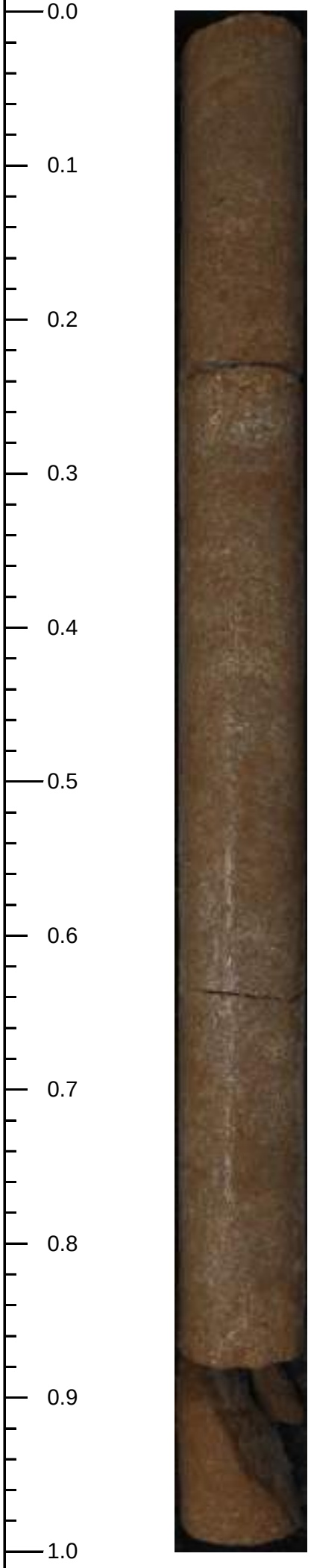
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	9–10 m

Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
			9.00–9.12	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining
			9.12–9.44	AZCL: 9.12–9.44 m
			9.44–10.00	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with closely spaced sub-horizontal fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 71%. Rock Quality Designation = 31%. 9.00–9.12 m section recovered from preceeding run. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	10–11 m

Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
			10.00–10.88	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining; closely to medium spaced sub-horizontal fractures
			10.88–11.00	Partial recovery. Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 90%. Rock Quality Designation = 88%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	11–11.86 m

Core Photography	Sampling		Depth (mbgl)	Stratum Description
	Depth (mbgl)	Results		
			11.00–11.12	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) with occasional black inclusions
			11.12–11.50	Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK)
			11.50–11.86	Partial recovery. Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 100%. Rock Quality Designation = 98%. TCR and RQD based upon 0.86 m section. Remainder of core section recovered as part of following run. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	11.86–12.06 m

Core Photography	**Sampling**		**Depth** (mbgl)	**Stratum Description**
	Depth (mbgl)	Results		
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0			11.86–12.06	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining



Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 100%. Rock Quality Designation = 100%. TCR and RQD based on 0.2 m section. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

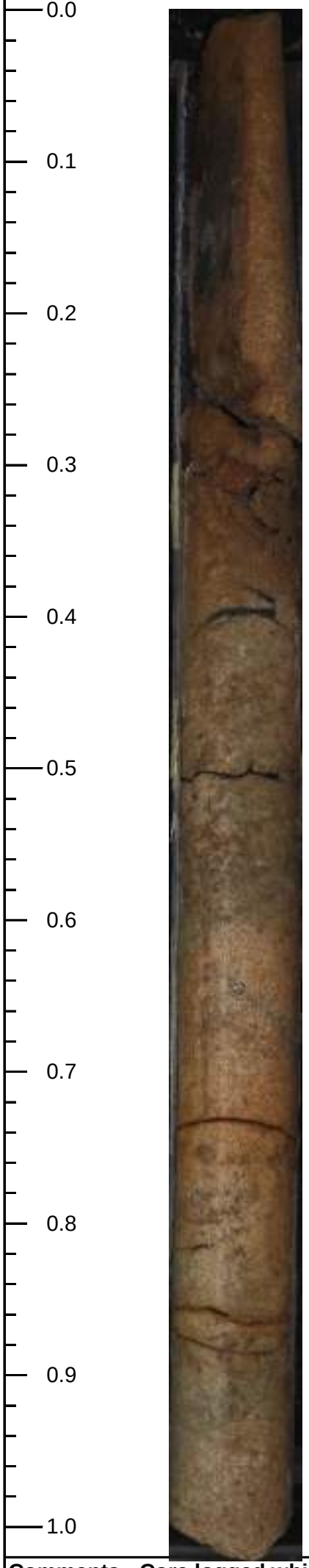
Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	07/12/2023	12–13 m

Core Photography	**Sampling** Depth (mbgl)	Results	**Depth** (mbgl)	**Stratum Description**
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0			12.00–12.80	AZCL: 12.0–12.8 m
			12.80–13.00	Non-intact greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK) recovered as medium to coarse gravel

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 20%. Rock Quality Designation = 0%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	13–14 m

Core Photography	**Sampling** Depth (mbgl)	**Sampling** Results	**Depth** (mbgl)	**Stratum Description**
			13.00–13.36	Partial recovery. Greyish-brown orange stained medium grained SANDSTONE (THE ROUGH ROCK)
			13.36–13.60	Dark greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with closely spaced fractures
			13.60–14.00	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining; very closely to closely spaced fractures

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 96%. Rock Quality Designation = 43%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

Core Logging

Project ID	**A231001**	**Hole Type**	Rotary	**Borehole ID**
Project Name	**Tetrosyl**	**Level**	151.078 (GL)	615
Client	**Barratt Homes**	**Co-ordinates**	E: 380964.914; N: 413973.989	**Depth Range**
Logged By	**James Bradley/Tom Mullan**	**Date**	06/12/2023	14–15 m

Core Photography



Sampling		Depth (mbgl)	Stratum Description
Depth (mbgl)	Results		
		14.00–14.84	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining
		14.84–14.88	Thin band of possible COAL
		14.88–14.96	Greyish-brown medium grained SANDSTONE (THE ROUGH ROCK) with frequent orange staining
		14.96–15.00	AZCL: 14.96–15.00

Comments: Core logged while frozen. AZCL: Assumzed Zone of Core Loss. Total Core Recovery = 94%. Rock Quality Designation = 85%. TCR and RQD have been calculated without differentiating between natural and drilling induced fractures.

APPENDIX B

GROUNDWATER FIELDWORK DATA RECORDS

GROUNDWATER MONITORING LOG

Site name:	Tetrosyl		Job number:	R2174	Weather Conditions:	dry / overcast	Ground Conditions:	damp
Time at:	start	7.45	Date:	24.01.24-25.01.24	Sampling Method:	waterra tubing ~~/ bailer~~	Purge Method:	steady state
	finish	4.30	Staff:	MJ/CM	Pump (if used):	~~Submersible /~~ Peristatic	Date of Equipment Last Calibration:	22.01.24
Record code:	GW01							

Well No.	GW depth TOS*	GW depth BGL	Depth to base TOS*	Depth to base BGL	Time	Volume purged[1]	Temp	DO	SPC	pH	ORP(eH)	Turbidity	Observations
	m bgl	m bgl	m bgl	m bgl		l	°C	mg l^{-1}	µs cm^{-1}	units	mV	NTU	
24.01.24													
RBH608	1.28	0.25	5.75	4.75	8.14	20	7.4	1.63	0.468	7.51	32.7	0.3068	-
					8.19	23	7.4	1.35	0.468	7.49	29.2	0.3041	
					8.24	25	7.5	2.03	0.469	7.46	43	0.3048	
					8.26	26	7.5	1.81	0.468	7.46	43.8	0.3047	
					8.28	27	7.5	1.27	0.468	7.46	45.7	0.3036	
					8.32	29	7.4	1.25	0.467	7.45	46.1	0.3036	
RBH607	2.2	1.37	6.74	5.85	8.51	30	9.7	1.41	0.514	7.81	27.2	0.3323	-
					8.57	34	10.2	0.71	0.51	7.81	21.7	0.3322	
					9.02	36	10.3	0.43	0.51	7.82	13.7	0.3321	
					9.15	42	10.4	0.31	0.51	7.81	10.6	0.3309	
					9.17	44	10.4	0.34	0.509	7.81	10.2	0.331	
RBH603(D)	0	0	9.56	8.78	9.37	30	10	2.06	0.402	7.29	43.4	0.2614	Artesian conditions
					9.39	31	10.1	2.01	0.4005	7.27	46.1	0.2606	
					9.43	35	10.2	2	0.3987	7.26	49.1	0.2589	
RBH603(s)	0.52	0.23	4.53	4.23	10	14	9.5	1.22	0.3974	7.24	58.7	0.2593	-
					10.05	16	9.9	4.16	0.3901	7.19	56.7	0.2574	
					10.07	17	9.9	4.45	0.3957	7.2	55.9	0.257	
					10.09	18	9.9	4.51	0.3945	7.19	55.7	0.2562	
RBH601(D)	1.13	0.52	11.33	10.74	10.32	37	8.2	7.42	0.4548	7.47	48.9	0.2979	-
					10.38	38	9.2	6.27	0.4574	7.31	63.8	0.2973	
					10.4	40	9.3	6.24	0.456	7.3	64.7	0.2965	
RBH601(s)	1.18	0.61	7.77	7.18	10.58	22	9.3	6.06	0.4537	7.4	66.8	0.2948	-
					11.01	23	9.6	5.92	0.4529	7.34	69	0.2946	
					11.05	24	9.6	5.89	0.452	7.27	69	0.2939	
					11.07	25	9.6	5.92	0.4522	7.26	69.3	0.2935	
RBH609(D)	3.37	2.8	8.7	8.1	11.34	31	10	2.5	0.4648	7.66	65.1	0.3005	-
					11.4	34	10.5	0.74	0.4465	7.58	59.2	0.2893	
					11.46	36	10.5	0.9	0.4417	7.55	56	0.2869	
					11.48	38	10.5	0.5	0.4414	7.55	55	0.2871	
					11.5	39	10.5	0.55	0.4364	7.55	52.3	0.2834	
RBH609(s)	3.26	2.6	4.93	4.27	12.28	15	9.5	0.3	0.807	8.38	-26.6	0.524	Strong, sweet, chemical odour; grey sediment
					12.36	18	9.6	0.27	0.798	8.4	-48.5	0.518	
					12.45	22	9.6	0.32	0.8	8.4	-58.5	0.52	
					12.49	24	9.6	0.41	0.804	8.4	-61.1	0.523	
					12.52	26	9.6	0.38	0.806	8.4	-61	0.524	
RBH610(D)	2.84	2.1	8.62	7.91	1.34	30	10.2	0.81	0.362	7.53	23.9	0.2356	-
					1.38	31	10.5	0.4	0.3538	7.49	26.3	0.2295	
					1.41	32	10.5	0.67	0.3514	7.48	26.9	0.2285	
					1.44	34	10.4	0.53	0.349	7.47	27.2	0.2265	
					1.47	36	10.4	0.3	0.3467	7.46	27.5	0.2251	
					1.51	38	10.4	0.27	0.3449	7.46	27.6	0.224	
					1.55	40	10.4	0.25	0.3419	7.46	27.7	0.2235	
RBH321	6.88	6.2	3.25	2.61	2.12	14	9.9	0.61	1.109	8.02	-45.7	0.721	Moderately strong, sweet, chemical odour
					2.15	15	10.1	0.62	1.112	8.04	-54.2	0.723	
					2.2	17	9.8	2.02	1.14	8.14	-71.8	0.743	
					2.28	21	9.8	3.22	1.137	8.16	-72.2	0.746	
					2.33	23	9.8	3.43	1.151	8.16	-73.1	0.749	
					2.37	25	9.8	3.39	1.152	8.16	-73.3	0.749	
RBH320	2.44	1.93	5.94	5.45	2.5	14	9	3.91	1.207	8.22	-42.4	0.785	Strong, sweet, chemical odour; black sediment
					3.02	20	9	4.85	1.229	8.23	-56.4	0.799	
					3.05	21	9	4.32	1.231	8.23	-57	0.826	
					3.07	22	9	4.37	1.232	8.23	-57.2	0.813	
RBH615(D)	3.66	2.59	12.65	11.63	3.2	40	10.2	1.24	0.4572	7.98	-23.2	0.2942	Slight, sweet, chemical odour
					3.23	41	10.2	0.79	0.4529	7.89	-23.5	0.2939	
					3.26	42	10.2	0.57	0.4485	7.88	-23	0.2926	
					3.28	44	10.2	0.3	0.4474	7.87	-22.8	0.2906	
					3.3	45	10.3	0.32	0.4475	7.87	-23.1	0.2909	
RBH615(S)	3.49	2.61	5.72	4.85	4	14	8.9	0.71	1.398	7.99	7.9	0.908	Slight, sweet, chemical odour; brown sediment
					4.05	16	9	0.35	1.397	7.99	1.8	0.907	
					4.08	18	9	0.41	1.392	7.99	-2.3	0.904	
					4.1	19	9.1	0.36	1.388	8	-6.7	0.902	
					4.12	20	9.1	0.35	1.386	8	-8.1	0.901	
25.01.24													
RBH614(s)	2.34	2.21	4.51	4.37	8.32	20	9.5	2.71	0.98	8.23	5.8	0.624	-
					8.34	21	10	1.45	0.964	8.27	3.3	0.626	
					8.37	23	10	1.19	0.973	8.32	-23.7	0.633	
					8.39	24	10.1	0.89	0.979	8.34	-38.2	0.631	
					8.41	25	10.1	0.63	0.974	8.35	-45.1	0.625	
					8.44	27	10.1	0.38	0.961	8.34	-49.3	0.619	
					8.46	28	10.2	0.41	0.955	8.34	-53.4	0.619	
Rbh614 (D)	2.96	2.13	11.8	10.4	9.04	40	10.1	0.54	0.614	8.29	-51.2	0.417	-
					9.07	42	10.3	0.48	0.614	8.29	-56.7	0.4172	
					9.1	43	10.4	0.54	0.615	8.29	-64.2	0.4168	

RBH612	2.72	1.75	6.68	5.72	9.28	20	9.9	1.86	0.601	8.3	-14.7	0.3891	-
					9.35	23	10.3	0.35	0.602	8.09	-15.7	0.3917	
					9.38	24	10.4	0.35	0.602	8.09	-15.9	0.3902	
RBH613	3.89	3.16	11.98	11.2	10.12	35	10.3	0.88	0.843	8.15	-30.8	0.546	-
					10.14	36	10.3	0.52	0.839	8.15	-32.2	0.545	
					10.16	37	10.1	0.23	0.851	8.15	-36.4	0.553	
					10.25	41	10.2	0.2	0.849	8.15	-37.5	0.552	
RBH605	4.45		7.45		10.52	28	9.9	0.94	0.3029	7.45	24.1	0.1935	-
					10.54	31	10.1	0.91	0.2908	7.41	27.8	0.1835	
					10.57	32	10.2	1.56	0.2907	7.4	29.8	0.1841	
					11	34	10.2	2.05	0.3022	7.4	31.2	0.193	
					11.03	35	10.2	1.99	0.3013	7.4	32.4	0.1931	
RBH604(s)	0	0	6.4	6.1	11.3	5	10.2	3.64	0.4172	7.14	54.4	0.2711	Artesian conditions
					11.32	7	10.2	6.49	0.4171	7.13	54.7	0.2711	
					11.34	8	10.3	3.39	0.417	7.13	55.4	0.2707	
					11.36	9	10.3	3.34	0.4161	7.13	55.7	0.2705	
RBH604(D)	0	0	12.43	11.37	11.49	5	10.1	4.14	0.4265	7.29	58.9	0.2766	Artesian conditions
					11.55	7	10.1	4.06	0.4207	7.2	61.6	0.2735	
					11.57	8	10.1	4.09	0.4195	7.2	61.9	0.2728	
RBH606(S)	3.3	2.2	10.5	8.5	12.18	28	10.8	0.32	0.513	7.56	50	0.3315	-
					12.21	30	10.9	0.27	0.508	7.56	47.3	0.3303	
					12.24	32	10.9	0.28	0.508	7.56	46.5	0.3303	
RBH606(D)	2.2	1.19	12.39	11.37	12.35	42	10.4	0.34	0.4619	7.45	46.3	0.3303	-
					12.38	44	10.5	0.31	0.4612	7.45	46	0.2999	
					12.41	45	10.5	0.36	0.462	7.45	45.7	0.3005	
RBH602	3.11	2.26	10.17	9.37	13.1	35	10.8	0.34	1.116	8.29	-22.1	0.725	Brown sediment
					13.33	36	10.7	0.47	1.127	8.36	-68.6	0.732	
					13.36	37	10.6	0.26	1.126	8.36	-70.1	0.732	
					13.38	38	10.6	0.21	1.128	8.37	-77.3	0.732	
					13.4	40	10.6	0.2	1.128	8.36	-77.3	0.732	

*TOS = Top of standpipe

GROUNDWATER MONITORING LOG

Site name:	Tetrosyl	Job number:	R2174	Weather Conditions:	dry / overcast	Ground Conditions:	damp
Time at:	start	Date:	03.04.24 - 04.04.24	Sampling Method:	waterra tubing ~~/ bailer~~	Purge Method:	steady state
	finish	Staff:	MJ/CM	Pump (if used):	~~Submersible /~~ Peristatic	Date of Equipment Last Calibration:	02.04.24
Record code:	GW02						

Well No.	GW depth TOC	GW depth BGL	Depth to base TOC	Depth to BGL	Time	Volume purged[1]	Temp	DO	DO	SPC	pH	ORP(eH)	TDS	Description / Observations
	m bgl[2]	m bgl[2]	m bgl[2]	m bgl[2]		l	°C	%	mg l^{-1}	µs cm^{-1}	units	mV		
03.04.24														
RBH601(D)	1.34	0.82	11.38	10.84	9.13	94	10.4	62.8	6.74	0.847	6.76	40.5	0.313	
					9.16		10.3	50.5	5.69	0.476	6.12	63.7	0.4743	
					9.2		10.2	47.4	5.31	0.4614	6	78.2	0.3043	
					9.23		10.3	47.6	5.33	0.4616	5.95	87	0.2995	
					9.28		10.2	44.7	5	0.4608	5.95	89.7	0.298	
RBH601 (s)	0.85	0.34	7.77	7.18	9.46	70	10.2	82.9	9.19	0.4658	6.01	84.6	0.3021	
					9.48		10.2	75	8.37	0.4642	5.96	86.7		
					9.51		10.2	61.4	6.84	0.461	5.91	90.1	0.2993	
					9.55		10.2	50.1	5.61	0.4201	5.88	91.1	0.299	
					9.56			47.2	5.81	0.4601	5.88	91.9	0.299	
RBH614(s)	2.42	2.28	6.34	4.5	10.3	28	9.8	14.5	1.88	0.849	6.89	-75.7	0.552	
					10.32		9.8	7.8	0.86	0.849	6.9	-79.5	0.552	
					10.34		9.8	5.6	0.59	0.849	6.91	-82.7	0.552	
					10.36		9.8	4.9	0.51	0.849	6.91	-84.7	0.552	
RBH320	2.7	2.23	5.91	5.31	11.16	36	8.9	8.3	0.92	0.974	6.87	-78.6	0.634	Strong, sweet, chemical odour; black sediment
					11.18		8.8	6.4	0.75	0.944	6.87	-77.8	0.626	
					11.2		8.8	6.7	0.78	0.92	6.86	-81.6	0.585	
					11.22		8.7	8.5	0.99	0.867	6.86	-83	0.574	
					11.24		8.7	11.8	1.37	0.88	6.86	-85.9	0.568	
					11.26		8.7	11.6	1.44	0.872	6.86	-86.3	0.564	
					11.28		8.7	13.3	1.52	0.887	6.86	-86.5	0.563	
RBH605	3.53	2.47	7.45	6.95	12.5	46	10.3	38.4	4.08	0.2937	6.55	2.2	0.191	Sandy sediment
					12.55		10.3	17.8	2.09	0.2936	5.47	5.5	0.2039	
					13.01		10.4	11.8	1.31	0.2955	6.37	10.8	0.1916	
					13.05		10.4	10.8	1.19	0.2944	6.35	12	0.1917	
					13.08		10.4	12.7	1.4	0.2875	6.25	18.6	0.1857	
					13.1		10.4	11.7	1.15	0.2799	6.21	25.4	0.1814	
RBH321	3.56	2.9	6.84	6.17	14.21	38	9.8	12	1.35	0.515	6.23	-71.2	0.3142	Moderately strong, sweet, chemical odour, no sediment
					14.25		9.8	10.9	1.23	0.3604	6.22	-72.5	0.2192	
					14.31		9.7	7.7	0.88	0.3301	6.22	-78.9	0.218	
					14.34		9.7	8.1	0.93	0.3286	6.22	-79	0.2183	
RHB609(D)	3.25	2.61	8.7	8.02	14.53	60	9.9	18.8	3.77	1.005	6.94	0.7	0.653	
					14.59		9.9	27.6	3.06	0.993	6.94	3.2	0.645	
					15.01		9.9	27.7	3.09	0.984	6.87	5.9	0.639	
					15.03		9.9	25.1	2.81	0.978	6.79	7.7	0.634	
					15.06		10	24.9	2.74	0.971	6.74	9.1	0.628	
RBH609(S)	3.67	3.36	4.98	4.37	15.1	23	9.2	2.9	0.39	1.278	6.92	-90.6	0.83	Strong, sweet, chemical odour, grey sediment
					15.14		9.2	2.8	0.32	1.274	6.92	-90.9	0.828	
					15.16		9.2	2.7	0.37	1.272	6.92	-91.2	0.827	
RBH610(D)	2.97	2.23	8.8	8.1	15.24	57	10.4	67.1	8.06	0.3444	6.16	19.1	0.2281	
					15.27		10.4	67.1	7.06	0.2118	6.16	20.2	0.142	
					15.29		10.4	83.2	9.41	0.2078	6.16	21.2	0.1341	
					15.31		10.4	77.2	8.58	0.2314	6.14	21.8	0.1945	
RBH615(s)	3.41	2.59	7.73	5.86	15.45	28	9.4	31.1	3.61	0.9	6.65	-85.2	0.585	Slight, sweet, chemical odour; brown sediment
					15.47		9.4	35	4.01	0.9	6.64	-84.8	0.585	
					15.49		9.5	7.8	0.89	0.899	6.65	-84.8	0.585	
					15.52		9.5	8.5	0.98	0.899	6.65	-84.8	0.585	
					15.54		9.5	9.7	1.11	0.899	6.65	-84.8	0.585	
					15.56		9.5	11.6	1.35	0.899	6.65	-84.7	0.585	
					15.57		9.5	12	1.36	0.899	6.65	-84.8	0.585	
RBH615(D)	3.54	2.52	12.59	11.57	4.02	84	9.8	36	4.04	0.584	6.65	-51.2	0.3793	Slight, sweet, chemical odour; no sediment
					4.04		10.2	23.6	2.52	0.584	6.76	-64.3	0.3784	
					4.07		10.2	15.1	1.61	0.582	6.78	-68.5	0.3781	
					4.09		10.2	13.8	1.53	0.58	6.79	-74.1	0.3767	
					4.14		10.5	13.6	1.55	0.567	6.81	-105.1	0.3684	
					4.16		10.5	14.5	1.56	0.566	6.81	-106.1	0.368	
RBH614(D)	2.97	2.18	11.17	10.38	4.3	28	10.3	2.9	0.43	0.617	6.95	-107.4	0.4022	
					4.32		10.3	3.7	0.41	0.618	6.95	-108	0.4015	
					4.34		10.3	3.6	0.4	0.618	6.95	-108.1	0.4017	
							04.04.23							
RBH603(D)	0.39	AGL	9.56	8.74	8.56	7	9.6	29.1	3.27	0.4337	5.95	60.9	0.2811	Artesian
					9.03		10.1	26.9	3.01	0.4295	5.94	62.1	0.2799	
					9.05		10.1	26.4	2.96	0.428	5.9	66.8	0.2771	
					9.07		10.1	25.1	2.85	0.4255	5.89	68.1	0.2772	
					9.1		10.1	25	2.8	0.4244	5.87	70.1	0.2754	
RBH603(s)	1.05	0.53	4.84	4.32	9.21	5	9.5	5.3	0.58	0.4113	5.88	63.9	0.2875	
					9.25		9.5	4.2	0.47	0.411	5.85	65	0.2674	
					9.27		9.5	10.2	1.25	0.412	5.85	63.1	0.2675	
					9.29		9.4	13.6	1.55	0.4121	5.86	54.1	0.268	
					9.31		9.4	9.9	1.12	0.4126	5.86	50.8	0.2681	

RBH607	2.62	2.42	6.65	5.94	10.02	55	9.4	54.9	4	0.936	6.45	42.1	0.63	
					10.06		10.3	3.9	0.43	0.969	6.42	26.2	0.629	
					10.08		10.3	3.6	0.59	0.976	6.41	25.7	0.625	
					10.1		10.3	8.4	0.69	0.986	6.41	23.3	0.629	
					10.11		10.3	7.8	0.89	0.977	6.41	22.7	0.629	
RBH612	2.92	1.98	6.63	5.71	10.33	40	10	3.4	0.59	1.052	6.71	-15.7	0.684	
					10.35		10	3.3	0.4	1.053	6.71	-17.3	0.683	
					10.38		10	3.5	0.42	1.043	6.72	-19.7	0.685	
RBH613	2.23	1.21	12.05	11.03	11.05	78	10.2	7.1	0.81	0.643	6.69	-29.7	0.4179	
					11.07		10.2	7.8	0.97	0.642	6.69	-30.1	0.4124	
					11.1		10.2	13.3	1.45	0.64	6.71	-38.7	0.4158	
					11.13		10.2	11.1	1.19	0.639	6.71	-39.2	0.4159	
					11.15		10.2	10.5	1.18	0.636	6.69	-40.2	0.4133	
RBH606(s)	2.6	1.78	9.63	8.81	11.35	63	10.5	7.3	0.76	0.767	6.54	-40.3	0.498	
					11.37		10.5	5.2	0.57	0.762	6.55	-41	0.495	
					11.4		10.5	5.5	0.62	0.761	6.55	-41.1	0.494	
					11.42		10.5	5.2	0.67	0.759	6.55	-41.2	0.493	
					11.43		10.5	6.9	0.77	0.759	6.55	-41.7	0.493	
					11.44		10.5	8.3	0.94	0.758	6.55	-41.8	0.493	
					11.45		10.5	9	1	0.758	6.55	-41.8	0.492	
					11.47		10.5	9	0.91	0.759	6.55	-41.8	0.492	
					11.48		10.5	8.4	0.98	0.758	6.55	-41.8	0.492	
RBH606(D)	4.37	3.33	12.56	11.51	12.04	100	11	6.7	0.75	0.525	6.3	5.5	0.3408	Brown sediment
					12.1		11	9	1.01	0.524	6.3	5.3	0.3407	
					12.14		11	9.4	1.05	0.525	6.3	5.4	0.341	
					12.16		11	9.8	1.09	0.524	6.3	5.2	0.3417	
					12.19		11	10.6	1.17	0.525	6.3	5.3	0.3415	
					12.2		11	10.7	1.17	0.525	6.3	5.3	0.3418	
					12.23		11	10.7	1.18	0.525	6.3	5.2	0.3415	
RBH602	3.34	2.44	10.19	9.29	12.43	75	11.7	1.8	0.19	1.177	7.02	-86.6	0.765	Brown sediment
					12.5		11.7	1.7	0.19	1.177	7.02	-86.7	0.765	
					12.55		11.7	1.6	0.17	1.178	7.02	-88.7	0.767	
					12.57		11.7	1.5	0.16	1.178	7.02	-88.8	0.767	
RBH604(s)	AGL	AGL	6.35	6.7	1.41	55	10.9	31.9	3.5	0.944	5.81	59	0.613	Artesian conditions
					1.43		10.9	33.2	3.68	0.942	5.78	65.1	0.613	
					1.45		10.9	33.8	3.78	0.943	5.78	65.3	0.613	
					1.48		10.9	33.1	3.78	0.943	5.78	66.1	0.605	
RBH604(d)	0.9	AGL	12.5	11.33	2.08	105	11.2	47.9	5.11	0.963	5.85	66	0.621	Artesian conditions
					2.1		10.8	34.2	4.32	0.945	5.8	68.1	0.592	
					2.12		10.7	38	4.21	0.911	5.75	74.1	0.593	
					2.14		10.6	38.1	4.22	0.909	5.75	74.9	0.593	
RBH608	1.86	0.84	5.81	4.79	2.42	44	9	6.4	0.75	0.49	6	68.5	0.3186	
					2.44		8.8	5.1	0.58	0.49	6	68.4	0.3183	
					2.45		8.8	4.6	0.52	0.49	6	68.4	0.3183	
					2.47		8.8	4.3	0.5	0.49	6	68.4	0.3183	
					2.49		8.8	4.1	0.49	0.49	6	68.4	0.3183	

APPENDIX C

SITE PHOTOGRAPHS

Site Investigation Photolog

1.



08.12.23: RBH601 – Location

2.



08.12.23: RBH601 – Core (4.5-7.5m)

3.



08.12.23: RBH601 – Core (7.5-10.5m)

4.



08.12.23: RBH601 – Core (10.5-13.5m)

5.



06.01.24: RBH602 – Location

6.



06.01.24: RBH602 – Core (10.5-13.5m)

7.



11.12.23: RBH603 – Location

8.



11.12.23: RBH603 – Core (3-6m)

9.



11.12.23: RBH603 – Core (6-9m)

10.



11.12.23: RBH603 – Core (9-12m)

11.



04.01.24: RBH604 – Location

12.



04.01.24: RBH604 – Core (4.5-7.5m)

13.



04.01.24: RBH604 – Core (7.5-10.5m)

14.



04.01.24: RBH604 – Core (10.5-12.5m)

15.



03.01.24: RBH605 – Location

16.



20.12.24: RBH605 – Core (4.5-6m)

17.



20.12.24: RBH605 – Core (6-9m)

18.



03.01.24: RBH605 – Core (9-12m)

19.



05.01.24: RBH606 – Location

20.



04.01.24: RBH606 – Core (3.35-4m)

21.



04.01.24: RBH606 – Core (4.5-7.5m)

22.



04.01.24: RBH606 – Core (7.5-9.5m)

23.



05.01.24: RBH606 – Core (9.5-12.5m)

24.



05.12.23: RBH607 – Location

25.



04.12.23: RBH607 – Core (1.5-3m)

26.



04.12.23: RBH607 – Core (3-6m)

27.



05.12.23: RBH607 – Core (6-9m)

28.



05.12.23: RBH607 – Core (9-10.5m)

29.



05.12.23: RBH608 – Location

30.



04.12.23: RBH608 – Core (1.5-3m)

31.



04.12.23: RBH608 – Core (3-6m)

32.



05.12.23: RBH608 – Core (7-10m)

33.



06.12.23: RBH609 – Location

34.



06.12.23: RBH609 – Core (3-6m)

35.



06.12.23: RBH609 – Core (6-9m)

36.



06.12.23: RBH609 – Core (9-12m)

37.



07.12.23: RBH610 – Location

38.



07.12.23: RBH610 – Core (6-9m)

39.



07.12.23: RBH610 – Core (9-12m)

40.



06.12.23: RBH611 – Location

41.



06.12.23: RBH611 – Core (3-6m)

42.



06.12.23: RBH611 – Core (6-9m)

43.



06.12.23: RBH611 – Core (9-12m)

44.



07.12.23: RBH612 – Location

45.



07.12.23: RBH612 – Core (6-9m)

46.



07.12.23: RBH612 – Core (9-12m)

47.



20.12.23: RBH613 – Location

48.



19.12.23: RBH613 – Core (6-9m)

49.



19.12.23: RBH613 – Core (9-10.5m)

50.



19.12.23: RBH613 – Core (10.5-13.5m)

51.



07.12.23: RBH614 – Location

52.



07.12.23: RBH614 – Core (3-6m)

53.



07.12.23: RBH614 – Core (6-9m)

54.



07.12.23: RBH614 – Core (9-12m)

55.  08.12.23: RBH615 – Location	**NO PHOTOGRAPH**

APPENDIX D

LABORATORY TEST CERTIFICATES

Phase 2 Sampling event 24-25 January 2024					Aliphatics											
Lab ref	Sample	Depth	Sample Type	Date sampled	>C5-C6	>C6-C8	>C8-C10	>C10-C12	>C12-C16	>C16-C21	>C21-C35	Total aliphatics C5-35	>C5-EC7	>EC7-EC8	>EC8-EC10	>EC10-EC12
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	48	29	21	*5*	*10*	*10*	*10*	98	*10*	*10*	*10*	*5*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	17	*10*	*10*	*10*	*5*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	512	17132	9407	*5*	*10*	*10*	*10*	27051	*100*	53437	46625	542
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	49	608	233	*5*	*10*	*10*	*10*	890	*10*	1962	1195	41
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*10*	19	*10*	*5*	*10*	*10*	*10*	19	*10*	*10*	*10*	*5*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*100*	13584	6322	*5*	*10*	*10*	*10*	19906	*100*	45151	29068	676
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	199	12576	6801	54	*10*	*10*	*10*	19630	*100*	40900	33107	453
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	14	20	17	*5*	*10*	*10*	*10*	51	*10*	*10*	*10*	*5*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	21	308	67	*5*	*10*	*10*	*10*	396	*10*	19	33	*5*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	28	71	27	*5*	*10*	*10*	*10*	126	*10*	*10*	36	*5*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	92	464	245	*5*	*10*	*10*	*10*	801	10	151	730	67
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	75	40	46	*5*	*10*	*10*	*10*	161	*10*	*10*	51	*5*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*10*	34	*10*	*5*	*10*	*10*	*10*	34	*10*	*10*	*10*	*5*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*10*	*10*	*10*	*5*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*5*

Min	10	10	10	5	10	10	10	10	10	10	10	5
Max	512	17132	9407	54	10	10	10	27051	100	53437	46625	676
Criteria	15,000	1,620,000	No breakthrough at compliance point	No breakthrough at compliance point	300	-	-	-	53.3	1349	12,600	257,000,000
	WHO	SS	SS	SS	WHO				SS	SS	SS	SS

Phase 2 Sampling event 24-25 January 2024				Aromatics						MTBE & BTEX						
Lab ref	Sample	Depth	Sample Type	Date sampled	>EC12-EC16	>EC16-EC21	>EC21-EC35	Total aromatics C5-35	Total aliphatics and aromatics(C5-35)	Methyl Tertiary Butyl Ether	Benzene	Toluene	Ethylbenzene	m/p-Xylene	o-Xylene	Total-Xylene
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	98	3.1	3.8	*5*	1	2	*1*	
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	*10*	2	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	17	3.8	1.8	*5*	*1*	*2*	1	
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	*10*	0.6	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	*10*	*0.1*	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	*10*	*0.1*	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	100604	127655	14.6	42.3	45156	6011	25450	4755	30205
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*10*	*10*	*10*	3198	4088	2.4	3.4	2216	197	823	208	1031
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	19	0.7	1.2	*5*	*1*	*2*	1	
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	50	*10*	*10*	74945	94851	11.2	86.6	48798	6010	18873	3497	22370
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*10*	*10*	*10*	74460	94090	10.3	35.4	42239	5660	20745	4456	25201
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*10*	*10*	51	5.3	3.3	*5*	*1*	*2*	*1*	
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*10*	*10*	*10*	52	448	0.7	2	22	15	12	2	14
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*10*	*10*	*10*	36	162	5.2	4	*5*	12	15	3	18
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*10*	*10*	*10*	958	1759	1.8	11.5	175	306	366	76	442
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*10*	*10*	*10*	51	212	3.6	7.5	*5*	11	7	*1*	
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.2	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	1.3	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.4	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.3	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	34	2.3	0.6	*5*	2	*2*	*1*	
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.6	*0.5*	*5*	*1*	*2*	*1*	
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*10*	*10*	*10*	*10*	*10*	0.6	*0.5*	*5*	*1*	*2*	*1*	

Min	10	10	10	10	10	0.1	0.5	5	1	2	1	
Max	50	10	10	100604	127655	14.6	86.6	48798	6011	25450	4755	30205
Criteria	90	90	90	-	-	60.7	53.3	1340	5520	30	30	9320
	WHO	WHO	WHO			SS	SS	SS	SS	EQS AA	EQS AA	SS

Phase 2 Sampling event 24-25 January 2024																
Lab ref	Sample	Depth	Sample Type	Date sampled	Dichlorodifluoromethane	Methyl Tertiary Butyl Ether	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	1,1-Dichloroethene (1,1 DCE)	Dichloromethane (DCM)	trans-1-2-Dichloroethene	1,1-Dichloroethane
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	539	3.1	*3*	1	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	248	2	*3*	0.1	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	162	3.8	*3*	3	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	54	0.6	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*2*	*0.1*	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*2*	*0.1*	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	5	14.6	*3*	4	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	34	2.4	*3*	0.5	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	78	0.7	*3*	4.5	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	79	11.2	*3*	3.3	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	22	10.3	*3*	3.8	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	41	5.3	*3*	1.5	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	334	0.7	*3*	0.9	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	255	5.2	*3*	0.4	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	828	1.8	*3*	0.8	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	863	3.6	*3*	0.9	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	46	0.2	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	110	1.3	*3*	0.3	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	33	0.4	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	24	0.3	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	29	2.3	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	16	0.6	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	5	0.6	*3*	*0.1*	*1*	*3*	*3*	*3*	*3*	*3*	*3*

Min	2	0.1	3	0.1	1	3	3	3	3	3	3
Max	863	14.6	3	4.5	1	3	3	3	3	3	3
Criteria	-	60.7		1.02					27,400		
		SS		SS					SS		

Phase 2 Sampling event 24-25 January 2024																
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	cis-1-2-Dichloroethene	2,2-Dichloropropane	Bromochloromethane	Chloroform	1,1,1-Trichloroethane	1,1-Dichloropropene	Carbon tetrhloride	1,2-Dichloroethane	Benzene	Trichloroethene (TCE)	1,2-Dichloropropane
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	3.8	*3*	*2*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	9	*1*	*2*	*2*	*2*	*3*	*2*	*2*	1.8	12	*2*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	55	*1*	*2*	*2*	*2*	*3*	*2*	*2*	42.3	5	*2*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	5	*1*	*2*	*2*	*2*	*3*	*2*	*2*	3.4	5	*2*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	29	*1*	*2*	*2*	*2*	*3*	*2*	*2*	1.2	11	*2*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	53	*1*	*2*	8	*2*	*3*	*2*	*2*	86.6	23	*2*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	51	*1*	*2*	*2*	*2*	*3*	*2*	*2*	35.4	9	*2*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	3.3	*3*	*2*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	2	*3*	*2*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	4	*3*	*2*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	11.5	*3*	*2*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	7.5	*3*	*2*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	0.6	*3*	*2*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*3*	*1*	*2*	*2*	*2*	*3*	*2*	*2*	*0.5*	*3*	*2*

Min	3	1	2	2	2	3	2	2	0.5	3	2
Max	55	1	2	8	2	3	2	2	86.6	23	2
Criteria	171			76.6				10	53.3	55.8	
	SS			SS				EQS AA	SS	SS	

Phase 2 Sampling event 24-25 January 2024					VOCs										
Lab ref	Sample	Depth	Sample Type	Date sampled	Dibromomethane	Bromodichloromethane	cis-1-3-Dichloropropene	Toluene	trans-1-3-Dichloropropene	1,1,2-Trichloroethane	Tetrhloroethene (PCE)	1,3-Dichloropropane	Dibromochloromethane	1,2-Dibromoethane	Chlorobenzene
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*2*	*2*	45156	*2*	*2*	17	*2*	*2*	*2*	66
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*3*	*2*	*2*	2216	*2*	*2*	*3*	*2*	*2*	*2*	3
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*3*	*2*	*2*	48798	*2*	*2*	10	*2*	*2*	*2*	39
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*3*	*2*	*2*	42239	*2*	*2*	7	*2*	*2*	*2*	55
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*3*	*2*	*2*	22	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*3*	*2*	*2*	175	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*3*	*2*	*2*	*5*	*2*	*2*	*3*	*2*	*2*	*2*	*2*

Min	3	2	2	5	2	2	3	2	2	2	2
Max	3	2	2	48798	2	2	17	2	2	2	66
Criteria				1340			129				300
				SS			SS				WHO

Phase 2 Sampling event 24-25 January 2024															
Lab ref	Sample	Depth	Sample Type	Date sampled	1,1,1,2-Tetrhloroethane	Ethylbenzene	m/p-Xylene	o-Xylene	Total-Xylene	Styrene	Bromoform	Isopropylbenzene	1,1,2,2-Tetrhloroethane	Bromobenzene	1,2,3-Trichloropropane
		m/bgl			ug/l	ug/l	ug/l	ug/l		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*2*	1	2	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*2*	*1*	*2*	1		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*2*	6011	25450	4755	30205	*2*	*2*	79	*4*	*2*	*3*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*2*	197	823	208	1031	*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*2*	*1*	*2*	1	3	*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*2*	6010	18873	3497	22370	*2*	*2*	78	*4*	*2*	*3*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*2*	5660	20745	4456	25201	*2*	*2*	69	*4*	*2*	*3*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*2*	15	12	2	14	*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*2*	12	15	3	18	*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*2*	306	366	76	442	*2*	*2*	5	*4*	*2*	*3*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*2*	11	7	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*2*	2	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*2*	*1*	*2*	*1*		*2*	*2*	*3*	*4*	*2*	*3*

Min	2	1	2	1		2	2	3	4	2	3
Max	2	6011	25450	4755		2	2	79	4	2	3
Criteria		5,520	30	30	9320					-	
		SS	EQS AA	EQS AA	SS						

Phase 2 Sampling event 24-25 January 2024														
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	Propylbenzene	2-Chlorotoluene	1,3,5-Trimethylbenzene	4-Chlorotoluene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	4-Isopropyltoluene	1,3-Dichlorobenzene
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	130	*3*	435	*3*	5	1336	11	10	*3*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*3*	*3*	8	*3*	*3*	25	*3*	*3*	*3*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	144	*3*	308	*3*	19	1047	15	12	*3*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	123	*3*	342	*3*	6	**1251**	8	6	*3*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	7	*3*	10	*3*	*3*	28	*3*	*3*	*3*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	5	*3*	*3*	*3*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*

Min	3	3	3	3	3	3	3	3	3
Max	144	3	435	3	19	1336	15	12	3
Criteria			-		-		-	-	20/200

EQS AA/MAC

Phase 2 Sampling event 24-25 January 2024													
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	1,4-Dichlorobenzene	n-Butylbenzene	1,2-Dichlorobenzene	1,2-Dibromo-3-chloropropane	1,2,4-Trichlorobenzene	Hexhlorobutiene	Naphthalene	1,2,3-Trichlorobenzene	2-Chlorophenol
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*3*	10	3	*2*	*3*	*3*	31	*3*	*20*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*3*	9	*3*	*2*	*3*	*3*	7	*3*	*1*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*3*	5	*3*	*2*	*3*	*3*	5	*3*	*1*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	2	*3*	*1*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*3*	*3*	*3*	*2*	*3*	*3*	*2*	*3*	*1*

Min	3	3	3	2	3	3	2	3	1
Max	3	10	3	2	3	3	31	3	20
Criteria	20/200	-	20/200				2/130		
	EQS AA/MAC		EQS AA/MAC				EQS AA/MAC		

Phase 2 Sampling event 24-25 January 2024				Phenols											
Lab ref	Sample	Depth	Sample Type	Date sampled	2-Methylphenol	2-Nitrophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Penthlorophenol	Phenol
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	29.4	*10*	*10*	27	*10*	*20*	*0.5*	54	*200*	*20*	20
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	10.9	*0.5*	*0.5*	1	*0.5*	*1*	*0.5*	5	*10*	*1*	*1*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	67.6	*0.5*	*0.5*	36	*0.5*	*1*	*0.5*	119	*10*	*1*	*1*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	39	*0.5*	*0.5*	36	*0.5*	*1*	*0.5*	67	*10*	*1*	2
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	1.4	*0.5*	*0.5*	10	*0.5*	*1*	*0.5*	2	*10*	*1*	*1*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*1*	*0.5*	*1*	*10*	*1*	*1*

Min	0.5	0.5	0.5	1	0.5	1	0.5	1	10	1	1
Max	67.6	10	10	36	10	20	0.5	119	200	20	20
Criteria		-	-	4.2/140	-				-		1,430,000
				EQS AA/MAC							SS

Phase 2 Sampling event 24-25 January 2024					PAHs									
Lab ref	Sample	Depth	Sample Type	Date sampled	2-Chloronaphthalene	2-Methylnaphthalene	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*1*	*1*	0.3	0.011	0.44	0.202	0.021	0.008	0.005	*0.005*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*20*	*20*	**13.4**	*0.005*	0.246	0.103	0.168	0.018	0.021	0.018
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*1*	*1*	0.5	*0.005*	0.024	0.01	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	0.011	0.009	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*1*	5	18.6	*0.005*	0.073	0.128	0.033	*0.005*	*0.005*	*0.005*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*1*	2	**9.5**	*0.005*	0.12	0.046	0.092	0.017	0.066	0.065
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*0.1*	*0.005*	0.207	0.092	0.018	0.007	0.019	0.021
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*1*	*1*	0.1	0.005	0.312	0.213	0.058	0.013	0.008	0.005
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	0.1	0.01	0.154	0.064	0.147	0.039	0.306	0.037
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*1*	*1*	1.6	*0.005*	1.442	0.816	0.147	0.051	0.023	0.01
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	0.8	*0.005*	0.732	0.508	0.044	0.016	0.005	0.005
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*1*	*1*	0.9	*0.005*	*0.005*	*0.005*	0.019	0.007	0.028	0.03
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	0.012	*0.005*	0.012	0.013
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	0.009	0.009	0.021	0.006	0.021	0.023
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*1*	*1*	*0.1*	*0.005*	0.017	0.018	0.019	0.005	*0.005*	*0.005*

Min	1	1	0.1	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Max	20	20	18.6	0.011	1.442	0.816	0.168	0.051	0.306	0.065
Criteria		-	2/130	-	-	-	-	0.1	0.0063/0.12	-
			EQS AA/MAC					EQS AA/MAC	EQS AA/MAC	

Phase 2 Sampling event 24-25 January 2024													Phthalates			
Lab ref	Sample	Depth	Sample Type	Date sampled	Benzo(a)anthrene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(123cd)pyrene	Dibenzo(ah)anthrene	Benzo(ghi)perylene	Bis(2-ethylhexyl) phthalate	Butylbenzyl phthalate	Di-n-butyl phthalate	Di-n-Octyl phthalate
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1*	*1*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*100*	*20*	*30*	*20*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*0.005*	0.005	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*0.005*	*0.005*	0.032	0.013	0.028	0.027	0.006	0.026	*5*	*1*	*1.5*	*1*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	0.006	0.015	0.012	*0.008*	0.014	0.01	*0.005*	0.011	*5*	*1*	*1.5*	*1*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	0.143	0.2	0.215	0.083	0.181	0.109	0.028	0.115	*5*	*1*	*1.5*	*1*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	0.01	0.021	0.019	*0.008*	0.02	0.013	*0.005*	0.013	*5*	*1*	*1.5*	*1*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*0.005*	0.011	*0.008*	*0.008*	0.01	0.006	*0.005*	0.006	*5*	*1*	*1.5*	*1*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	0.007	0.014	0.013	*0.008*	0.015	0.01	*0.005*	0.01	*5*	*1*	*1.5*	*1*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*0.005*	*0.005*	*0.008*	*0.008*	*0.005*	*0.005*	*0.005*	*0.005*	*5*	*1*	*1.5*	*1*

Min	0.005	0.005	0.008	0.008	0.005	0.005	0.005	0.005	5	1	1	1
Max	0.143	0.2	0.215	0.083	0.181	0.109	0.028	0.115	100	20	30	20
Criteria	-	-	0.017 EQS MAC	0.017 EQS MAC	0.00017/0.27 EQS AA/MAC	-	-	0.0082 EQS MAC	-			

Phase 2 Sampling event 24-25 January 2024															
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	Diethyl phthalate	Dimethyl phthalate	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Nitroaniline	2,4-Dinitrotoluene	2,6-Dinitrotoluene	3-Nitroaniline
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*10*	*20*	*20*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	3	*1*	1	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	2	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.5*	*1*	*1*

Min	1	1	1	1	1	1	1	0.5	1	1
Max	20	20	20	20	20	20	20	10	20	20
Criteria					20/200		20/200	20/200		
					EQS AA/MAC		EQS AA/MA	EQS AA/MAC		

Phase 2 Sampling event 24-25 January 2024					Other SVOCs								
Lab ref	**Sample**	**Depth**	**Sample Type**	**Date sampled**	4-Bromophenylphenylether	4-Chloroaniline	4-Chlorophenylphenylether	4-Nitroaniline	Azobenzene	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Carbazole	Dibenzofuran
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*20*	*20*	*20*	*10*	*10*	*10*	*20*	*10*	*10*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	0.6
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*1*	*1*	*1*	*0.5*	*0.5*	*0.5*	*1*	*0.5*	*0.5*

Min	1	1	1	0.5	0.5	0.5	1	0.5	0.5
Max	20	20	20	10	10	10	20	10	10
Criteria									

Phase 2 Sampling event 24-25 January 2024												Glycols					
Lab ref	Sample	Depth	Sample Type	Date sampled	Hexhloroben zene	Hexhlorobuti ene	Hexhlorocycl opentiene	Hexhloroetha ne	Isophorone	N-nitrosodi-n-propylamine	Nitrobenzene	Monoethylene glycol	Propylene glycol	Diethylene glycol	Triethylene glycol	Thiodiglycol	Resorcinol
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*20*	*20*	*20*	*20*	*10*	*10*	*20*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	20
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*1*	*1*	*1*	*1*	*0.5*	*0.5*	*1*	*10*	*10*	*10*	*10*	*10*	*10*

Min	1	1	1	1	0.5	0.5	1	10	10	10	10	10	10				
Max	20	20	20	20	10	10	20	10	10	10	10	10	20				
Criteria										14,000	14,000	14,000	14,000				
										USEPA	USEPA	USEPA	USEPA				

Phase 2 Sampling event 24-25 January 2024				Speciated Phenols										
Lab ref	Sample	Depth	Sample Type	Date sampled	Catechol	Phenol	m/p-cresol	o-cresol	Total cresols	Xylenols	1-naphthol	2,3,5-trimethyl phenol	2-isopropylphenol	Total Speciated Phenols HPLC
		m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l
24/1306	RBH607	4.00-6.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH608	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH603(S)	3.50-5.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH603(D)	7.00-9.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH601(S)	5.00-7.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH601(D)	9.00-11.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH609(S)	3.00-5.00	Ground Water	24/01/2024	*10*	20	100	50	150	80	*10*	*10*	*10*	30
24/1306	RBH609(D)	6.50-8.50	Ground Water	24/01/2024	*10*	*10*	*20*	20	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH610(D)	6.50-8.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH320	3.00-6.00	Ground Water	24/01/2024	*10*	*10*	150	100	250	70	*10*	*10*	*10*	30
24/1306	RBH321	3.00-6.00	Ground Water	24/01/2024	*10*	*10*	110	60	170	80	*10*	*10*	*10*	30
24/1306	RBH615(S)	3.00-5.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH615(D)	9.00-12.00	Ground Water	24/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH614(S)	4.00-6.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH614(D)	9.00-12.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH612	4.00-6.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH613	9.00-11.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH605	5.50-7.50	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH604(S)	5.50-7.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH604(D)	9.50-11.50	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH606(S)	3.00-5.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH606(D)	7.00-9.00	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*
24/1306	RBH602	7.50-10.50	Ground Water	25/01/2024	*10*	*10*	*20*	*10*	*30*	*60*	*10*	*10*	*10*	*10*

Min	10	10	20	10	30	60	10	10	10	10
Max	10	20	150	100	250	80	10	10	10	30
Criteria	14,000	1,430,000	-	-	-	-	-	-	-	-
	USEPA	SS								

Phase 2 Sampling event 03-04 April 2024				Aliphatics								Aromatics							
Sample	**Depth**	**Sample Type**	**Date sampled**	>C5-C6	>C6-C8	>C8-C10	>C10-C12	>C12-C16	>C16-C21	>C21-C35	Total aliphatics C5-35	>C5-EC7	>EC7-EC8	>EC8-EC10	>EC10-EC12	>EC12-EC16	>EC16-EC21	>EC21-EC35	Total aromatics C5-35
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024	34	17	15	<5	<10	<10	<10	66	<10	<10	<10	<5	<10	<10	<10	
RBH608	3.00-5.00	Ground Water	04/04/2024	14	<10	<10	<5	<10	<10	<10	14	<10	<10	<10	<5	<10	<10	<10	
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	15	505	167	<5	<10	<10	<10	687	<10	1769	877	<5	<10	<10	<10	
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10	
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10	
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10	
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	657$_{AC}$	17363$_{AC}$	8352$_{AC}$	25	<10	<10	<10	26397	<100$_{AC}$	56719$_{AC}$	41555$_{AC}$	618	<10	<10	<10	
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	<10	178	94	<5	<10	<10	<10	272	<10	528	431	<5	<10	<10	<10	
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	<10	37	16	<5	<10	<10	<10	53	<10	60	43	<5	<10	<10	<10	
RBH320	3.00-6.00	Ground Water	24/01/2024	65	11828	5835	<5	<10	<10	<10	17728	74	40248	27130	657	<10	<10	<10	
RBH321	3.00-6.00	Ground Water	03/04/2024	81	3076	1777	<5	<10	<10	<10	4934	12	10083	8519	227	<10	<10	<10	
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	19	41	25	<5	<10	<10	<10	85	<10	<10	<10	<5	<10	<10	<10	
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	65	692	248	<5	<10	<10	<10	1005	10	107	428	<5	<10	<10	<10	
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	34	57	124	<5	<10	<10	<10	215	<10	42	369	<5	<10	<10	<10	
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	62	69	131	<5	<10	<10	<10	262	<10	19	324	<5	<10	<10	<10	
RBH612	4.00-6.00	Ground Water	04/04/2024	55	<10	<10	<5	<10	<10	<10	55	<10	<10	<10	<5	<10	<10	<10	
RBH613	9.00-11.00	Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10	
RBH605	5.50-7.50	Ground Water	03/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10	
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10	
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10	
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	31	332	20	<5	<10	<10	<10	383	<10	25	83	<5	<10	<10	<10	
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	<10	99	<10	<5	<10	<10	<10	99	<10	<10	<10	<5	<10	<10	<10	
RBH602	7.50-10.50	Ground Water	04/04/2024	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<5	<10	<10	<10	
Min				<10	17	15	<5	<10	<10	<10	<10	10	<10	<10	<5	<10	<10	<10	0
Max				657	17363	8352	25	<10	<10	<10	26397	74	56719	41555	657	<10	<10	<10	0
Criteria				15000	1,620,000	No breakthrough at compliance point	No breakthrough at compliance point	300	-	-	-	53.3	1340	12600	257,000,000	90	90	90	-
				WHO	SS	SS	SS	WHO				SS	SS	SS	SS	WHO	WHO	WHO	

Phase 2 Sampling event 03-04 April 2024					MTBE & BTEX														
Sample	**Depth**	**Sample Type**	**Date sampled**	Total aliphatics and aromatics(C5-35)	Methyl Tertiary Butyl Ether	Benzene	Toluene	Ethylbenzene	m/p-Xylene	o-Xylene	total-Xylene	Dichlorodifluoromethane	Methyl Tertiary Butyl Ether	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	1,1-Dichloroethene (1,1 DCE)	Dichloromethane (DCM)
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024		2.6	1.9	<5	<1	<2	<1	<3	591	2.6	<3	1	<1	<3	<3	<3	<3
RBH608	3.00-5.00	Ground Water	04/04/2024		2.2	<0.5	<5	<1	<2	<1	<3	451	2.2	<3	0.3	<1	<3	<3	<3	<3
RBH603(S)	3.50-5.00	Ground Water	04/04/2024		2.1	3.4	1923$_{AB}$	168	565	126		159	2.1	<3	1.6	<1	<3	<3	<3	<3
RBH603(D)	7.00-9.00	Ground Water	04/04/2024		0.1	<0.5	<5	<1	<2	<1	<3	56	0.1	<3	<0.1	<1	<3	<3	<3	<3
RBH601(S)	5.00-7.00	Ground Water	03/04/2024		<0.1	<0.5	<5	<1	<2	<1	<3	<2	<0.1	<3	<0.1	<1	<3	<3	<3	<3
RBH601(D)	9.00-11.00	Ground Water	03/04/2024		<0.1	<0.5	<5	<1	<2	<1	<3	<2	<0.1	<3	<0.1	<1	<3	<3	<3	<3
RBH609(S)	3.00-5.00	Ground Water	03/04/2024		23	50.2	61942$_{AD}$	8207$_{AC}$	29765$_{AD}$	6455$_{AC}$	36220	5	23	<3	4.4	<1	<3	<3	<3	<3
RBH609(D)	6.50-8.50	Ground Water	03/04/2024		1.5	1.2	596	33	359	69	428	23	1.5	<3	0.5	<1	<3	<3	<3	<3
RBH610(D)	6.50-8.00	Ground Water	03/04/2024		0.6	1.1	59	7	21	3	24	99	0.6	<3	3.6	<1	<3	<3	<3	<3
RBH320	3.00-6.00	Ground Water	24/01/2024		13.2	88.5	47763$_{AD}$	6823$_{AC}$	19978$_{AD}$	3980$_{AC}$	23958	87	13.2	<3	3.9	<1	<3	<3	<3	<3
RBH321	3.00-6.00	Ground Water	03/04/2024		8	12.8	10339$_{AD}$	1582$_{AC}$	6228$_{AC}$	1236$_{AC}$	7464	74	8	<3	5.2	<1	<3	<3	<3	<3
RBH615(S)	3.00-5.00	Ground Water	03/04/2024		5.9	<0.5	<5	<1	<2	<1	<3	88	5.9	<3	1.8	<1	<3	<3	<3	<3
RBH615(D)	9.00-12.00	Ground Water	03/04/2024		0.6	10.5	118	221	211	36	247	661	0.6	<3	0.4	<1	<3	<3	<3	<3
RBH614(S)	4.00-6.00	Ground Water	03/04/2024		5.8	8.3	44	142	195	33	228	217	5.8	<3	0.7	<1	<3	<3	<3	<3
RBH614(D)	9.00-12.00	Ground Water	03/04/2024		1.3	9.9	20	227	131	14	145	627	1.3	<3	0.7	<1	<3	<3	<3	<3
RBH612	4.00-6.00	Ground Water	04/04/2024		3.1	<0.5	<5	<1	<2	<1	<3	871	3.1	<3	0.7	<1	<3	<3	<3	<3
RBH613	9.00-11.00	Ground Water	04/04/2024		0.3	<0.5	<5	<1	<2	<1	<3	61	0.3	<3	<0.1	<1	<3	<3	<3	<3
RBH605	5.50-7.50	Ground Water	03/04/2024		0.9	<0.5	<5	<1	<2	<1	<3	134	0.9	<3	0.3	<1	<3	<3	<3	<3
RBH604(S)	5.50-7.00	Ground Water	04/04/2024		0.3	<0.5	<5	<1	<2	<1	<3	32	0.3	<3	<0.1	<1	<3	<3	<3	<3
RBH604(D)	9.50-11.50	Ground Water	04/04/2024		<0.1	<0.5	<5	<1	<2	<1	<3	23	<0.1	<3	<0.1	<1	<3	<3	<3	<3
RBH606(S)	3.00-5.00	Ground Water	04/04/2024		18.8	5.9	28	45	32	7		278	18.8	<3	0.2	<1	<3	<3	<3	<3
RBH606(D)	7.00-9.00	Ground Water	04/04/2024		5.1	<0.5	<5	2	3	1		72	5.1	<3	<0.1	<1	<3	<3	<3	<3
RBH602	7.50-10.50	Ground Water	04/04/2024		0.6	<0.5	<5	<1	<2	<1	<3	10	0.6	<3	<0.1	<1	<3	<3	<3	<3

Min	0	<0.1	<0.5	<5	<1	<2	<1	<3	<2	<0.1	<3	<0.1	<1	<3	<3	<3	<3
Max	0	23	88.5	61942	8207	29765	6455	36220	871	23	<3	5.2	<1	<3	<3	<3	<3
Criteria	-	60.7	53.3	1340	5520	30	30	9320	-	60.7		1.02					27,400
		SS	SS	SS	SS	EQS AA	EQS AA	SS		SS		SS					SS

Phase 2 Sampling event 03-04 April 2024

Sample	Depth	Sample Type	Date sampled	trans-1-2-Dichloroethene	1,1-Dichloroethane	cis-1-2-Dichloroethene	2,2-Dichloropropane	Bromochloromethane	Chloroform	1,1,1-Trichloroethane	1,1-Dichloropropene	Carbon tetrhloride	1,2-Dichloroethane	Benzene	Trichloroethene (TCE)	1,2-Dichloropropane	Dibromomethane	Bromodichloromethane	cis-1-3-Dichloropropene	Toluene
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	1.9	<3	<2	<3	<2	<2	<5
RBH608	3.00-5.00	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	<3	<3	6	<1	<2	<2	<2	<3	<2	<2	3.4	7	<2	<3	<2	<2	1923$_{AB}$
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	<3	<3	62	<1	<2	<2	<2	<3	<2	<2	50.2	4	<2	<3	<2	<2	61942$_{AD}$
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	1.2	<3	<2	<3	<2	<2	596
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	5	<3	23	<1	<2	<2	<2	<3	<2	<2	1.1	9	<2	<3	<2	<2	59
RBH320	3.00-6.00	Ground Water	24/01/2024	<3	4	58	<1	<2	10	3	<3	<2	<2	88.5	16	<2	<3	<2	<2	47763$_{AD}$
RBH321	3.00-6.00	Ground Water	03/04/2024	4	<3	28	<1	<2	<2	<2	<3	<2	<2	12.8	6	<2	<3	<2	<2	10339$_{AD}$
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	10.5	<3	<2	<3	<2	<2	118
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	8.3	<3	<2	<3	<2	<2	44
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	9.9	<3	<2	<3	<2	<2	20
RBH612	4.00-6.00	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH613	9.00-11.00	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH605	5.50-7.50	Ground Water	03/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	5.9	<3	<2	<3	<2	<2	28
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
RBH602	7.50-10.50	Ground Water	04/04/2024	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5

Min	<3	<3	<3	<1	<2	<2	<2	<3	<2	<2	<0.5	<3	<2	<3	<2	<2	<5
Max	<3	<3	62	<1	<2	10	3	<3	<2	<2	88.5	16	<2	<3	<2	<2	61942
Criteria			171 SS			76.6 SS				10 EQS AA	53.3 SS	55.8 SS					1340 SS

Phase 2 Sampling event 03-04 April 2024				VOCs																
Sample	**Depth**	**Sample Type**	**Date sampled**	trans-1-3-Dichloropropene	1,1,2-Trichloroethane	Tetrachloroethene (PCE)	1,3-Dichloropropane	Dibromochloromethane	1,2-Dibromoethane	Chlorobenzene	1,1,1,2-Tetrhloroethane	Ethylbenzene	m/p-Xylene	o-Xylene	Xylene-Total	Styrene	Bromoform	Isopropylbenzene	1,1,2,2-Tetrhloroethane	Bromobenzene
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<3	<2	<2	<3	<4	<2
RBH608	3.00-5.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<3	<2	<2	<3	<4	<2
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	168	565	126	691	<2	<2	<3	<4	<2
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	<2	<2	21	<2	<2	<2	72	<2	8207$_{AC}$	29765$_{AD}$	6455$_{AC}$	44427	<2	<2	107	<4	<2
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	33	359	69	428	<2	<2	<3	<4	<2
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	7	21	3	24	<2	<2	<3	<4	<2
RBH320	3.00-6.00	Ground Water	24/01/2024	<2	<2	12	<2	<2	<2	45	<2	6823$_{AC}$	19978$_{AD}$	3980$_{AC}$	30781	<2	<2	106	<4	<2
RBH321	3.00-6.00	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	16	<2	1582$_{AC}$	6228$_{AC}$	1236$_{AC}$	9046	<2	<2	18	<4	<2
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	221	211	36	247	<2	<2	5	<4	<2
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	142	195	33	228	<2	<2	5	<4	<2
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	227	131	14	145	<2	<2	4	<4	<2
RBH612	4.00-6.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH613	9.00-11.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH605	5.50-7.50	Ground Water	03/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	45	32	7	39	<2	<2	<3	<4	<2
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	2	3	1	4	<2	<2	<3	<4	<2
RBH602	7.50-10.50	Ground Water	04/04/2024	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2

Min	<2	<2	<3	<2	<2	<2	<2	<2	<1	<2	<1	<4	<2	<2	<3	<4	<2
Max	<2	<2	21	<2	<2	<2	72	<2	8207	29765	6455	44427	<2	<2	107	<4	<2
Criteria			129				300		5520	30	30	9320			-		
			SS				WHO		SS	EQS AA	EQS AA	SS					

Phase 2 Sampling event 03-04 April 2024

Sample	Depth	Sample Type	Date sampled	1,2,3-Trichloropropane	Propylbenzene	2-Chlorotoluene	1,3,5-Trimethylbenzene	4-Chlorotoluene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	4-Isopropyltoluene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	n-Butylbenzene	1,2-Dichlorobenzene	1,2-Dibromo-3-chloropropane	1,2,4-Trichlorobenzene	Hexhlorobutiene	Naphthalene
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH608	3.00-5.00	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	<3	<3	<3	3	<3	<3	11	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	<3	181	<3	407	<3	8	1409$_{AC}$	9	8	<3	<3	<3	3	<2	<3	<3	13
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	<3	<3	<3	<3	<3	<3	8	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH320	3.00-6.00	Ground Water	24/01/2024	<3	174	<3	296	<3	21	1273$_{AC}$	15	13	<3	<3	<3	3	<2	<3	<3	33
RBH321	3.00-6.00	Ground Water	03/04/2024	<3	27	<3	82	<3	<3	328	<3	<3	<3	<3	<3	<3	<2	<3	<3	4
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	<3	6	<3	13	<3	<3	27	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	<3	4	<3	8	<3	<3	19	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	<3	4	<3	14	<3	<3	32	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH612	4.00-6.00	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH613	9.00-11.00	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH605	5.50-7.50	Ground Water	03/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
RBH602	7.50-10.50	Ground Water	04/04/2024	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2

Min	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2	<3	<3	<2
Max	<3	181	<3	407	<3	21	1409	15	13	<3	<3	<3	3	<2	<3	<3	<3	33
Criteria		-		-		-	-	-	-	20/200	20/200	-	20/200					2/130
										EQS AA/MAC	EQS AA/MAC		EQS AA/MAC					EQS AA/MAC

Phase 2 Sampling event 03-04 April 2024					Phenols															
Sample	**Depth**	**Sample Type**	**Date sampled**	1,2,3-Trichlorobenzene	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Penthlorophenol	Phenol	2-Chloronaphthalene	2-Methylnaphthalene	Naphthalene	Acenaphthylene
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	0.3	<0.005
RBH608	3.00-5.00	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	<3	<1	0.7	<0.5	<0.5	<1	<0.5	<1	<0.5	1	<10	<1	<1	<1	<1	0.4	<0.005
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	<3	<1	32.5	<0.5	<0.5	24	<0.5	<1	<0.5	71	<10	<1	5	<1	2	19.0$_{AC}$	<0.005
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	<3	<1	3.3	<0.5	<0.5	<1	<0.5	<1	<0.5	2	<10	<1	<1	<1	<1	0.3	<0.005
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH320	3.00-6.00	Ground Water	24/01/2024	<3	<1	112.7$_{AB}$	<0.5	<0.5	52	<0.5	<1	<0.5	142$_{AB}$	<10	<1	<1	<1	6	21.8$_{AC}$	<0.005
RBH321	3.00-6.00	Ground Water	03/04/2024	<3	<1	16.6	<0.5	<0.5	10	<0.5	<1	<0.5	30	<10	<1	<1	<1	<1	4.9	<0.005
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	0.4	0.008
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	<3	<1	0.9	<0.5	<0.5	3	<0.5	<1	<0.5	2	<10	<1	<1	<1	<1	1.8	0.025
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	<3	<1	1.1	<0.5	<0.5	8	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	1.3	<0.005
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	<3	<1	0.6	<0.5	<0.5	7	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	2.8	0.016
RBH612	4.00-6.00	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	0.01
RBH613	9.00-11.00	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	0.4	<0.005
RBH605	5.50-7.50	Ground Water	03/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	<3	<1	0.7	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
RBH602	7.50-10.50	Ground Water	04/04/2024	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005

Min	<3	<1	<0.5	<0.5	<0.5	<1	<0.5	<1	<0.5	<1	<10	<1	<1	<1	<1	<0.1	<0.005
Max	<3	<1	112.7	<0.5	<0.5	52	<0.5	<1	<0.5	142	<10	<1	5	<1	6	21.8	0.025
Criteria			-	-	4.2/140	-				-			1430000mg/l		-	2/130	-
					EQS AA/MAC								SS			EQS AA/MAC	

Phase 2 Sampling event 03-04 April 2024				PAHs														Phth		
Sample	**Depth**	**Sample Type**	**Date sampled**	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthrene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(123cd)pyrene	Dibenzo(ah)anthrene	Benzo(ghi)perylene	Bis(2-ethylhexyl) phthalate	Butylbenzyl phthalate	Di-n-butyl phthalate
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024	0.401	0.194	0.019	0.007	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH608	3.00-5.00	Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	0.269	0.095	0.181	0.012	0.016	0.013	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	0.061	0.018	0.009	<0.005	0.005	0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	0.013	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH320	3.00-6.00	Ground Water	24/01/2024	0.07	0.117	0.029	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH321	3.00-6.00	Ground Water	03/04/2024	0.043	0.016	0.023	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	0.745	0.406	0.072	0.018	0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	1.904	1.145	0.359	0.034	0.009	0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	0.369	0.148	0.019	0.009	0.008	0.006	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	1.587	0.833	0.169	0.04	0.03	0.015	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH612	4.00-6.00	Ground Water	04/04/2024	0.182	0.113	<0.005	<0.005	0.019	0.021	0.016	0.011	0.011	<0.008	0.007	0.005	<0.005	0.006	<5	<1	<1.5
RBH613	9.00-11.00	Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	0.014	0.015	0.012	0.008	0.01	<0.008	0.007	0.005	<0.005	0.005	<5	<1	<1.5
RBH605	5.50-7.50	Ground Water	03/04/2024	<0.005	<0.005	0.011	<0.005	0.02	0.022	0.016	0.013	0.017	<0.008	0.012	0.009	<0.005	0.009	<5	<1	<1.5
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	0.008	0.007	0.035	0.009	0.07	0.07	0.039	0.04	0.047	0.018	0.039	0.026	0.006	0.024	<5	<1	<1.5
RBH602	7.50-10.50	Ground Water	04/04/2024	0.011	0.01	0.043	0.015	0.063	0.06	0.035	0.033	<0.008	<0.008	<0.005	0.026	<0.005	0.025	<5	<1	<1.5
Min				<0.005	<0.005	<0.005	<0.055	<0.005	<0.005	<0.005	<0.005	<0.008	<0.008	<0.005	<0.005	<0.005	<0.005	<5	<1	<1.5
Max				1.904	1.145	0.359	0.04	0.07	0.07	0.039	0.04	0.047	0.018	0.039	0.026	0.006	0.025	<5	<1	<1.5
Criteria				-	-	-	0.1	0.0063/0.12	-	-	-	0.017	0.017	.00017/0.2	-	-	0.0082			
							EQS AA/MAC	QS AA/MAC				EQS MAC	EQS MAC	QS AA/MAC			EQS MAC			

Phase 2 Sampling event 03-04 April 2024				ılates			Other SVOCs													
Sample	**Depth**	**Sample Type**	**Date sampled**	Di-n-Octyl phthalate	Diethyl phthalate	Dimethyl phthalate	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Nitroaniline	2,4-Dinitrotoluene	2,6-Dinitrotoluene	3-Nitroaniline	4-Bromophenyl phenylether	4-Chloroaniline	4-Chlorophenyl phenylether	4-Nitroaniline	Azobenzene	Bis(2-chloroethoxy) methane
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH608	3.00-5.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	<1	<1	<1	3	<1	1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH320	3.00-6.00	Ground Water	24/01/2024	<1	<1	<1	3	<1	2	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH321	3.00-6.00	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH612	4.00-6.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH613	9.00-11.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH605	5.50-7.50	Ground Water	03/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
RBH602	7.50-10.50	Ground Water	04/04/2024	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5

Min	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
Max	<1	<1	<1	3	<1	2	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5
Criteria				20/200		20/200	20/200										
				EQS AA/MAC		EQS AA/MAC	EQS AA/MAC										

Phase 2 Sampling event 03-04 April 2024														Glycols						
Sample	**Depth**	**Sample Type**	**Date sampled**	Bis(2-chloroethyl)ether	Carbazole	Dibenzofuran	Hexhloroben zene	Hexhlorobuti ene	Hexhlorocycl opentiene	Hexhloroetha ne	Isophorone	N-nitrosodi-n-propylamine	Nitrobenzene	Monoethylene glycol	Propylene glycol	Diethylene glycol	Triethylene glycol	Thiodiglycol	Resorcinol	Catechol
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
RBH607	4.00-6.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH608	3.00-5.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH320	3.00-6.00	Ground Water	24/01/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						0.01	<0.01
RBH321	3.00-6.00	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	<1	0.6	1	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	<1	<0.5	0.6	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH612	4.00-6.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH613	9.00-11.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH605	5.50-7.50	Ground Water	03/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
RBH602	7.50-10.50	Ground Water	04/04/2024	<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1						<0.01	<0.01
Min				<1	<0.5	<0.5	<1	<1	<1	<1	<0.5	<0.5	<1	0	0	0	0	0	<0.01	<0.01
Max				<1	0.6	1	<1	<1	<1	<1	<0.5	<0.5	<1	0	0	0	0	0	0.01	<0.01
Criteria														14,000 USEPA	14,000 USEPA	14,000 USEPA	14,000 USEPA	14,000 USEPA	-	-

Phase 2 Sampling event 03-04 April 2024				Speciated Phenols								
Sample	**Depth**	**Sample Type**	**Date sampled**	Phenol	m/p-cresol	o-cresol	Total cresols	Xylenols	1-naphthol	2,3,5-trimethyl phenol	2-isopropylphenol	Total Speciated Phenols HPLC
	m/bgl			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l
RBH607	4.00-6.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH608	3.00-5.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH603(S)	3.50-5.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH603(D)	7.00-9.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH601(S)	5.00-7.00	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH601(D)	9.00-11.00	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH609(S)	3.00-5.00	Ground Water	03/04/2024	0.02	0.11	0.05	0.16	0.06	<0.01	<0.01	<0.01	0.2
RBH609(D)	6.50-8.50	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH610(D)	6.50-8.00	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH320	3.00-6.00	Ground Water	24/01/2024	<0.01	0.23	0.18	0.41	0.09	<0.01	<0.01	<0.01	0.5
RBH321	3.00-6.00	Ground Water	03/04/2024	<0.01	0.05	0.03	0.08	<0.06	<0.01	<0.01	<0.01	<0.1
RBH615(S)	3.00-5.00	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH615(D)	9.00-12.00	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH614(S)	4.00-6.00	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH614(D)	9.00-12.00	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH612	4.00-6.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH613	9.00-11.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH605	5.50-7.50	Ground Water	03/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH604(S)	5.50-7.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH604(D)	9.50-11.50	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH606(S)	3.00-5.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH606(D)	7.00-9.00	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
RBH602	7.50-10.50	Ground Water	04/04/2024	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1

Min	<0.01	<0.02	<0.01	<0.03	<0.06	<0.01	<0.01	<0.01	<0.1
Max	0.02	0.23	0.18	0.41	0.09	<0.01	<0.01	<0.01	0.5
Criteria	1430000 mg/l SS	-	-	-	-	-	-	-	-

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LL13 9TY

Attention :	Meg Jones
Date :	14th February, 2024
Your reference :	R2174
Our reference :	Test Report 24/1306 Batch 1
Location :	Tetrosyl - GW Monitoring
Date samples received :	25th January, 2024
Status :	Final Report
Issue :	202402141449

Twenty four samples were received for analysis on 25th January, 2024 of which twenty three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 103.098 kg of CO2

Scope 1&2&3 emissions - 243.646 kg of CO2

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-11	12-22	23-33	34-44	45-55	56-66	67-77	78-88	89-99	100-110	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH603(S)	RBH603(D)	RBH601(S)	RBH601(D)	RBH609(S)	RBH609(D)	RBH610(D)	RBH320			
Depth	4.00-6.00	3.00-5.00	3.50-5.00	7.00-9.00	5.00-7.00	9.00-11.00	3.00-5.00	6.50-8.50	6.50-8.00	3.00-6.00			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Dissolved Manganese #	4741	3181	1464	1324	13	29	2121	2587	8210	2290	<2	ug/l	TM30/PM14
Dissolved Potassium #	4.0	2.8	2.4	2.5	2.3	2.0	13.7	5.4	2.6	6.6	<0.1	mg/l	TM30/PM14
Dissolved Sodium #	31.5	33.7	23.6	35.9	46.4	39.2	39.2	27.5	20.8	41.6	<0.1	mg/l	TM30/PM14
Total Iron	6600	47	1204	<20	<20	44	12054	776	11055	21105$_{AA}$	<20	ug/l	TM30/PM14
Total Manganese	4530	2879	1374	1252	<2	<2	2091	2697	8008	2244	<2	ug/l	TM30/PM14
Total Sulphur as S	12980	28176	14491	13164	12242	12221	20531	14690	10151	9564	<10	ug/l	TM30/PM14
PAH MS													
Naphthalene #	0.3^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	>>13.4	0.5	<0.1	18.6	<0.1	ug/l	TM4/PM30
Acenaphthylene #	0.011^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Acenaphthene #	0.440^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	0.246	0.024	0.011	0.073	<0.005	ug/l	TM4/PM30
Fluorene #	0.202^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	0.103	0.010	0.009	0.128	<0.005	ug/l	TM4/PM30
Phenanthrene #	0.021^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	0.168	<0.005	<0.005	0.033	<0.005	ug/l	TM4/PM30
Anthracene #	0.008^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	0.018	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Fluoranthene #	0.005^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	0.021	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Pyrene #	<0.005^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	0.018	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Chrysene #	<0.005^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.008^{SV}	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.005^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.005^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.005^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.005^{SV}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
PAH 16 Total #	0.987^{SV}	<0.173	<0.173	<0.173	<0.173	<0.173	13.974	0.534	<0.173	18.839	<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.008^{SV}	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.008^{SV}	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	62^{SV}	81	72	77	80	74	79	70	90	93	<0	%	TM4/PM30
VOC TICs	ND	ND	ND	ND	ND	ND	See Attached	ND	ND	See Attached		None	TM15/PM10
Methyl Tertiary Butyl Ether #	3.1	2.0	3.8	0.6	<0.1	<0.1	14.6	2.4	0.7	11.2	<0.1	ug/l	TM15/PM10
Benzene #	3.8	<0.5	1.8	<0.5	<0.5	<0.5	42.3	3.4	1.2	86.6	<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5	<5	45156$_{AE}$	2216$_{AB}$	<5	48798$_{AD}$	<5	ug/l	TM15/PM10
Ethylbenzene #	1	<1	<1	<1	<1	<1	6011$_{AB}$	197	<1	6010$_{AD}$	<1	ug/l	TM15/PM10
m/p-Xylene #	2	<2	<2	<2	<2	<2	25450$_{AC}$	823	<2	18873$_{AD}$	<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	1	<1	<1	<1	4755$_{AB}$	208	1	3497$_{AD}$	<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	101	110	110	109	109	110	104	110	109	107	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	91	94	94	95	94	93	65	97	93	84	<0	%	TM15/PM10
SVOC TICs	ND	ND	ND	ND	ND	ND	See Attached	ND	ND	See Attached		None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-11	12-22	23-33	34-44	45-55	56-66	67-77	78-88	89-99	100-110	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH603(S)	RBH603(D)	RBH601(S)	RBH601(D)	RBH609(S)	RBH609(D)	RBH610(D)	RBH320			
Depth	4.00-6.00	3.00-5.00	3.50-5.00	7.00-9.00	5.00-7.00	9.00-11.00	3.00-5.00	6.50-8.50	6.50-8.00	3.00-6.00			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
TPH CWG													
Aliphatics													
>C5-C6 #	48	<10	<10	<10	<10	<10	512 AB	49	<10	<100 AB	<10	ug/l	TM36/PM12
>C6-C8 #	29	<10	17	<10	<10	<10	17132 AB	608	19	13584 AB	<10	ug/l	TM36/PM12
>C8-C10 #	21	<10	<10	<10	<10	<10	9407 AB	233	<10	6322 AB	<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	98	<10	17	<10	<10	<10	27051	890	19	19906	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10	<10	<10	<10	<100 AB	<10	<10	<100 AB	<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10	<10	<10	53437 AB	1962	<10	45151 AB	<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10	<10	<10	46625 AB	1195	<10	29068 AB	<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5	<5	<5	542	41	<5	676	<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	50	<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10	<10	<10	<10	100604	3198	<10	74945	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	98	<10	17	<10	<10	<10	127655	4088	19	94851	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Resorcinol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	mg/l	TM26/PM0
Catechol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
m/p-cresol	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.10	<0.02	<0.02	0.15	<0.02	mg/l	TM26/PM0
o-cresol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.02	<0.01	0.10	<0.01	mg/l	TM26/PM0
Total cresols #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.15	<0.03	<0.03	0.25	<0.03	mg/l	TM26/PM0
Xylenols #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.08	<0.06	<0.06	0.07	<0.06	mg/l	TM26/PM0
1-naphthol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
2,3,5-trimethyl phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
2-isopropylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Total Speciated Phenols HPLC	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	0.3	<0.1	mg/l	TM26/PM0
Sulphate as SO4 #	40.2	89.2	46.1	41.8	38.4	38.0	63.4	46.6	31.5	28.5	<0.5	mg/l	TM38/PM0
Chloride #	48.5	47.1	49.6	58.0	76.2	77.6	30.2	51.1	34.0	40.3	<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	<0.2	1.8	2.2	11.2	17.1	17.6	<0.2	4.7	<0.2	<0.2	<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	0.68	<0.02	<0.02	<0.02	mg/l	TM38/PM0
Monoethylene glycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0
Propylene glycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0
Diethylene glycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0
Triethylene glycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0
Thiodiglycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-11	12-22	23-33	34-44	45-55	56-66	67-77	78-88	89-99	100-110	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH603(S)	RBH603(D)	RBH601(S)	RBH601(D)	RBH609(S)	RBH609(D)	RBH610(D)	RBH320			
Depth	4.00-6.00	3.00-5.00	3.50-5.00	7.00-9.00	5.00-7.00	9.00-11.00	3.00-5.00	6.50-8.50	6.50-8.00	3.00-6.00			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Dissolved Methane #	>>7259	553	515	<1	<1	<1	>>2356	339	411	>>1423	<1	ug/l	TM25/PM0
Dissolved Ethene #	2	<1	4	<1	<1	<1	5	<1	4	3	<1	ug/l	TM25/PM0
Dissolved Carbon Dioxide	>>180807	>>137716	>>249412	>>126993	>>108322	>>112588	>>121728	>>138139	>>222475	>>193543	<1	ug/l	TM25/PM0
Total Alkalinity as CaCO3 #	138	62	64	46	42	44	246	78	76	282	<1	mg/l	TM75/PM0
Sulphide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM107/PM0
BOD (Settled) #	10	1	<1	<1	<1	<1	117	9	1	70	<1	mg/l	TM58/PM0
COD (Settled) #	14	15	<7	<7	<7	<7	260	24	17	187	<7	mg/l	TM57/PM0
Dissolved Organic Carbon #	<2	<2	<2	<2	<2	<2	62	5	<2	37	<2	mg/l	TM60/PM0
Dissolved Iron II	5	<1	1	<1	<1	<1	17_{AA}	<1	12_{AA}	28_{AA}	<1	mg/l	TM213/PM31
Dissolved Iron III	<1	<1	<1	<1	<1	<1	$<5_{AA}$	<1	$<5_{AA}$	6_{AA}	<1	mg/l	TM30/TM213/PM0
Manganese II	4.59	3.25	1.41	1.29	<0.02	0.03	1.53	2.60	8.25	2.11	<0.02	mg/l	TM62/PM0
pH #	6.57	6.29	6.21	6.20	6.13	6.11	7.00	6.33	6.24	6.97	<0.01	pH units	TM73/PM0
Total Organic Carbon #	4	2	<2	<2	<2	<2	116	8	<2	82	<2	mg/l	TM60/PM0

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	111-121	122-132	133-143	144-154	155-165	166-176	177-187	188-198	199-209	210-220	LOD/LOR	Units	Method No.
Sample ID	RBH321	RBH615(S)	RBH615(D)	RBH614(S)	RBH614(D)	RBH612	RBH613	RBH605	RBH604(S)	RBH604(D)			
Depth	3.00-6.00	3.00-5.00	9.00-12.00	4.00-6.00	9.00-12.00	4.00-6.00	9.00-11.00	5.50-7.50	5.50-7.00	9.50-11.50			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Dissolved Manganese #	2057	1895	5032	1966	2666	6120	6253	3924	63	65	<2	ug/l	TM30/PM14
Dissolved Potassium #	11.8	8.9	2.9	6.7	5.4	4.9	4.8	3.1	1.9	1.9	<0.1	mg/l	TM30/PM14
Dissolved Sodium #	39.7	39.0	25.0	54.6	23.0	32.9	24.4	30.5	30.9	31.7	<0.1	mg/l	TM30/PM14
Total Iron	29973 AA	26759 AA	20922 AA	44214 AA	18800 AA	4104	50912 AB	5151	61	69	<20	ug/l	TM30/PM14
Total Manganese	2135	1839	4848	2330	3280 AA	6051	9214 AB	3916	61	20	<2	ug/l	TM30/PM14
Total Sulphur as S	20302	56587	13674	18346	10530	11612	11370	14555	12713	13005	<10	ug/l	TM30/PM14
PAH MS													
Naphthalene #	>>9.5	<0.1	0.1	0.1	1.6	0.8	0.9	<0.1	<0.1	<0.1	<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.005	<0.005	0.005	0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Acenaphthene #	0.120	0.207	0.312	0.154	1.442	0.732	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Fluorene #	0.046	0.092	0.213	0.064	0.816	0.508	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Phenanthrene #	0.092	0.018	0.058	0.147	0.147	0.044	0.019	0.012	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Anthracene #	0.017	0.007	0.013	0.039	0.051	0.016	0.007	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Fluoranthene #	0.066	0.019	0.008	0.306	0.023	0.005	0.028	0.012	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Pyrene #	0.065	0.021	0.005	0.037	0.010	0.005	0.030	0.013	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005	0.006	<0.005	0.143	<0.005	<0.005	0.010	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Chrysene #	<0.005	0.015	<0.005	0.200	<0.005	<0.005	0.021	0.011	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	0.045	0.017	<0.008	0.298	<0.008	<0.008	0.026	0.011	<0.008	<0.008	<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	0.028	0.014	<0.005	0.181	<0.005	<0.005	0.020	0.010	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	0.027	0.010	<0.005	0.109	<0.005	<0.005	0.013	0.006	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	0.006	<0.005	<0.005	0.028	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	0.026	0.011	<0.005	0.115	<0.005	<0.005	0.013	0.006	<0.005	<0.005	<0.005	ug/l	TM4/PM30
PAH 16 Total #	10.038	0.437	0.714	1.931	4.089	2.110	1.087	<0.173	<0.173	<0.173	<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	0.032	0.012	<0.008	0.215	<0.008	<0.008	0.019	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	0.013	<0.008	<0.008	0.083	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	61 SV	91	91	85	80	96	98	95	80	72	<0	%	TM4/PM30
VOC TICs	See Attached	ND	See Attached	ND	ND	ND	ND	ND	ND	ND		None	TM15/PM10
Methyl Tertiary Butyl Ether #	10.3	5.3	0.7	5.2	1.8	3.6	0.2	1.3	0.4	0.3	<0.1	ug/l	TM15/PM10
Benzene #	35.4	3.3	2.0	4.0	11.5	7.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM10
Toluene #	42239 AD	<5	22	<5	175	<5	<5	<5	<5	<5	<5	ug/l	TM15/PM10
Ethylbenzene #	5660 AD	<1	15	12	306	11	<1	<1	<1	<1	<1	ug/l	TM15/PM10
m/p-Xylene #	20745 AD	<2	12	15	366	7	<2	<2	<2	<2	<2	ug/l	TM15/PM10
o-Xylene #	4456 AD	<1	2	3	76	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	108	107	104	105	111	109	111	104	103	104	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	85	92	102	99	96	94	94	100	96	98	<0	%	TM15/PM10
SVOC TICs	See Attached	ND	ND	ND	ND	ND	ND	ND	ND	ND		None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	111-121	122-132	133-143	144-154	155-165	166-176	177-187	188-198	199-209	210-220	LOD/LOR	Units	Method No.
Sample ID	RBH321	RBH615(S)	RBH615(D)	RBH614(S)	RBH614(D)	RBH612	RBH613	RBH605	RBH604(S)	RBH604(D)			
Depth	3.00-6.00	3.00-5.00	9.00-12.00	4.00-6.00	9.00-12.00	4.00-6.00	9.00-11.00	5.50-7.50	5.50-7.00	9.50-11.50			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
TPH CWG													
Aliphatics													
>C5-C6 #	199 AB	14	21	28	92	75	<10	<10	<10	<10	<10	ug/l	TM36/PM12
>C6-C8 #	12576 AB	20	308	71	464	40	<10	<10	<10	<10	<10	ug/l	TM36/PM12
>C8-C10 #	6801 AB	17	67	27	245	46	<10	<10	<10	<10	<10	ug/l	TM36/PM12
>C10-C12 #	54	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	19630	51	396	126	801	161	<10	<10	<10	<10	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<100 AB	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	ug/l	TM36/PM12
>EC7-EC8 #	40900 AB	<10	19	<10	151	<10	<10	<10	<10	<10	<10	ug/l	TM36/PM12
>EC8-EC10 #	33107 AB	<10	33	36	730	51	<10	<10	<10	<10	<10	ug/l	TM36/PM12
>EC10-EC12 #	453	<5	<5	<5	67	<5	<5	<5	<5	<5	<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	74460	<10	52	36	958	51	<10	<10	<10	<10	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	94090	51	448	162	1759	212	<10	<10	<10	<10	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Resorcinol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Catechol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
m/p-cresol	0.11	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/l	TM26/PM0
o-cresol	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Total cresols #	0.17	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/l	TM26/PM0
Xylenols #	0.08	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/l	TM26/PM0
1-naphthol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
2,3,5-trimethyl phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
2-isopropylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Total Speciated Phenols HPLC	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/l	TM26/PM0
Sulphate as SO4 #	52.9	168.0	43.8	58.6	30.9	35.4	35.9	45.7	39.7	39.5	<0.5	mg/l	TM38/PM0
Chloride #	37.0	21.2	40.3	47.4	38.4	46.6	62.2	64.6	63.8	64.6	<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.6	1.7	11.8	12.7	<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/l	TM38/PM0
Monoethylene glycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0
Propylene glycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0
Diethylene glycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0
Triethylene glycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0
Thiodiglycol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM179/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	111-121	122-132	133-143	144-154	155-165	166-176	177-187	188-198	199-209	210-220	LOD/LOR	Units	Method No.
Sample ID	RBH321	RBH615(S)	RBH615(D)	RBH614(S)	RBH614(D)	RBH612	RBH613	RBH605	RBH604(S)	RBH604(D)			
Depth	3.00-6.00	3.00-5.00	9.00-12.00	4.00-6.00	9.00-12.00	4.00-6.00	9.00-11.00	5.50-7.50	5.50-7.00	9.50-11.50			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Dissolved Methane #	>>1394	>>1160	>>1014	>>6521	>>11632	>>9421	>>5210	>>1263	4	<1	<1	ug/l	TM25/PM0
Dissolved Ethene #	3	2	1	2	4	3	<1	<1	<1	<1	<1	ug/l	TM25/PM0
Dissolved Carbon Dioxide	>>161888	>>273848	>>179028	>>198622	>>156506	>>128526	>>193851	>>168626	>>144841	>>133297	<1	ug/l	TM25/PM0
Total Alkalinity as CaCO3 #	252	230	76	290	204	190	194	62	44	44	<1	mg/l	TM75/PM0
Sulphide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM107/PM0
BOD (Settled) #	66	4	4	13	19	17	10	<1	<1	<1	<1	mg/l	TM58/PM0
COD (Settled) #	208	31	13	31	32	22	35	8	<7	<7	<7	mg/l	TM57/PM0
Dissolved Organic Carbon #	42	6	3	<2	6	4	6	<2	<2	<2	<2	mg/l	TM60/PM0
Dissolved Iron II	14_{AA}	31_{AA}	22_{AA}	<1	20_{AA}	7	29_{AA}	2	<1	<1	<1	mg/l	TM213/PM31
Dissolved Iron III	$<5_{AA}$	7_{AA}	$<5_{AA}$	<1	$<5_{AA}$	<1	6_{AA}	<1	<1	<1	<1	mg/l	TM30/TM213/PM0
Manganese II	1.75	1.66	4.86	2.88	2.45	6.27	6.11	3.90	0.06	0.06	<0.02	mg/l	TM62/PM0
pH #	6.85	6.64	6.32	6.86	6.93	6.71	6.74	6.23	6.15	6.13	<0.01	pH units	TM73/PM0
Total Organic Carbon #	89	8	6	9	11	10	10	<2	<2	<2	<2	mg/l	TM60/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	221-231	232-242	243-253									
Sample ID	RBH606(S)	RBH606(D)	RBH602									
Depth	3.00-5.00	7.00-9.00	7.50-10.50									
COC No / misc												
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G									
Sample Date	25/01/2024	25/01/2024	25/01/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	25/01/2024	25/01/2024	25/01/2024									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Dissolved Manganese #	2605	1628	2904								<2	ug/l	TM30/PM14
Dissolved Potassium #	1.9	1.8	6.3								<0.1	mg/l	TM30/PM14
Dissolved Sodium #	22.0	20.0	17.6								<0.1	mg/l	TM30/PM14
Total Iron	8554	36351 AA	57954 AB								<20	ug/l	TM30/PM14
Total Manganese	2644	1630	2828								<2	ug/l	TM30/PM14
Total Sulphur as S	18920	16614	4146								<10	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1	<0.1								<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.005	<0.005	<0.005								<0.005	ug/l	TM4/PM30
Acenaphthene #	<0.005	0.009	0.017								<0.005	ug/l	TM4/PM30
Fluorene #	<0.005	0.009	0.018								<0.005	ug/l	TM4/PM30
Phenanthrene #	<0.005	0.021	0.019								<0.005	ug/l	TM4/PM30
Anthracene #	<0.005	0.006	0.005								<0.005	ug/l	TM4/PM30
Fluoranthene #	<0.005	0.021	<0.005								<0.005	ug/l	TM4/PM30
Pyrene #	<0.005	0.023	<0.005								<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005	0.007	<0.005								<0.005	ug/l	TM4/PM30
Chrysene #	<0.005	0.014	<0.005								<0.005	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.008	0.018	<0.008								<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.005	0.015	<0.005								<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.005	0.010	<0.005								<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.005	<0.005	<0.005								<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.005	0.010	<0.005								<0.005	ug/l	TM4/PM30
PAH 16 Total #	<0.173	<0.173	<0.173								<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.008	0.013	<0.008								<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.008	<0.008	<0.008								<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	94	87	88								<0	%	TM4/PM30
VOC TICs	ND	ND	ND									None	TM15/PM10
Methyl Tertiary Butyl Ether #	2.3	0.6	0.6								<0.1	ug/l	TM15/PM10
Benzene #	0.6	<0.5	<0.5								<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5								<5	ug/l	TM15/PM10
Ethylbenzene #	2	<1	<1								<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2								<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1								<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	104	106								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	99	99	102								<0	%	TM15/PM10
SVOC TICs	ND	ND	ND									None	TM16/PM30

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	221-231	232-242	243-253								LOD/LOR	Units	Method No.
Sample ID	RBH606(S)	RBH606(D)	RBH602										
Depth	3.00-5.00	7.00-9.00	7.50-10.50										
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G										
Sample Date	25/01/2024	25/01/2024	25/01/2024										
Sample Type	Ground Water	Ground Water	Ground Water										
Batch Number	1	1	1										
Date of Receipt	25/01/2024	25/01/2024	25/01/2024										
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C6-C8 #	34	<10	<10								<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5								<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	34	<10	<10								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5								<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	34	<10	<10								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Resorcinol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Catechol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Phenol #	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
m/p-cresol	<0.02	<0.02	<0.02								<0.02	mg/l	TM26/PM0
o-cresol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Total cresols #	<0.03	<0.03	<0.03								<0.03	mg/l	TM26/PM0
Xylenols #	<0.06	<0.06	<0.06								<0.06	mg/l	TM26/PM0
1-naphthol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
2,3,5-trimethyl phenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
2-isopropylphenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Total Speciated Phenols HPLC	<0.1	<0.1	<0.1								<0.1	mg/l	TM26/PM0
Sulphate as SO4 #	59.3	54.0	12.2								<0.5	mg/l	TM38/PM0
Chloride #	58.4	65.6	18.9								<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	<0.2	1.0	<0.2								<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	0.09	<0.02	<0.02								<0.02	mg/l	TM38/PM0
Monoethylene glycol	<10	<10	<10								<10	ug/l	TM179/PM0
Propylene glycol	<10	<10	<10								<10	ug/l	TM179/PM0
Diethylene glycol	<10	<10	<10								<10	ug/l	TM179/PM0
Triethylene glycol	<10	<10	<10								<10	ug/l	TM179/PM0
Thiodiglycol	<10	<10	<10								<10	ug/l	TM179/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	221-231	232-242	243-253									
Sample ID	RBH606(S)	RBH606(D)	RBH602									
Depth	3.00-5.00	7.00-9.00	7.50-10.50									
COC No / misc												
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G									
Sample Date	25/01/2024	25/01/2024	25/01/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	25/01/2024	25/01/2024	25/01/2024									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Dissolved Methane #	>>2080	562	>>22642								<1	ug/l	TM25/PM0
Dissolved Ethene #	<1	<1	<1								<1	ug/l	TM25/PM0
Dissolved Carbon Dioxide	>>186266	>>145925	>>225451								<1	ug/l	TM25/PM0
Total Alkalinity as CaCO3 #	82	60	228								<1	mg/l	TM75/PM0
Sulphide	<0.01	<0.01	<0.01								<0.01	mg/l	TM107/PM0
BOD (Settled) #	2	<1	23								<1	mg/l	TM58/PM0
COD (Settled) #	11	<7	46								<7	mg/l	TM57/PM0
Dissolved Organic Carbon #	<2	<2	6								<2	mg/l	TM60/PM0
Dissolved Iron II	8	<1	<1								<1	mg/l	TM213/PM31
Dissolved Iron III	<1	<1	<1								<1	mg/l	TM30/TM213/PM0
Manganese II	2.26	1.67	2.86								<0.02	mg/l	TM62/PM0
pH #	6.34	6.22	7.82								<0.01	pH units	TM73/PM0
Total Organic Carbon #	<2	<2	15								<2	mg/l	TM60/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

SVOC Report : **Liquid**

EMT Sample No.	1-11	12-22	23-33	34-44	45-55	56-66	67-77	78-88	89-99	100-110	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH603(S)	RBH603(D)	RBH601(S)	RBH601(D)	RBH609(S)	RBH609(D)	RBH610(D)	RBH320			
Depth	4.00-6.00	3.00-5.00	3.50-5.00	7.00-9.00	5.00-7.00	9.00-11.00	3.00-5.00	6.50-8.50	6.50-8.00	3.00-6.00			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	29.4 AC	10.9	<0.5	67.6	<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1	<1	<1	27 AC	1	<1	36	<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1	<1	<1	54 AC	5	<1	119 AA	<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<200 AC	<10	<10	<10	<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	5	<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	<5	<5	<100 AC	<5	<5	<5	<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<30.0 AC	<1.5	<1.5	<1.5	<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	3	<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	1	<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10.0 AC	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1	<1	<1	<20 AC	<1	<1	<1	<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	107	102	89	108	111	112	109 AC	94	115	120	<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	115	106	92	110	113	116	89 AC	106	127	115	<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

SVOC Report : **Liquid**

EMT Sample No.	111-121	122-132	133-143	144-154	155-165	166-176	177-187	188-198	199-209	210-220	LOD/LOR	Units	Method No.
Sample ID	RBH321	RBH615(S)	RBH615(D)	RBH614(S)	RBH614(D)	RBH612	RBH613	RBH605	RBH604(S)	RBH604(D)			
Depth	3.00-6.00	3.00-5.00	9.00-12.00	4.00-6.00	9.00-12.00	4.00-6.00	9.00-11.00	5.50-7.50	5.50-7.00	9.50-11.50			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylphenol #	39.0	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	36	<1	<1	<1	10	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
4-Methylphenol	67	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Phenol	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylnaphthalene #	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	105	105	105	97	108	99	97	105	98	106	<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	115	114	114	107	112	106	100	111	100	117	<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

SVOC Report : **Liquid**

EMT Sample No.	221-231	232-242	243-253									
Sample ID	RBH606(S)	RBH606(D)	RBH602									
Depth	3.00-5.00	7.00-9.00	7.50-10.50							Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G									
Sample Date	25/01/2024	25/01/2024	25/01/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	25/01/2024	25/01/2024	25/01/2024									
SVOC MS										LOD/LOR	Units	Method No.
Phenols												
2-Chlorophenol #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Other SVOCs												
1,2-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	108	91	88							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	117	92	92							<0	%	TM16/PM30

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

VOC Report : **Liquid**

EMT Sample No.	1-11	12-22	23-33	34-44	45-55	56-66	67-77	78-88	89-99	100-110	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH603(S)	RBH603(D)	RBH601(S)	RBH601(D)	RBH609(S)	RBH609(D)	RBH610(D)	RBH320			
Depth	4.00-6.00	3.00-5.00	3.50-5.00	7.00-9.00	5.00-7.00	9.00-11.00	3.00-5.00	6.50-8.50	6.50-8.00	3.00-6.00			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
VOC MS													
Dichlorodifluoromethane	539	248	162	54	<2	<2	5	34	78	79	<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	3.1	2.0	3.8	0.6	<0.1	<0.1	14.6	2.4	0.7	11.2	<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Vinyl Chloride #	1.0	0.1	3.0	<0.1	<0.1	<0.1	4.0	0.5	4.5	3.3	<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	5	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	9	<3	<3	<3	55	5	29	53	<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2	<2	<2	<2	<2	<2	8	<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Benzene #	3.8	<0.5	1.8	<0.5	<0.5	<0.5	42.3	3.4	1.2	86.6	<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	12	<3	<3	<3	5	5	11	23	<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5	<5	45156$_{AE}$	2216$_{AB}$	<5	48798$_{AD}$	<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	17	<3	<3	10	<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2	<2	<2	66	3	<2	39	<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Ethylbenzene #	1	<1	<1	<1	<1	<1	6011$_{AB}$	197	<1	6010$_{AD}$	<1	ug/l	TM15/PM10
m/p-Xylene #	2	<2	<2	<2	<2	<2	25450$_{AC}$	823	<2	18873$_{AD}$	<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	1	<1	<1	<1	4755$_{AB}$	208	1	3497$_{AD}$	<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	79	<3	<3	78	<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3	<3	<3	130	<3	<3	144	<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	435	8	<3	308	<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3	<3	<3	5	<3	<3	19	<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	1336$_{AC}$	25	<3	1047$_{AD}$	<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3	<3	<3	11	<3	<3	15	<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3	<3	<3	10	<3	<3	12	<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3	<3	<3	10	<3	<3	9	<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2	<2	31	<2	<2	7	<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	101	110	110	109	109	110	104	110	109	107	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	91	94	94	95	94	93	65	97	93	84	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

VOC Report : **Liquid**

EMT Sample No.	111-121	122-132	133-143	144-154	155-165	166-176	177-187	188-198	199-209	210-220	LOD/LOR	Units	Method No.
Sample ID	RBH321	RBH615(S)	RBH615(D)	RBH614(S)	RBH614(D)	RBH612	RBH613	RBH605	RBH604(S)	RBH604(D)			
Depth	3.00-6.00	3.00-5.00	9.00-12.00	4.00-6.00	9.00-12.00	4.00-6.00	9.00-11.00	5.50-7.50	5.50-7.00	9.50-11.50			
COC No / misc													
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G			
Sample Date	24/01/2024	24/01/2024	24/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024	25/01/2024			
VOC MS													
Dichlorodifluoromethane	22	41	334	255	828	863	46	110	33	24	<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	10.3	5.3	0.7	5.2	1.8	3.6	0.2	1.3	0.4	0.3	<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Vinyl Chloride #	3.8	1.5	0.9	0.4	0.8	0.9	<0.1	0.3	<0.1	<0.1	<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	51	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Benzene #	35.4	3.3	2.0	4.0	11.5	7.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	9	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Toluene #	42239 AD	<5	22	<5	175	<5	<5	<5	<5	<5	<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	7	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chlorobenzene #	55	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Ethylbenzene #	5660 AD	<1	15	12	306	11	<1	<1	<1	<1	<1	ug/l	TM15/PM10
m/p-Xylene #	20745 AD	<2	12	15	366	7	<2	<2	<2	<2	<2	ug/l	TM15/PM10
o-Xylene #	4456 AD	<1	2	3	76	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Isopropylbenzene #	69	<3	<3	<3	5	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Propylbenzene #	123	<3	<3	<3	7	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	342	<3	<3	<3	10	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
tert-Butylbenzene #	6	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	>>1251	<3	<3	<3	28	5	<3	<3	<3	<3	<3	ug/l	TM15/PM10
sec-Butylbenzene #	8	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-Isopropyltoluene #	6	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
n-Butylbenzene #	5	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Naphthalene	5	<2	<2	<2	2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	108	107	104	105	111	109	111	104	103	104	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	85	92	102	99	96	94	94	100	96	98	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl - GW Monitoring
Contact: Meg Jones
EMT Job No: 24/1306

VOC Report : **Liquid**

EMT Sample No.	221-231	232-242	243-253									
Sample ID	RBH606(S)	RBH606(D)	RBH602									
Depth	3.00-5.00	7.00-9.00	7.50-10.50							Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V HN HCL Z P BOD G	V HN HCL Z P BOD G	V HN HCL Z P BOD G									
Sample Date	25/01/2024	25/01/2024	25/01/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	25/01/2024	25/01/2024	25/01/2024									
VOC MS												
Dichlorodifluoromethane	29	16	5							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	2.3	0.6	0.6							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3							<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	0.6	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	2	<1	<1							<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	104	106							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	99	99	102							<0	%	TM15/PM10

Job number: 24/1306
Sample number: 67
Sample identity: RBH609(S)
Sample depth: 3.00-5.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
67-64-1	Acetone	2.345	86	105
96-37-7	Cyclopentane, methyl-	3.472	91	166
110-82-7	Cyclohexane	3.870	91	638
589-34-4	Hexane, 3-methyl-	3.937	95	136
142-82-5	Heptane	4.180	91	114
108-87-2	Cyclohexane, methyl-	4.509	94	353
620-14-4	Benzene, 1-ethyl-3-methyl-	6.521	95	924
611-14-3	Benzene, 1-ethyl-2-methyl-	6.662	95	201
611-15-4	Benzene, 1-ethenyl-2-methyl-	7.086	93	132

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/1306
Sample number: 100
Sample identity: RBH320
Sample depth: 3.00-6.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
110-82-7	Cyclohexane	3.869	91	391
108-87-2	Cyclohexane, methyl-	4.508	94	277
620-14-4	Benzene, 1-ethyl-3-methyl-	6.519	95	1212
611-14-3	Benzene, 1-ethyl-2-methyl-	6.666	95	349

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/1306
Sample number: 111
Sample identity: RBH321
Sample depth: 3.00-6.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
96-37-7	Cyclopentane, methyl-	3.471	91	143
110-82-7	Cyclohexane	3.869	91	534
108-87-2	Cyclohexane, methyl-	4.508	94	235
620-14-4	Benzene, 1-ethyl-3-methyl-	6.519	95	1201
611-14-3	Benzene, 1-ethyl-2-methyl-	6.666	94	327

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/1306
Sample number: 133
Sample identity: RBH615(D)
Sample depth: 9.00-12.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
108-10-1	Methyl Isobutyl Ketone	5.066	87	126

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/1306
Sample number: 77
Sample identity: RBH609(S)
Sample depth: 3.00-5.00
Sample Type: Ground Water
Units: ug/l

Method: SVOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
526-73-8	Benzene, 1,2,3-trimethyl-	5.371	95	5522
873-94-9	Cyclohexanone, 3,3,5-trimethyl-	5.436	95	636
496-11-7	Indane	5.487	93	1315
141-93-5	Benzene, 1,3-diethyl-	5.643	95	285
1758-88-9	Benzene, 2-ethyl-1,4-dimethyl-	5.917 - 6.173	93,93	949
527-84-4	o-Cymene	5.936	94	664
933-98-2	Benzene, 1-ethyl-2,3-dimethyl-	5.992	93	1206
95-93-2	Benzene, 1,2,4,5-tetramethyl-	6.285 - 6.584	87,95,95	1540
874-35-1	1H-Indene, 2,3-dihydro-5-methyl-	6.463	86	149

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/1306
Sample number: 110
Sample identity: RBH320
Sample depth: 3.00-6.00
Sample Type: Ground Water
Units: ug/l

Method: SVOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
526-73-8	Benzene, 1,2,3-trimethyl-	5.371	95	196

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/1306
Sample number: 121
Sample identity: RBH321
Sample depth: 3.00-6.00
Sample Type: Ground Water
Units: ug/l

Method: SVOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
526-73-8	Benzene, 1,2,3-trimethyl-	5.371	95	171

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP

Matrix : Liquid

Reference: R2174

Location: Tetrosyl - GW Monitoring

Contact: Meg Jones

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
24/1306	1	RBH603(S)	3.50-5.00	23-33	BOD	Sample holding time exceeded
24/1306	1	RBH609(S)	3.00-5.00	67-77	VOC	Analysis taken from a previously sampled container.
24/1306	1	RBH610(D)	6.50-8.00	89-99	VOC	Analysis taken from a previously sampled container.
24/1306	1	RBH320	3.00-6.00	100-110	VOC	Analysis taken from a previously sampled container.
24/1306	1	RBH321	3.00-6.00	111-121	VOC	Analysis taken from a previously sampled container.
24/1306	1	RBH615(S)	3.00-5.00	122-132	VOC	Analysis taken from a previously sampled container.
24/1306	1	RBH614(S)	4.00-6.00	144-154	Metals	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

EMT Job No.: 24/1306

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution
AC	x20 Dilution
AD	x50 Dilution
AE	x200 Dilution

EMT Job No: 24/1306

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM25	Determintaion of Dissolved Methane, Ethane and Ethene by Headspace GC-FID	PM0	No preparation is required.				
TM25	Determintaion of Dissolved Methane, Ethane and Ethene by Headspace GC-FID	PM0	No preparation is required.	Yes			

EMT Job No: 24/1306

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM30/TM213	Calculation of Fe (III) based on Iron and Fe(II)	PM0	No preparation is required.				
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	APHA SMEWW 5210B:1999 22nd Edition. Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as am	PM0	No preparation is required.	Yes			
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.	Yes			

EMT Job No: 24/1306

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM62	Determination of Manganese (II) by reaction with Formaldoxime in ammoniacal solution to form a manganese complex which is analysed spectrophotometrically.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM0	No preparation is required.				
TM179	Determination of Glycols using LCMS	PM0	No preparation is required.				
TM213	Fe(II) and Mn(II) by IC and Spectro	PM31	Prep of Waters for Inorganics				

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Smith Grant LLP
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Bryn Estyn Road
Wrexham
United Kingdom
LL13 9TY

Attention :	Louise Stock
Date :	19th April, 2024
Your reference :	R2174
Our reference :	Test Report 24/5862 Batch 1
Location :	Tetrosyl
Date samples received :	6th April, 2024
Status :	Final Report
Issue :	202404191621

Twenty five samples were received for analysis on 6th April, 2024 of which twenty three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 101.143 kg of CO2

Scope 1&2&3 emissions - 239.027 kg of CO2

Authorised By:

D Bower

Darcey Bower MESci
Project Co-ordinator

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-13	14-26	27-39	40-51	52-64	65-75	76-87,333	88-100	101-113	114-126	LOD/LOR	Units	Method No.
Sample ID	RBH601(S)	RBH601(D)	RBH602	RBH603(S)	RBH603(D)	RBH604(S)	RBH604(D)	RBH605	RBH606(S)	RBH606(D)			
Depth	5.00-7.00	9.00-12.00	7.50-10.50	3.00-5.00	7.00-9.00	5.50-7.50	9.50-11.50	5.50-7.50	7.00-9.00	9.50-11.50			
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	03/04/2024	03/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	03/04/2024	04/04/2024	04/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
Dissolved Manganese #	<2	<2	2941	1272 AB	550	56	36	3609	7484 AB	2974	<2	ug/l	TM30/PM14
Dissolved Potassium #	2.1	2.1	5.6	2.2	2.1	2.1	2.0	2.9	3.6	2.1	<0.1	mg/l	TM30/PM14
Dissolved Sodium #	44.4	44.5	16.3	24.6	34.8	36.4	36.4	28.9	17.0	18.7	<0.1	mg/l	TM30/PM14
Total Manganese	<2	<2	3395	1377 AB	553	59	57	3632	7802 AB	3033	<2	ug/l	TM30/PM14
Total Sulphur as S	9442	12710	3290	14366	13830	13464	12991	15337	9720	14723	<10	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Acenaphthene #	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	ug/l	TM4/PM30
Fluorene #	<0.005	<0.005	0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	ug/l	TM4/PM30
Phenanthrene #	<0.005	<0.005	0.043	0.005	<0.005	<0.005	<0.005	0.011	<0.005	0.035	<0.005	ug/l	TM4/PM30
Anthracene #	<0.005	<0.005	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	ug/l	TM4/PM30
Fluoranthene #	<0.005	<0.005	0.063	<0.005	<0.005	<0.005	<0.005	0.020	<0.005	0.070	<0.005	ug/l	TM4/PM30
Pyrene #	<0.005	<0.005	0.060	<0.005	<0.005	<0.005	<0.005	0.022	<0.005	0.070	<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005	<0.005	0.035	<0.005	<0.005	<0.005	<0.005	0.016	<0.005	0.039	<0.005	ug/l	TM4/PM30
Chrysene #	<0.005	<0.005	0.033	<0.005	<0.005	<0.005	<0.005	0.013	<0.005	0.040	<0.005	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	0.023	<0.008	0.065	<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.012	<0.005	0.039	<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.005	<0.005	0.026	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	0.026	<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.005	<0.005	0.025	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	0.024	<0.005	ug/l	TM4/PM30
PAH 16 Total #	<0.173	<0.173	0.321	0.405	<0.173	<0.173	<0.173	<0.173	<0.173	0.438	<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	0.017	<0.008	0.047	<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	0.018	<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	87	89	85	83	79	90	70	80	76	82	<0	%	TM4/PM30
VOC TICs	ND	ND	ND	ND	ND	ND	ND	ND	See Attached	ND		None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	0.6	2.1	0.1	0.3	<0.1	0.9	18.8	5.1	<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	3.4	<0.5	<0.5	<0.5	<0.5	5.9	<0.5	<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	1923 AB	<5	<5	<5	<5	28	<5	<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	168	<1	<1	<1	<1	45	2	<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	565	<2	<2	<2	<2	32	3	<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	126	<1	<1	<1	<1	7	1	<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	58	85	84	87	86	92	86	97	94	94	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	83	89	83	86	83	95	83	101	92	99	<0	%	TM15/PM10
SVOC TICs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-13	14-26	27-39	40-51	52-64	65-75	76-87,333	88-100	101-113	114-126	LOD/LOR	Units	Method No.
Sample ID	RBH601(S)	RBH601(D)	RBH602	RBH603(S)	RBH603(D)	RBH604(S)	RBH604(D)	RBH605	RBH606(S)	RBH606(D)			
Depth	5.00-7.00	9.00-12.00	7.50-10.50	3.00-5.00	7.00-9.00	5.50-7.50	9.50-11.50	5.50-7.50	7.00-9.00	9.50-11.50			
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	03/04/2024	03/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	03/04/2024	04/04/2024	04/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	15	<10	<10	<10	<10	31	<10	<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	505	<10	<10	<10	<10	332	99	<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	167	<10	<10	<10	<10	20	<10	<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C35-C44	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-44	<10	<10	<10	687	<10	<10	<10	<10	383	99	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	1769	<10	<10	<10	<10	25	<10	<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	877	<10	<10	<10	<10	83	<10	<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC35-EC44	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aromatics C5-44	<10	<10	<10	2646	<10	<10	<10	<10	108	<10	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-44)	<10	<10	<10	3333	<10	<10	<10	<10	491	99	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Resorcinol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Catechol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
m/p-cresol	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/l	TM26/PM0
o-cresol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Total cresols #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/l	TM26/PM0
Xylenols #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/l	TM26/PM0
1-naphthol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
2,3,5-trimethyl phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
2-isopropylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Total Speciated Phenols HPLC	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/l	TM26/PM0
Sulphate as SO4 #	39.3	39.6	5.2	44.4	43.2	41.0	40.8	47.9	27.7	44.3	<0.5	mg/l	TM38/PM0
Chloride #	79.0	77.6	22.3	52.7	63.2	67.6	68.2	64.5	51.0	62.8	<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	15.3	15.4	<0.2	8.2	10.7	11.5	12.0	1.7	<0.2	<0.2	<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/l	TM38/PM0
Dissolved Methane #	<1	<1	>>23968	312	<1	<1	<1	>>1702	>>16562	>>4865	<1	ug/l	TM25/PM0
Dissolved Ethene #	<1	<1	<1	3	<1	<1	<1	<1	<1	<1	<1	ug/l	TM25/PM0
Dissolved Ethane #	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	ug/l	TM25/PM0
Dissolved Carbon Dioxide	96644	93468	>>162445	>>205349	>>131449	>>133431	>>123796	>>171524	>>243161	>>150464	<1	ug/l	TM25/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-13	14-26	27-39	40-51	52-64	65-75	76-87,333	88-100	101-113	114-126	LOD/LOR	Units	Method No.
Sample ID	RBH601(S)	RBH601(D)	RBH602	RBH603(S)	RBH603(D)	RBH604(S)	RBH604(D)	RBH605	RBH606(S)	RBH606(D)			
Depth	5.00-7.00	9.00-12.00	7.50-10.50	3.00-5.00	7.00-9.00	5.50-7.50	9.50-11.50	5.50-7.50	7.00-9.00	9.50-11.50			
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	03/04/2024	03/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	03/04/2024	04/04/2024	04/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
Total Alkalinity as CaCO3 #	36	36	232	50	44	38	36	66	188	92	<1	mg/l	TM75/PM0
Tert Butyl Alcohol (TBA)	<100	<100	<100	<100	<100	<100	<100	<100	191	<100	<100	ug/l	TM83/PM10
Sulphide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM107/PM0
BOD (Settled) #	<1	<1	25	7	<1	<1	<1	5	14	9	<1	mg/l	TM58/PM0
COD (Settled) #	<7	<7	48	20	<7	<7	<7	18	33	15	<7	mg/l	TM57/PM0
Dissolved Organic Carbon #	<2	<2	8	5	<2	<2	<2	<2	4	4	<2	mg/l	TM60/PM0
Dissolved Iron II	<1	<1	<1	1	<1	<1	<1	<1	4	4	<1	mg/l	TM213/PM31
Dissolved Iron III	<1	<1	<1	<1	<1	<1	<1	<1	8	<1	<1	mg/l	TM30/TM213/PM0
Manganese II	<0.02	<0.02	3.04	1.06	0.53	0.05	0.03	3.67	5.64	2.73	<0.02	mg/l	TM213/PM31
pH #	6.04	6.06	6.72	6.07	6.03	6.01	6.02	6.18	6.43	6.33	<0.01	pH units	TM73/PM0
Total Organic Carbon #	<2	<2	11	5	<2	<2	<2	2	10	4	<2	mg/l	TM60/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	127-139	140-151	152-170	171-189	190-208	209-226	227-245	246-258	259-271	272-284	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH609(S)	RBH609(D)	RBH610(D)	RBH320	RBH321	RBH612	RBH613	RBH614(S)			
Depth	7.00-9.00	3.00-5.00	3.00-5.00	6.50-8.50	6.50-8.50	3.00-6.00	3.00-6.00	4.00-6.00	9.00-11.00	4.00-6.00			
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	04/04/2024	04/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	04/04/2024	04/04/2024	03/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
Dissolved Manganese #	4126_{AA}	3268_{AA}	1899	9046_{AB}	10524_{AB}	2596_{AC}	2111_{AB}	6390_{AB}	5005	2881_{AB}	<2	ug/l	TM30/PM14
Dissolved Potassium #	3.6	2.8	13.0	7.9	2.4	6.2	3.5	4.7	4.4	6.1	<0.1	mg/l	TM30/PM14
Dissolved Sodium #	29.6	31.5	42.4	30.0	20.4	49.9	22.6	32.6	25.7	38.6	<0.1	mg/l	TM30/PM14
Total Manganese	4238_{AA}	3327	1901	9377_{AB}	11019_{AB}	2997_{AC}	2235_{AB}	6559_{AB}	5039	3110_{AB}	<2	ug/l	TM30/PM14
Total Sulphur as S	12952	25466	2352	13240	11338	3062	6262	9964	11333	13586	<10	ug/l	TM30/PM14
PAH MS													
Naphthalene #	0.3	<0.1	19.0_{AC}	0.3	<0.1	21.8_{AC}	4.9	<0.1	0.4	1.3	<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.010	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Acenaphthene #	0.401	<0.005	0.269	0.061	0.013	0.070	0.043	0.182	<0.005	0.369	<0.005	ug/l	TM4/PM30
Fluorene #	0.194	<0.005	0.095	0.018	0.012	0.117	0.016	0.113	<0.005	0.148	<0.005	ug/l	TM4/PM30
Phenanthrene #	0.019	<0.005	0.181	0.009	<0.005	0.029	0.023	<0.005	<0.005	0.019	<0.005	ug/l	TM4/PM30
Anthracene #	0.007	<0.005	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	ug/l	TM4/PM30
Fluoranthene #	<0.005	<0.005	0.016	0.005	<0.005	<0.005	<0.005	0.019	0.014	0.008	<0.005	ug/l	TM4/PM30
Pyrene #	<0.005	<0.005	0.013	0.005	<0.005	<0.005	<0.005	0.021	0.015	0.006	<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.016	0.012	<0.005	<0.005	ug/l	TM4/PM30
Chrysene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	0.008	<0.005	<0.005	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	0.015	0.014	<0.008	<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.007	<0.005	<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.005	<0.005	<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.005	<0.005	<0.005	ug/l	TM4/PM30
PAH 16 Total #	0.921	<0.173	19.586	0.398	<0.173	22.016	4.982	0.405	0.480	1.859	<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	0.011	0.010	<0.008	<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	77	88	86	77	76	79	83	83	85	82	<0	%	TM4/PM30
VOC TICs	ND	ND	See Attached	ND	ND	See Attached	See Attached	ND	ND	ND		None	TM15/PM10
Methyl Tertiary Butyl Ether #	2.6	2.2	23.0	1.5	0.6	13.2	8.0	3.1	0.3	5.8	<0.1	ug/l	TM15/PM10
Benzene #	1.9	<0.5	50.2	1.2	1.1	88.5	12.8	<0.5	<0.5	8.3	<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	61942_{AD}	596	59	47763_{AD}	10339_{AD}	<5	<5	44	<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	8207_{AC}	33	7	6823_{AC}	1582_{AC}	<1	<1	142	<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	29765_{AD}	359	21	19978_{AD}	6228_{AC}	<2	<2	195	<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	6455_{AC}	69	3	3980_{AC}	1236_{AC}	<1	<1	33	<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	95	96	102	104	96	101	101	97	146	105	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	96	99	100	99	103	99	98	145	103	<0	%	TM15/PM10
SVOC TICs	ND	ND	See Attached	ND	ND	See Attached	ND	ND	ND	ND		None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	127-139	140-151	152-170	171-189	190-208	209-226	227-245	246-258	259-271	272-284	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH609(S)	RBH609(D)	RBH610(D)	RBH320	RBH321	RBH612	RBH613	RBH614(S)			
Depth	7.00-9.00	3.00-5.00	3.00-5.00	6.50-8.50	6.50-8.50	3.00-6.00	3.00-6.00	4.00-6.00	9.00-11.00	4.00-6.00			
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	04/04/2024	04/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	04/04/2024	04/04/2024	03/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
TPH CWG													
Aliphatics													
>C5-C6 #	34	14	657$_{AC}$	<10	<10	65	81	55	<10	34	<10	ug/l	TM36/PM12
>C6-C8 #	17	<10	17363$_{AC}$	178	37	11828	3076	<10	<10	57	<10	ug/l	TM36/PM12
>C8-C10 #	15	<10	8352$_{AC}$	94	16	5835	1777	<10	<10	124	<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	25	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C35-C44	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-44	66	14	26397	272	53	17728	4934	55	<10	215	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<100$_{AC}$	<10	<10	74	12	<10	<10	<10	<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	56719$_{AC}$	528	60	40248	10083	<10	<10	42	<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	41555$_{AC}$	431	43	27130	8519	<10	<10	369	<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	618	<5	<5	657	227	<5	<5	<5	<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>EC35-EC44	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aromatics C5-44	<10	<10	98892	959	103	68109	18841	<10	<10	411	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-44)	66	14	125289	1231	156	85837	23775	55	<10	626	<10	ug/l	TM5/TM36/PM12/PM16/PM30
Resorcinol	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Catechol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol #	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
m/p-cresol	<0.02	<0.02	0.11	<0.02	<0.02	0.23	0.05	<0.02	<0.02	<0.02	<0.02	mg/l	TM26/PM0
o-cresol	<0.01	<0.01	0.05	<0.01	<0.01	0.18	0.03	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Total cresols #	<0.03	<0.03	0.16	<0.03	<0.03	0.41	0.08	<0.03	<0.03	<0.03	<0.03	mg/l	TM26/PM0
Xylenols #	<0.06	<0.06	0.06	<0.06	<0.06	0.09	<0.06	<0.06	<0.06	<0.06	<0.06	mg/l	TM26/PM0
1-naphthol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
2,3,5-trimethyl phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
2-isopropylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Total Speciated Phenols HPLC	<0.1	<0.1	0.2	<0.1	<0.1	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	mg/l	TM26/PM0
Sulphate as SO4 #	38.5	80.1	3.5	40.2	33.2	5.3	18.0	28.2	32.3	38.6	<0.5	mg/l	TM38/PM0
Chloride #	45.5	49.6	36.2	52.0	35.8	47.8	69.5	47.9	66.5	38.1	<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	<0.2	1.7	<0.2	3.1	<0.2	<0.2	<0.2	<0.2	2.0	<0.2	<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02	<0.02	0.15	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	mg/l	TM38/PM0
Dissolved Methane #	>>8705	>>3205	>>2517	44	271	>>1912	>>1468	>>9476	>>3018	>>8729	<1	ug/l	TM25/PM0
Dissolved Ethene #	3	<1	6	<1	3	5	7	<1	<1	4	<1	ug/l	TM25/PM0
Dissolved Ethane #	10	4	2	<1	4	12	6	10	<1	12	<1	ug/l	TM25/PM0
Dissolved Carbon Dioxide	>>160565	>>152289	>>138564	55071	>>179107	>>216590	>>265737	>>119884	>>148146	>>180662	<1	ug/l	TM25/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	127-139	140-151	152-170	171-189	190-208	209-226	227-245	246-258	259-271	272-284	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH609(S)	RBH609(D)	RBH610(D)	RBH320	RBH321	RBH612	RBH613	RBH614(S)			
Depth	7.00-9.00	3.00-5.00	3.00-5.00	6.50-8.50	6.50-8.50	3.00-6.00	3.00-6.00	4.00-6.00	9.00-11.00	4.00-6.00			
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	04/04/2024	04/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	04/04/2024	04/04/2024	03/04/2024			
Sample Type	Ground Water												
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
Total Alkalinity as CaCO3 #	130	68	280	88	74	330	160	180	116	250	<1	mg/l	TM75/PM0
Tert Butyl Alcohol (TBA)	<100	<100	110	<100	<100	149	<100	<100	<100	<100	<100	ug/l	TM83/PM10
Sulphide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM107/PM0
BOD (Settled) #	9	4	133	2	2	89	32	16	8	17	<1	mg/l	TM58/PM0
COD (Settled) #	24	16	337	19	15	203	75	23	14	29	<7	mg/l	TM57/PM0
Dissolved Organic Carbon #	<2	5	88	2	2	47	28	4	3	6	<2	mg/l	TM60/PM0
Dissolved Iron II	4	<1	<1	<1	4	31	4	<1	<1	34	<1	mg/l	TM213/PM31
Dissolved Iron III	<1	<1	<1	<1	6	<1	15	<1	<1	8	<1	mg/l	TM30/TM213/PM0
Manganese II	3.71	3.14	1.81	6.87	7.38	1.67	1.52	4.64	4.91	1.42	<0.02	mg/l	TM213/PM31
pH #	6.47	6.22	6.92	6.40	6.22	6.81	6.44	6.66	6.45	6.68	<0.01	pH units	TM73/PM0
Total Organic Carbon #	4	6	139	4	<2	90	29	5	6	13	<2	mg/l	TM60/PM0

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	285-297	298-315	316-328									
Sample ID	RBH614(D)	RBH615(S)	RBH615(D)									
Depth	9.00-12.00	3.00-5.00	9.00-11.00									
COC No / misc												
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G									
Sample Date	03/04/2024	03/04/2024	03/04/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	06/04/2024	06/04/2024	06/04/2024									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Dissolved Manganese #	3942 AB	1259	4983 AB								<2	ug/l	TM30/PM14
Dissolved Potassium #	6.1	5.7	4.4								<0.1	mg/l	TM30/PM14
Dissolved Sodium #	24.4	28.6	23.4								<0.1	mg/l	TM30/PM14
Total Manganese	4024 AB	1265	5088 AB								<2	ug/l	TM30/PM14
Total Sulphur as S	3978	33670	5886								<10	ug/l	TM30/PM14
PAH MS													
Naphthalene #	2.8	0.4	1.8								<0.1	ug/l	TM4/PM30
Acenaphthylene #	0.016	0.008	0.025								<0.005	ug/l	TM4/PM30
Acenaphthene #	1.587	0.745	1.904								<0.005	ug/l	TM4/PM30
Fluorene #	0.833	0.406	1.145								<0.005	ug/l	TM4/PM30
Phenanthrene #	0.169	0.072	0.359								<0.005	ug/l	TM4/PM30
Anthracene #	0.040	0.018	0.034								<0.005	ug/l	TM4/PM30
Fluoranthene #	0.030	0.005	0.009								<0.005	ug/l	TM4/PM30
Pyrene #	0.015	<0.005	0.005								<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005	<0.005	<0.005								<0.005	ug/l	TM4/PM30
Chrysene #	<0.005	<0.005	<0.005								<0.005	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.008	<0.008	<0.008								<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.005	<0.005	<0.005								<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.005	<0.005	<0.005								<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.005	<0.005	<0.005								<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.005	<0.005	<0.005								<0.005	ug/l	TM4/PM30
PAH 16 Total #	5.490	1.654	5.281								<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.008	<0.008	<0.008								<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.008	<0.008	<0.008								<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	80	98	89								<0	%	TM4/PM30
VOC TICs	ND	ND	See Attached									None	TM15/PM10
Methyl Tertiary Butyl Ether #	1.3	5.9	0.6								<0.1	ug/l	TM15/PM10
Benzene #	9.9	<0.5	10.5								<0.5	ug/l	TM15/PM10
Toluene #	20	<5	118								<5	ug/l	TM15/PM10
Ethylbenzene #	227	<1	221								<1	ug/l	TM15/PM10
m/p-Xylene #	131	<2	211								<2	ug/l	TM15/PM10
o-Xylene #	14	<1	36								<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	113	101	103								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	113	97	99								<0	%	TM15/PM10
SVOC TICs	ND	ND	ND									None	TM16/PM30

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	285-297	298-315	316-328									
Sample ID	RBH614(D)	RBH615(S)	RBH615(D)									
Depth	9.00-12.00	3.00-5.00	9.00-11.00									
COC No / misc												
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G									
Sample Date	03/04/2024	03/04/2024	03/04/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	06/04/2024	06/04/2024	06/04/2024									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	62	19	65								<10	ug/l	TM36/PM12
>C6-C8 #	69	41	692								<10	ug/l	TM36/PM12
>C8-C10 #	131	25	248								<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5								<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>C35-C44	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-44	262	85	1005								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	10								<10	ug/l	TM36/PM12
>EC7-EC8 #	19	<10	107								<10	ug/l	TM36/PM12
>EC8-EC10 #	324	<10	428								<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5								<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC35-EC44	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
Total aromatics C5-44	343	<10	545								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-44)	605	85	1550								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Resorcinol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Catechol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Phenol #	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
m/p-cresol	<0.02	<0.02	<0.02								<0.02	mg/l	TM26/PM0
o-cresol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Total cresols #	<0.03	<0.03	<0.03								<0.03	mg/l	TM26/PM0
Xylenols #	<0.06	<0.06	<0.06								<0.06	mg/l	TM26/PM0
1-naphthol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
2,3,5-trimethyl phenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
2-isopropylphenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Total Speciated Phenols HPLC	<0.1	<0.1	<0.1								<0.1	mg/l	TM26/PM0
Sulphate as SO4 #	10.0	94.2	16.6								<0.5	mg/l	TM38/PM0
Chloride #	38.2	24.9	39.6								<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	<0.2	<0.2	<0.2								<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02	<0.02								<0.02	mg/l	TM38/PM0
Dissolved Methane #	>>10998	>>3609	>>6314								<1	ug/l	TM25/PM0
Dissolved Ethene #	<1	5	<1								<1	ug/l	TM25/PM0
Dissolved Ethane #	10	12	<1								<1	ug/l	TM25/PM0
Dissolved Carbon Dioxide	>>113931	>>262670	>>124329								<1	ug/l	TM25/PM0

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	285-297	298-315	316-328									
Sample ID	RBH614(D)	RBH615(S)	RBH615(D)									
Depth	9.00-12.00	3.00-5.00	9.00-11.00									
COC No / misc												
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G									
Sample Date	03/04/2024	03/04/2024	03/04/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	06/04/2024	06/04/2024	06/04/2024									

Please see attached notes for all abbreviations and acronyms

				LOD/LOR	Units	Method No.
Total Alkalinity as CaCO3 #	218	214	172	<1	mg/l	TM75/PM0
Tert Butyl Alcohol (TBA)	<100	<100	<100	<100	ug/l	TM83/PM10
Sulphide	<0.01	<0.01	<0.01	<0.01	mg/l	TM107/PM0
BOD (Settled) #	17	10	14	<1	mg/l	TM58/PM0
COD (Settled) #	21	28	46	<7	mg/l	TM57/PM0
Dissolved Organic Carbon #	<2	4	8	<2	mg/l	TM60/PM0
Dissolved Iron II	<1	2	5	<1	mg/l	TM213/PM31
Dissolved Iron III	<1	5	<1	<1	mg/l	TM30/TM213/PM0
Manganese II	2.79	1.06	3.66	<0.02	mg/l	TM213/PM31
pH #	6.71	6.49	6.56	<0.01	pH units	TM73/PM0
Total Organic Carbon #	9	9	8	<2	mg/l	TM60/PM0

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All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	40-51										Please see attached notes for all abbreviations and acronyms		
Sample ID	RBH603(S)												
Depth	3.00-5.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	04/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
Surrogate Recovery Toluene D8	106 **AB**										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98 **AB**										<0	%	TM15/PM10

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Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	152-170										Please see attached notes for all abbreviations and acronyms		
Sample ID	RBH609(S)												
Depth	3.00-5.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
											LOD/LOR	Units	Method No.
Surrogate Recovery Toluene D8	112 AC										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	107 AC										<0	%	TM15/PM10

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Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	152-170										Please see attached notes for all abbreviations and acronyms		
Sample ID	RBH609(S)												
Depth	3.00-5.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
											LOD/LOR	Units	Method No.
Surrogate Recovery Toluene D8	114 AD										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	109 AD										<0	%	TM15/PM10

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Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	190-208										Please see attached notes for all abbreviations and acronyms		
Sample ID	RBH610(D)												
Depth	6.50-8.50												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
Surrogate Recovery Toluene D8	101										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101										<0	%	TM15/PM10

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Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	209-226										Please see attached notes for all abbreviations and acronyms		
Sample ID	RBH320												
Depth	3.00-6.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
											LOD/LOR	Units	Method No.
Surrogate Recovery Toluene D8	111 AC										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	102 AC										<0	%	TM15/PM10

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	209-226										Please see attached notes for all abbreviations and acronyms		
Sample ID	RBH320												
Depth	3.00-6.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1											LOD/LOR	Units	Method No.
Date of Receipt	06/04/2024												
Surrogate Recovery Toluene D8	109 AD											<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101 AD											<0	%	TM15/PM10

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Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	227-245												
Sample ID	RBH321												
Depth	3.00-6.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Surrogate Recovery Toluene D8	109 AC										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	102 AC										<0	%	TM15/PM10

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Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	227-245										Please see attached notes for all abbreviations and acronyms		
Sample ID	RBH321												
Depth	3.00-6.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1											LOD/LOR	Units	Method No.
Date of Receipt	06/04/2024												
Surrogate Recovery Toluene D8	109 **AD**											<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	100 **AD**											<0	%	TM15/PM10

Element Materials Technology

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

Report : Liquid (Duplicate results)

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	298-315										Please see attached notes for all abbreviations and acronyms		
Sample ID	RBH615(S)												
Depth	3.00-5.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
Surrogate Recovery Toluene D8	105										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101										<0	%	TM15/PM10

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Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

SVOC Report : **Liquid**

EMT Sample No.	1-13	14-26	27-39	40-51	52-64	65-75	76-87,333	88-100	101-113	114-126	LOD/LOR	Units	Method No.
Sample ID	RBH601(S)	RBH601(D)	RBH602	RBH603(S)	RBH603(D)	RBH604(S)	RBH604(D)	RBH605	RBH606(S)	RBH606(D)			
Depth	5.00-7.00	9.00-12.00	7.50-10.50	3.00-5.00	7.00-9.00	5.50-7.50	9.50-11.50	5.50-7.50	7.00-9.00	9.50-11.50			
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	03/04/2024	03/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	03/04/2024	04/04/2024	04/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	108	116	113	97	113	114	98	113	105	107	<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	117	123	120	102	118	122	115	121	112	110	<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

SVOC Report : **Liquid**

EMT Sample No.	127-139	140-151	152-170	171-189	190-208	209-226	227-245	246-258	259-271	272-284	LOD/LOR	Units	Method No.
Sample ID	RBH607	RBH608	RBH609(S)	RBH609(D)	RBH610(D)	RBH320	RBH321	RBH612	RBH613	RBH614(S)			
Depth	7.00-9.00	3.00-5.00	3.00-5.00	6.50-8.50	6.50-8.50	3.00-6.00	3.00-6.00	4.00-6.00	9.00-11.00	4.00-6.00			
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	04/04/2024	04/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	04/04/2024	04/04/2024	03/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	32.5	3.3	<0.5	112.7 AB	16.6	<0.5	<0.5	1.1	<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	24	<1	<1	52	10	<1	<1	8	<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	71	2	<1	142 AB	30	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Phenol	<1	<1	5	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	2	<1	<1	6	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	3	<1	<1	3	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	1	<1	<1	2	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	101	111	117	108	124	140 SV	117	115	120	120	<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	111	118	122	118	131 SV	133 SV	127	121	128	128	<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

SVOC Report : **Liquid**

EMT Sample No.	285-297	298-315	316-328									
Sample ID	RBH614(D)	RBH615(S)	RBH615(D)									
Depth	9.00-12.00	3.00-5.00	9.00-11.00							Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G									
Sample Date	03/04/2024	03/04/2024	03/04/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	06/04/2024	06/04/2024	06/04/2024									
SVOC MS										LOD/LOR	Units	Method No.
Phenols												
2-Chlorophenol #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	0.6	<0.5	0.9							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	7	<1	3							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	2							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Other SVOCs												
1,2-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	0.6							<0.5	ug/l	TM16/PM30
Dibenzofuran #	0.6	<0.5	1.0							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	118	129	133 SV							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	124	135 SV	140 SV							<0	%	TM16/PM30

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid**

EMT Sample No.	1-13	14-26	27-39	40-51	52-64	65-75	76-87,333	88-100	101-113	114-126	LOD/LOR	Units	Method No.
Sample ID	RBH601(S)	RBH601(D)	RBH602	RBH603(S)	RBH603(D)	RBH604(S)	RBH604(D)	RBH605	RBH606(S)	RBH606(D)			
Depth	5.00-7.00	9.00-12.00	7.50-10.50	3.00-5.00	7.00-9.00	5.50-7.50	9.50-11.50	5.50-7.50	7.00-9.00	9.50-11.50			
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	03/04/2024	03/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024	03/04/2024	04/04/2024	04/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024			
VOC MS													
Dichlorodifluoromethane	<2	<2	10	159	56	32	23	134	278	72	<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	0.6	2.1	0.1	0.3	<0.1	0.9	18.8	5.1	<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	1.6	<0.1	<0.1	<0.1	0.3	0.2	<0.1	<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	6	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	3.4	<0.5	<0.5	<0.5	<0.5	5.9	<0.5	<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	7	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	1923 AB	<5	<5	<5	<5	28	<5	<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	168	<1	<1	<1	<1	45	2	<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	565	<2	<2	<2	<2	32	3	<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	126	<1	<1	<1	<1	7	1	<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	11	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	58	85	84	87	86	92	86	97	94	94	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	83	89	83	86	83	95	83	101	92	99	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid**

EMT Sample No.	127-139	140-151	152-170	171-189	190-208	209-226	227-245	246-258	259-271	272-284			
Sample ID	RBH607	RBH608	RBH609(S)	RBH609(D)	RBH610(D)	RBH320	RBH321	RBH612	RBH613	RBH614(S)			
Depth	7.00-9.00	3.00-5.00	3.00-5.00	6.50-8.50	6.50-8.50	3.00-6.00	3.00-6.00	4.00-6.00	9.00-11.00	4.00-6.00	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G			
Sample Date	04/04/2024	04/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024	04/04/2024	04/04/2024	03/04/2024			
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	06/04/2024	LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	591	451	5	23	99	87	74	871	61	217	<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	2.6	2.2	23.0	1.5	0.6	13.2	8.0	3.1	0.3	5.8	<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Vinyl Chloride #	1.0	0.3	4.4	0.5	3.6	3.9	5.2	0.7	<0.1	0.7	<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	5	<3	4	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	4	<3	<3	<3	<3	<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	62	<3	23	58	28	<3	<3	<3	<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2	<2	10	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2	3	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Benzene #	1.9	<0.5	50.2	1.2	1.1	88.5	12.8	<0.5	<0.5	8.3	<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	4	<3	9	16	6	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Toluene #	<5	<5	61942$_{AD}$	596	59	47763$_{AD}$	10339$_{AD}$	<5	<5	44	<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	21	<3	<3	12	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	72	<2	<2	45	16	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	8207$_{AC}$	33	7	6823$_{AC}$	1582$_{AC}$	<1	<1	142	<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	29765$_{AD}$	359	21	19978$_{AD}$	6228$_{AC}$	<2	<2	195	<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	6455$_{AC}$	69	3	3980$_{AC}$	1236$_{AC}$	<1	<1	33	<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	107	<3	<3	106	18	<3	<3	5	<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	181	<3	<3	174	27	<3	<3	4	<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	407	<3	<3	296	82	<3	<3	8	<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	8	<3	<3	21	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	1409$_{AC}$	8	<3	1273$_{AC}$	328	<3	<3	19	<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	9	<3	<3	15	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	8	<3	<3	13	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	3	<3	<3	3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Naphthalene	<2	<2	13	<2	<2	33	4	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	95	96	102	104	96	101	101	97	146	105	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	96	99	100	99	103	99	98	145	103	<0	%	TM15/PM10

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid**

EMT Sample No.	285-297	298-315	316-328									
Sample ID	RBH614(D)	RBH615(S)	RBH615(D)									
Depth	9.00-12.00	3.00-5.00	9.00-11.00									
COC No / misc												
Containers	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G	V H HN HCL Z P BOD G									
Sample Date	03/04/2024	03/04/2024	03/04/2024									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	06/04/2024	06/04/2024	06/04/2024									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	627	88	661								<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	1.3	5.9	0.6								<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3								<3	ug/l	TM15/PM10
Vinyl Chloride #	0.7	1.8	0.4								<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1								<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3								<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3								<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3								<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3								<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3								<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3								<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1								<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2								<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2								<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3								<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2								<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Benzene #	9.9	<0.5	10.5								<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3								<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2								<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3								<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2								<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2								<2	ug/l	TM15/PM10
Toluene #	20	<5	118								<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2								<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3								<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2								<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2								<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2								<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Ethylbenzene #	227	<1	221								<1	ug/l	TM15/PM10
m/p-Xylene #	131	<2	211								<2	ug/l	TM15/PM10
o-Xylene #	14	<1	36								<1	ug/l	TM15/PM10
Styrene	<2	<2	<2								<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2								<2	ug/l	TM15/PM10
Isopropylbenzene #	4	<3	5								<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4								<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2								<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3								<3	ug/l	TM15/PM10
Propylbenzene #	4	<3	6								<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	14	<3	13								<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3								<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	32	<3	27								<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2								<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3								<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3								<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2								<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3								<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	113	101	103								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	113	97	99								<0	%	TM15/PM10

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	40-51										LOD/LOR	Units	Method No.
Sample ID	RBH603(S)												
Depth	3.00-5.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	04/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
VOC MS													
Surrogate Recovery Toluene D8	106 AB										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98 AB										<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	152-170										LOD/LOR	Units	Method No.
Sample ID	RBH609(S)												
Depth	3.00-5.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
VOC MS													
Surrogate Recovery Toluene D8	112 AC										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	107 AC										<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	152-170												
Sample ID	RBH609(S)												
Depth	3.00-5.00										Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024										LOD/LOR	Units	Method No.
VOC MS													
Surrogate Recovery Toluene D8	114 AD										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	109 AD										<0	%	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	190-208												
Sample ID	RBH610(D)												
Depth	6.50-8.50										Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024										LOD/LOR	Units	Method No.
VOC MS													
Surrogate Recovery Toluene D8	101										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101										<0	%	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	209-226												
Sample ID	RBH320												
Depth	3.00-6.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
VOC MS													
Surrogate Recovery Toluene D8	111 AC											<0	%
Surrogate Recovery 4-Bromofluorobenzene	102 AC											<0	%

Please see attached notes for all abbreviations and acronyms

LOD/LOR	Units	Method No.
<0	%	TM15/PM10
<0	%	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	209-226												
Sample ID	RBH320												
Depth	3.00-6.00										Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024										LOD/LOR	Units	Method No.
VOC MS													
Surrogate Recovery Toluene D8	109 AD										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101 AD										<0	%	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	227-245										LOD/LOR	Units	Method No.
Sample ID	RBH321												
Depth	3.00-6.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
VOC MS													
Surrogate Recovery Toluene D8	109 AC										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	102 AC										<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	227-245										LOD/LOR	Units	Method No.
Sample ID	RBH321												
Depth	3.00-6.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
VOC MS													
Surrogate Recovery Toluene D8	109AD										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	100AD										<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP
Reference: R2174
Location: Tetrosyl
Contact: Louise Stock
EMT Job No: 24/5862

VOC Report : **Liquid (Duplicate results)**

EMT Sample No.	298-315										LOD/LOR	Units	Method No.
Sample ID	RBH615(S)												
Depth	3.00-5.00												
COC No / misc													
Containers	V H HN HCL Z P BOD G												
Sample Date	03/04/2024												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	06/04/2024												
VOC MS													
Surrogate Recovery Toluene D8	105										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101										<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/5862
Sample number: 101
Sample identity: RBH606(S)
Sample depth: 7.00-9.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
108-20-3	Diisopropyl ether	3.249	90	282

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/5862
Sample number: 152
Sample identity: RBH609(S)
Sample depth: 3.00-5.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
67-64-1	Acetone	2.390	80	154
67-63-0	Isopropyl Alcohol	2.505	86	115
110-54-3	n-Hexane	3.120	94	200
96-37-7	Cyclopentane, methyl-	3.515	94	170
110-82-7	Cyclohexane	3.914	95	568
589-34-4	Hexane, 3-methyl-	3.983	91	112
108-87-2	Cyclohexane, methyl-	4.555	95	339
620-14-4	Benzene, 1-ethyl-3-methyl-	6.573	95	1181
622-96-8	Benzene, 1-ethyl-4-methyl-	6.593	94	452
611-14-3	Benzene, 1-ethyl-2-methyl-	6.726	94	493
526-73-8	Benzene, 1,2,3-trimethyl-	7.035	97	378
1758-88-9	Benzene, 2-ethyl-1,4-dimethyl-	7.170 - 7.372	94,95,96	206

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/5862
Sample number: 209
Sample identity: RBH320
Sample depth: 3.00-6.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
110-54-3	n-Hexane	3.120	94	104
96-37-7	Cyclopentane, methyl-	3.516	90	102
108-87-2	Cyclohexane, methyl-	4.555	94	256
108-10-1	Methyl Isobutyl Ketone	4.999	87	121
611-14-3	Benzene, 1-ethyl-2-methyl-	6.573	94	1013
622-96-8	Benzene, 1-ethyl-4-methyl-	6.593	91	377
620-14-4	Benzene, 1-ethyl-3-methyl-	6.726	91	453
526-73-8	Benzene, 1,2,3-trimethyl-	7.035	97	411
527-84-4	o-Cymene	7.170	94	162
934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	7.370	96	128
488-23-3	Benzene, 1,2,3,4-tetramethyl-	7.584 - 7.609	97,97	114

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/5862
Sample number: 227
Sample identity: RBH321
Sample depth: 3.00-6.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
620-14-4	Benzene, 1-ethyl-3-methyl-	6.573	94	248
622-96-8	Benzene, 1-ethyl-4-methyl-	6.726	93	107

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/5862
Sample number: 316
Sample identity: RBH615(D)
Sample depth: 9.00-11.00
Sample Type: Ground Water
Units: ug/l

Method: VOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
108-10-1	Methyl Isobutyl Ketone	4.999	87	373

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/5862
Sample number: 169
Sample identity: RBH609(S)
Sample depth: 3.00-5.00
Sample Type: Ground Water
Units: ug/l

Method: SVOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
526-73-8	Benzene, 1,2,3-trimethyl-	5.456	95	246

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 24/5862
Sample number: 224
Sample identity: RBH320
Sample depth: 3.00-6.00
Sample Type: Ground Water
Units: ug/l

Method: SVOC
Matrix: Liquid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
526-73-8	Benzene, 1,2,3-trimethyl-	5.451	95	260

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Smith Grant LLP

Matrix : Liquid

Reference: R2174

Location: Tetrosyl

Contact: Louise Stock

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
24/5862	1	RBH601(S)	5.00-7.00	1-13	BOD	Sample holding time exceeded
24/5862	1	RBH601(D)	9.00-12.00	14-26	BOD	Sample holding time exceeded
24/5862	1	RBH603(S)	3.00-5.00	40-51	VOC	Analysis taken from a previously sampled container.
24/5862	1	RBH605	5.50-7.50	88-100	BOD	Sample holding time exceeded
24/5862	1	RBH606(S)	7.00-9.00	101-113	BOD	Sample holding time exceeded
24/5862	1	RBH606(D)	9.50-11.50	114-126	BOD	Sample holding time exceeded
24/5862	1	RBH607	7.00-9.00	127-139	BOD	Sample holding time exceeded
24/5862	1	RBH608	3.00-5.00	140-151	BOD	Sample holding time exceeded
24/5862	1	RBH609(S)	3.00-5.00	152-170	BOD	Sample holding time exceeded
24/5862	1	RBH609(D)	6.50-8.50	171-189	BOD	Sample holding time exceeded
24/5862	1	RBH610(D)	6.50-8.50	190-208	BOD	Sample holding time exceeded
24/5862	1	RBH320	3.00-6.00	209-226	BOD	Sample holding time exceeded
24/5862	1	RBH321	3.00-6.00	227-245	BOD	Sample holding time exceeded
24/5862	1	RBH612	4.00-6.00	246-258	BOD	Sample holding time exceeded
24/5862	1	RBH613	9.00-11.00	259-271	BOD	Sample holding time exceeded
24/5862	1	RBH614(S)	4.00-6.00	272-284	BOD	Sample holding time exceeded
24/5862	1	RBH614(D)	9.00-12.00	285-297	BOD	Sample holding time exceeded
24/5862	1	RBH615(S)	3.00-5.00	298-315	BOD	Sample holding time exceeded
24/5862	1	RBH615(D)	9.00-11.00	316-328	BOD	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/5862

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x2 Dilution
AB	x5 Dilution
AC	x10 Dilution
AD	x200 Dilution

EMT Job No: 24/5862

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM25	Determintaion of Dissolved Methane, Ethane and Ethene by Headspace GC-FID	PM0	No preparation is required.				

EMT Job No: 24/5862

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM25	Determintaion of Dissolved Methane, Ethane and Ethene by Headspace GC-FID	PM0	No preparation is required.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM30/TM213	Calculation of Fe (III) based on Iron and Fe(II)	PM0	No preparation is required.				
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	APHA SMEWW 5210B:1999 22nd Edition. Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as am	PM0	No preparation is required.	Yes			

EMT Job No: 24/5862

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM83	Modified USEPA method 8260B v2:1996. Determination of Alcohols, Acetates, Acetone, Fuel Oxygenates, THF and Cyclohexane by Headspace GC-MS	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM0	No preparation is required.				
TM213	Fe(II) and Mn(II) by IC and Spectro	PM31	Prep of Waters for Inorganics				

APPENDIX E

INSTRUMENT CALIBRATION

Ribble Enviro Ltd
www.ribble-enviro.co.uk
...everything gas detection



Certificate of Calibration

Customer:	Smith Grant LLP
Instrument:	MiniRAE 3000
Job:	Service, Test & Calibration
Serial number:	592-915404
Fleet Number:	N/A
Certificate no:	915404 / 230123
Next calibration due date:	23 Jan 2024
Tested on:	23 Jan 2023
Calibrated for:	Isobutylene

Applied Gas Concentration:	Cylinder Reference:	Final Sensor Reading	Accuracy Limits	Pass / Fail
Isobutylene: 100 ppm	62725 / 4622	99.9 ppm	± 5%	Pass ✓

The instrument has been calibrated after re-zeroing and introducing span calibration gas, using gas that is traceable to national standards and has been prepared in accordance with BS EN ISO 6145-6:2017

Calibration Engineer: LESLEY BAINBRIDGE

Sign:

Quality Assessed by (Print):	C.S.	Sign:	

Tel: 01200 445 804 Fax: 01200 445 809 Email: info@ribble-enviro.co.uk
Ribble Enviro Ltd. Unit 4, Gisburn Business Park, Gisburn, Nr Clitheroe, BB7 4JP, UK

Company Registered in England: 06140569 VAT No: GB 906 6241 34 EORI: GB906624134000

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Certificate of Calibration

Customer:	Smith Grant LLP
Instrument:	MiniRAE 3000
Job:	Service, Test & Calibration
Serial number:	592-915404
Fleet Number:	N/A
Certificate no:	915404 / 260125
Next calibration due date:	26 Jan 2025
Tested on:	26 Jan 2024
Calibrated for:	Isobutylene

Applied Gas Concentration:	Cylinder Reference:	Final Sensor Reading	Accuracy Limits	Pass / Fail
Isobutylene: 100 ppm	62880 / 0323	98.7 ppm	± 5%	Pass ✓

The instrument has been calibrated after re-zeroing and introducing span calibration gas, using gas that is traceable to national standards and has been prepared in accordance with BS EN ISO 6145-6:2017

Calibration Engineer: CHRIS SHILLITOE

Sign:

Quality Assessed by (Print):	C.S.	Sign:	

Tel: 01200 445 804 Fax: 01200 445 809 Email: info@ribble-enviro.co.uk
Ribble Enviro Ltd. Unit 4, Gisburn Business Park, Gisburn, Nr Clitheroe, BB7 4JP, UK

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Pro Series PCB &Cable Simulation Test

Temperature Range Check °C

Temp°C	(Resistance)	Complete	√/X	Range	Meter	√/X	Cable	√/X
0.0 °C	(32.66 KΩ)	0.0	√	-0.2 to 0.2 °C	-	-	-	-
10.0 °C	(19.90 KΩ)	10.0	√	9.8 to 10.2 °C	-	-	-	-
40.0 °C	(5.239 KΩ)	40.0	√	39.8 to 40.2 °C	-	-	-	-
25.0 °C	(10.00 KΩ)	25.0	√	24.8 to 25.2 °C	-	-	-	-

Conductivity Check - SpCond

Temp @ 25°C – Change Cal Value to 450uS/cm

SpCond	(Resistance)	Complete	√/X	Range	Meter	√/X	Cable	√/X
450.0µS - Glp Cell Constant		5.00	√	4.90 to 5.10	-	-	-	-
450.0µS	(11.11 KΩ)	450.0	√	447.1 to 453.0 µS	-	-	-	-
4500 µS	(1111.0 Ω)	4499	√	4471 to 4530 µS	-	-	-	-
45.00 mS	(111.10 Ω)	45.01	√	44.66 to 45.35 mS	-	-	-	-
150.0 mS	(33.330 Ω)	150.0	√	148.2 to 151.8 mS	-	-	-	-

Oxygen Range Check - %sat

Temp @ 25°C, Yellow membrane, Polarographic.
Change cal value to 760mmHg

WARNING! Restore sensor menu setting immediately after test if Galvanic DO probe is to be fitted

DO	(Resistance)	Complete	√/X	Range	Meter	√/X	Cable	√/X
100.0%	(111.42 KΩ)	100.0%	√	99.9 to 100.1%	-	-	-	-
8.26 mg/L	(111.42 KΩ)	8.26	√	8.24 to 8.28 mg/L	-	-	-	-
44.6%	(250.0 KΩ)	44.6%	√	44.4 to 44.8%	-	-	-	-
3.68 mg/L	(250.0 KΩ)	3.68	√	3.66 to 3.70 mg/L	-	-	-	-
5.6%	(2.04 MΩ)	5.4%	√	5.1 to 5.9%	-	-	-	-
0.45 mg/L	(2.04 MΩ)	0.45	√	0.41 to 0.49 mg/L	-	-	-	-
0.0%	(200 MΩ)	0.0%	√	-1.0 to 1.0 %	-	-	-	-
0.00 mg/L	(200 MΩ)	0.0	√	-0.01 to 0.01 mg/L	-	-	-	-

DO Polarizing voltage Check

DO Setting	Complete	√/X	Range	PCB	√/X	Cable	√/X
Polarographic	760	√	760 to 640	-	-	-	-
Galvanic	0	√	0	-	-	-	-

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YSI SonTek WTW

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YSI Pro Series Annual Maintenance Service

RGA # 231434	Customer: Smith Gran:
Date: 02/10/2023	Contact: Dan Wayland
YSI Service Tech: Martin Maddams-wilkinson	Customer Reference Number: NA

Instrument Details	Model	Serial Number	Inspection / Notes
Meter (Pro Plus, Pro 20, etc)	Pro Quatro	21B100901	
Cable (20-4, Quatro-1, etc)	Quatro 4m	21C100325	
DO Sensor (Galv, Pol)	POI	21B100393	
C/T Sensor (5560, integral)	5560	21B100804	
ISE 1	PH	22C	
ISE 2	ORP	17C	
Accessories			

Notes:

Test Equipment	Model	Serial Number	Last calibrated
Simulation test box	YSID04	020	10/01/2023
Temperature meter control	Fluke 1521	A6BC32.B4A2800	30/07/2023
DVM	Fluke 287	96580193	05/12/2022
pH meter control	AB15+	AB92234207	31/01/2023

Notes:

	Y/N	Details
Downloaded config and files to server/PC	YES	File Name:
Software update	-	Version: 4.0.0
O-rings, gasket and vent plug replacement	YES	
Fitted warranty and tested labels	YES	
Reconditioned DO sensor and replaced membrane	YES	Membrane Type: Yellow
Cleaned ISE sensors	YES	
Cleaned C/T sensor	YES	

Notes:

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Pro Series PCB & Cable Simulation Test (cont)

pH mV Range Check °C

Uncal ISE1 and ISE2 before test.
Test with Temp at 25°C

pH	Complete	√/X	Range	PCB	√/X	Cable	√/X
ISE1 pH 7	6.99	√	6.98 to 7.02 pH				
ISE1 pH 7 mV	0.3	√	-2 to 2 mV				
ISE1 pH7 high Ω	1.8	√	-9 to 9 mV				
ISE2 ORP 0mV	0.3	√	-2 to 2 mV				
ISE2 ORP high Ω	1.8	√	-9 to 9 mV				
ISE1 pH 4	4.00	√	3.98 to 4.02 pH				
ISE1 pH 4 mV	177.6	√	175 to 179 mV				
ISE1 pH 4 high Ω	176.7	√	168 to 186 mV				
ISE2 ORP 177mV	177.6	√	175 to 179 mV				
ISE2 ORP high Ω	176.6	√	168 to 186 mV				
ISE1 pH 10	9.99	√	9.98 to 10.02 pH				
ISE1 pH 10 mV	-177.1	√	-175 to -179 mV				
ISE1 pH 10 high Ω	-173.5	√	-168 to -186 mV				
ISE2 ORP -177mV	-177.1	√	-175 to -179 mV				
ISE2 ORP high Ω	-173.5	√	-168 to -186 mV				

Cable Simulation Plug Tests

WARNING! Restore sensor menu setting immediately after test if Galvanic DO probe is to be fitted

Parameter	Value	√/X	Range	Cal Restored?
Temperature	25.0	√	25 C ± 0.02	
Conductivity	500	√	500 uS/cm ± 2	
pH	6.99	√	7 ± 0.02	
pH milli-volts	0.0	√	0 mV ± 2.0	
Dissolved Oxygen	127	√	130.0 % ± 5	
ORP	0.2	√	0 mV ± 2.0	

Open Inputs Cable Test

Parameter	Value	√/X	Correct Output
Temperature	C	√	---- C
Conductivity	?????	√	< 3 uS/cm
Dissolved Oxygen	?????	√	?????
pH	?????	√	?????

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Pro Sensor Testing & Diagnostics

DO Sensor Test

Sensor must be reconditioned rinsed and dried

Test	Value	√/X	Range
Resistance between Anode and Cathode	PASS	√	200m Ω or more OL
Resistance between Anode and connector	PASS	√	
Resistance between Cathode and connector	PASS	√	
Zero DO test	PASS	√	<2% within 5 minutes

Bench pH Sensor Test

Standard	mV Value	√/X	Range
pH 7	0.3	√	-60 to 60 mV
pH 10	-171.4	√	-130 to -180 mV
pH 4	173.5	√	130 to 180 mV
Slope 7 to 4	173.2	√	162 to 190 mV
Slope 7 to 10	171.7	√	162 to 190 mV

pH Sensor response test

Sensor immersed in pH 4 buffer after calibration
Transfer to aerated freshwater test tank

	Value	√/X	Range
pH Control Value	5.65	√	+/- 0.2 pH
pH value after 3 minutes	5.59	√	+/- 0.2 pH

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Sensor Test Calibration Diagnostics

Temperature	Control Thermistor	19 to 21	Pre	19.6	+/-0.2°C ? °K	
Specific Conductance	Cal value in 1413uS/CM	1432	Air / Dry 5 to -5 uS/cm	0	Cond Gain (4.50 to 5.50)	4.93
Dissolved Oxygen	-ve Polarisation	99.2	mmHg	767.3	DO Gain (0.5 to 6.5)	5.4
pH	7.02@ 19.6°C		4.00 @ 19.6 °C		10.07 @ 19.5°C	
pH mV	7.00	0.3	4.00	173.5	>0.00	171.4
Slope	+162 °C -185 >	173.2	<>	171.7	< 162 to 185	
ORP mV Check	Temp °C	19.6	259.7mV	262.2	Offset	

Summary

This YSI Pro Series instrument has been serviced tested and calibrated by a Xylem Analytics UK engineer and is working to the manufacturer's specifications

Xylem Analytics UK Service Engineer: Tim Wyllie / Service Technician

Xylemanalytics.co.uk
Registered in England (Co. No. 4938571).
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APPENDIX H

Written Correspondence with the Environment Agency

Project ref: **ENVPAC/1/GMC/00223**
Our ref: SO/2020/120065/09-L01
Your ref: 63533

Date: 31 December 2024

Smith Grant LLP
Station House
Station Road
Ruabon
Wrexham
LL14 6DL

Dear Sir/Madam

FURTHER DETAILS FOR REVIEW - SUBMITTED SEPTEMBER 2024

BEVIS GREEN WORKS, MILL ROAD, BURY, BL9 6RE

Thank you for accepting our offer to provide detailed planning advice. We are providing this advice under Agreement No. **ENVPAC/1/GMC/00223**.

Hours used / remaining: -
Previous hours remaining: - 12
Additional hours requested: - 28 = Total 40 hours

Please note we have taken 16 hours to review and provide our advice on these documents. ***(Hours remaining on this agreement 24)***

Environment Agency position
We have reviewed the following, and would like to comment as follows:

- A Remediation Verification Report 3. Phase 2 (Excluding Phase 2A/2B) by GroundTech Consulting ltd dated June 2024,
- Site Investigation on Former Mill Lodge Reservoir & Additional Investigation of Phase 2B [Ref: 2174-R15-V3 (Final)] by Smith Grant LLP dated August 2024.
- A Detailed Controlled Waters Risk Assessment for Phases 2A, 2B and Former Mill Lodge Reservoir [Ref: R2174-R16-v2 (Final)] by Smith Grant LLP dated August 2024 and a
- Letter report by Urban Regen Ltd dated September 2024 regarding Phase 2B Implementation Plan.

We have reviewed the submissions to understand the current conditions on site and the works that have been undertaken to address the known concentrations of contamination which previous ground investigations and assessments have identified.

Site History
The reports which have been submitted to the Environment Agency for the site show that there has been established industrial land use. These previous activities appear to have led to significantly elevated concentrations of contamination which pose an adverse risk to Controlled Waters.

More recently, work to redevelop the site has led to the site being divided into distinct phases. Phase 1 work has been undertaken with the Western part of the site whilst additional investigation and assessment work has been undertaken throughout the Phase 2 area to the east of the site.

Our review has identified that this iteration of reporting is for the wider Phase 2 area.

Environmental Setting
Based on the information available to the Environment Agency, the site is in an area where the superficial deposits of glacial till are considered to sit atop the Rough Rock Sandstone formation. That, in turn is above the Rossendale Mudstone formation with a deeper Upper Haslingden Flags Sandstone formation below that. This deepest sandstone formation sub-crops further to the west of the site where the main River Irwell valley runs north to south.

The Superficial deposits are considered a secondary aquifer whilst the bedrock deposits are Secondary A aquifers.

Records held by the Environment Agency have additionally identified the presence of a watercourse that appears to pass through the site. Pigs Lee Brook is a culverted watercourse that is identified as appearing from culvert to the west of the site.
We considered the aquifers and the watercourses to be controlled waters.

Remediation Verification Report 3. Phase 2
We have carefully reviewed this submission to assess the success of the agreed remedial works at each of the identified hot spots that previous investigations and assessments identified pose a risk to controlled waters.

We note that most of the remedial works report a success in removing land contamination and reducing contaminant concentrations to a level that either poses an acceptable risk to controlled waters or removes the risk altogether.

However, in reading the reports we have identified that hot spot (HS) 1 did not achieve the required validation and verification standard and that the investigation of the former Reservoir required additional investigation and assessment.

We therefore advise that further work is needed at these locations.

Site Investigation & Risk Assessment
We have reviewed these submissions following the review of the GroundTech validation report.

The submissions report that additional groundwater sampling and assessment was undertaken because of previous ground investigations which indicated the presence of groundwater contamination.

The site investigation undertaken on this occasion was confined to Phase2B where the main, longest-standing, industrial activities were undertaken and where most of the previous hotspots were located.

The work in 2024 has identified the presence of groundwater contamination within the Secondary A Aquifer beneath the site and within Phase 2B of the site development.

The spectrum of contamination appears to reflect the industrial activities on the site and that the groundwater body is adversely impacted by hazardous as well as non-hazardous substances.

The presence of artesian conditions in deep and shallow boreholes suggests a rigorous and dynamic hydrogeological condition on site and reflects the wider location of the site and environmental conditions.

The risk assessment which has been carried out includes a quantitative assessment of risk with a nominal compliance point of 100m being adopted. There is also narrative regarding work from and by C.E. GeoChem regarding the retardation and attenuation of continuation in the bedrock deposits.

Unfortunately, additional research by the Environment Agency has not identified sufficient information to inform us of the process that this company follows so we are hesitant to fully accept the work that has been done by them.

Whilst this work suggests a degree of retardation it appears not to consider the presence of hazardous substances in the groundwater body. In these circumstances, and as we have previously identified, this means that the requirements of the Groundwater (Daughter) Directive 2006/118/EC apply especially in terms of prevent and limit parameters.

Following our review we do not believe that there is sufficient information available to clearly identify that the hazardous substances in the aquifer body are either a stable or reducing source term therefore active and direct remediation of the impacted groundwater body is indicated.

In considering this position we have carefully assessed the input parameters of the quantitative risk assessment and have identified that the use of the nominal 100m compliance point does not align with the position put forwards in ‘The Environment Agency’s approach to groundwater protection’ as well as the risk management framework provided in Guidance on Land contamination risk management (LCRM) Land contamination risk management (LCRM) - GOV.UK (www.gov.uk).

We recommend that for Hazardous Substances the default 50m compliance point value is more relevant and appropriate whilst for non-hazardous substances, the site-specific value of 200m (to the outfall point of the Pigs Lee Brook culverted watercourse) is appropriate.

A brief re-evaluation of the P20 Remedial Target Methodology suggests that active remediation of the groundwater body is indicated.

Phase 2B Implementation Plan
In the circumstances described above we would welcome the opportunity to meet with you and your client to discuss how an appropriate remediation strategy can be implemented to achieve revised remedial target concentrations.

At this time, we do not believe additional ground investigation and monitoring/sampling will yield additional information and that effort should be made on arriving at and implementing a suitable strategy to deal with the known impact.

It is unlikely that we will agree to another small-scale remediation/pilot trial under PRS 215.

We therefore advise that sufficient work is undertaken to support a comprehensive deployment to site to treat the contamination which is present.

We agree that a sustainable approach to remediation is required however the primary goal of remediation should be to address the significant and unacceptable risks to controlled waters to achieve adequate environmental protection.

Next Steps
I hope the above advice is helpful. If there is any further work, you anticipate needing our detailed advice on in relation to this project please let me know so it can be incorporated into this charging agreement.

Yours sincerely

Mrs. SYLVIA WHITTINGHAM
Planning Advisor

SPPlanning.RFH@environment-agency.gov.uk

Disclaimer
Our opinion is based on the information available to us at the time of the enquiry. When the formal planning application is submitted, our position may change if there have been changes to environmental risk or evidence, and/or planning policy.

End