Verde Environmental Consultants

Phase 2 Environmental Due Diligence Report

Canal Bank Project

Pa Healy Road

Limerick City

October 2021

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

DOCUMENT CONTROL

Project Title:	Phase 2 Environmental Due Diligence
Report Ref.:	52187
Status:	Final
Client:	Lawlor Burns & Associates
Site Details:	Canal Bank, Pa Healy Road, Limerick City
Issued By:	Verdé Environmental Consultants Ltd

Document Production / Approval Record				
	Name	**Signature**	**Date**	**Position**
Created By	Krzysztof Pniewczuk		18th Feb 2019	Senior Environmental Consultant
Contribution from	Donal Hogan		26th Oct 2021	Senior Hydrogeologist
Checked and Approved by	Kevin Cleary		26th Oct 2021	Operations Director

EXECUTIVE SUMMARY

Verde was commissioned to carry out an environmental assessment at a proposed development site located at Pa Healy Road in Limerick City. For the most part of the known history the site remained undeveloped; however some significant deposition of soils with C&D materials took place sometime in the past. The assessment outlined in this report has been completed to establish the existing soil and groundwater at the site and to develop a Generic Quantitative Risk Assessment (GQRA) for the site to determine if there are environmental liability considerations that should be regarded in the context of proposals for development.

Land use surrounding the site is a mixture of undeveloped land, recreational land with addition of commercial and residential properties located in close proximity to the site. The Park Canal with associated public walkway is located north of the site and the Abbey River is located approximately 580m to the west of the site.

Currently the site remains vacant with the exception of a single steel frame warehouse present in the eastern portion of the site. This report is based on the understanding that the proposed re-development plans for the site include a mixed commercial and residential land use with landscaped public open spaces and hard standing surfaces to accommodate vehicle parking.

In addition an Appropriate Assessment Stage 2 Natura Impact Statement (NIS) and an Asbestos R&D Survey of the warehouse building present on site were completed and are reported separately. The screening assessment found that the proposed redevelopment of the site will have no significant effect and that Stage 1 Habitats Directive Assessment Screening for Appropriate Assessment is not required. The asbestos survey completed for the warehouse on site identified the presence of ACM in roof panels, upper wall panels, front rain water guttering and as fragments on the ground. An Environmental Impact Assessment Report (EIAR) has been prepared in respect of the proposed development.

The site environmental investigation, completed in January 2018, included the completion of 15 trial pits and 4 boreholes, soil groundwater & surface water sampling and surveying. As the site is proposed for a mixed use, with approximately 50% of the area to be developed as public space and car parking, the soil results were assessed against Generic Assessment Criteria (GAC) for the following end uses: commercial, residential without home grown produce (residential) and with home grown produce(residential HP) and public open spaces in residential use. The main findings are summarised as follows:

The review of the analytical results established the following:

- The site is suitable to be developed according to the plans as mixed use property, once some remedial solutions are implemented
- Elevated Lead concentrations were reported in a sample from TP-110 at depths between 2.4 and 2.8mbgl. The reported concentrations exceed Residential, Residential HP and Commercial GAC;
- Slightly elevated Beryllium concentration was reported in the deeper natural soils in TP-108B (3.1-3.4mgl) exceeding Residential HP and Residential GACs. Elevated beryllium was not present in the shallow made ground sample TP-108A taken at depths between 1.4 and 3.1mbgl;
- Elevated concentrations of hydrocarbons were reported in the made ground sample from TP-108 (1.4-3.1mbgl). The concentrations exceeded Residential HP and Residential GAC. The lateral extent of hydrocarbons should be further investigated, especially in the area to the east of TP-108, where Block 2 is proposed to be constructed;
- Elevated concentrations of PAHs were reported in trial pit TP-115 at depths between 0.1 and 2.4mBGL and the concentrations exceeded Residential, Residential HP, Public Opens Spaces and on occasion Commercial GACs.
- Soil pH was reported to exceed the upper 9pH units limit in two locations including TP-109 (0.2-2.8mbgl) and TP110 (2.4-2.8mbgl)
- Asbestos fibres were present in 12 of 15 excavated trial pits; with only one trial pit (TP-103) reporting evidence of Asbestos Containing Materials (ACMs) in a form of fragment of roof tile

- Groundwater beneath the site is of good quality. The identified Barium and localised arsenic exceedance is considered not to interfere with proposed development plans.
- No contamination has been identified in surface water samples taken from The Park Canal. The site and the canal are not considered to be hydrologically connected.

In accordance with best practise, a GQRA was completed to assess the potential risks posed by the identified contamination to receptors and the findings are summarised as follows;

- A Very Low risk to future site residents from the migration of volatile compounds;
- A Very Low risk to future site residents from the dermal contact, ingestion and inhalation of contaminated soils;
- Should excavation works be required as part of the site redevelopment there is a Low to Moderate risk from exposure to asbestos fibres for workers undertaking the redevelopment;
- Low risk from exposure to asbestos fibres for future site residents and commercial users. This assumes that the site will be infilled with clean material which will act as a barrier to exposure;
- Very Low risk to future site residents and commercial users from prolonged exposure to contaminates permeating through the potable water pipes;
- Very Low risk from leaching of contamination from the contaminated soils to the limestone aquifer and the nearest abstraction borehole. The groundwater quality data indicates no current impact;
- Very Low risk from groundwater Barium contamination to the limestone aquifer, the nearest abstraction borehole and to the nearby Lower River Shannon SAC.

Based on the findings and conclusions from the Phase 2 site investigation and GQRA it is recommended to further investigate the vertical and lateral extent of localised hotspots of Lead, TPH and PAH contamination identified on site. In addition the presence of asbestos fibres in soils on site requires further delineation and quantification.

With the implementation of the following remedial options it is considered that the identified risks can be appropriately managed and the site will be suitable for the planned future use:

- Excavation of contaminated soils in the areas of identified and quantified contamination;
- Encapsulation of contaminated soils by the importation of suitable clean fill material onto the site;

Construction phase of the project should consider the following:

- Implementation of Mitigation Measures to Minimise Environmental Impacts from the construction works including unearthing, storage and transportation of contaminated soils;
- Remediation to Protect Services needs to be considered due to the presence of elevated contaminates and their potential to interact with underground plastic water supply pipes. This can be completed by backfilling the service trenches with material considered to be clean and not contaminated.
- Health and Safety Measures for Construction Workers need to be considered due to potential exposure to the contaminants in the soils
- It is recommended that an environmental management plan should be developed and implemented prior to the redevelopment of the site to assess and mitigate any environmental and human health risks;
- Any soil or waste removal of from the site will need to be undertaken in strict accordance with waste management legislation, ensuring that selected soil recovery or disposal facilities have the appropriate authorisation (Waste Facility Licence or Permit) and ensuring that all hauliers are fully authorised;
- Material excavation, segregation and removal should be managed and supervised by a competent person to ensure correct procedures are followed and that wastes are appropriately logged and tracked according to waste management requirements and legislation.

LIMITATIONS

This report describes the outcome of a site investigation conducted at the above referenced site in January 2019. Best practice was followed at all times and within the limitations stated; works were undertaken according to budgetary considerations. This report is the property of Verdé Environmental Consultants Limited (Verde) and cannot be used, copied or given to any third party without the explicit prior approval or agreement of Verdé Environmental Consultants Limited.

This report represents an assessment of the site and was performed in accordance with generally accepted standards regarding environmental assessments. Verde makes no other representations whatsoever, including those concerning the legal significance of its findings or as to other legal matters touched on in this report, including, but not limited to ownership of any property or the application of any law to the facts set forth herein.

Except as otherwise may be requested by the client, Verde disclaims any obligation to update the report for events taking place after the time during which we conducted our assessment.

1 INTRODUCTION

1.1 Project Contractual Basis & Parties Involved

Verde was commissioned by Lawlor Burns & Associates to carry out an environmental due diligence assessment of a proposed Canal Bank development site located on Pa Healy Road in Limerick City. Works were completed in accordance with Verde's proposal issued on 13th of December 2019 and were authorised for commencement in December 2019. In October 2021 a repeat round of groundwater levels were obtained to confirm the groundwater level and flow direction beneath the site.

Verde understands that the proposed development includes for the construction of a mixed commercial/ residential development. This includes a construction of a mixed-use development of build-to-rent apartments, student apartments incorporating common areas, café and 3no retail units, creche and management facilities building, and dwelling houses. Approximately 50% of the site area following the proposed development will be surface car-parking and landscaped areas.

1.2 Development Description

The development will consist of a 4ha area bounded by City Canal to the north, Pa Healy Road to the south and Park Road to the east, Canal Bank, Limerick;

A. Demolition of existing 530m^2 warehouse building on site.
B. Block 1 – Student accommodation building of 8,238m^2 stepped from three to six storeys, with ground floor café of 144.60m^2 and 3 no. retail units facing onto Pa Healy road of 86.59m^2 each, with 9 no. two bedroom, 37 no. three bedroom, and 15 no. four bedroom student apartments, totalling 189 bed spaces, ancillary laundry, refuse and enclosed communal courtyard with landscaping and bicycle storage;
C. Block 2 - A residential apartment building of 6,013.25m^2 with eight storeys and two penthouse storeys, total ten storeys containing 10 no. studio, 1 no. one bedroom and 52 no. two-bedroom apartments;
D. Block 3 – A residential apartment building of 8,107.10m^2 with six storeys and two penthouse storeys, total eight storeys containing 16 no. studio, 9 no. one bedroom, and 63 no. two-bedroom apartments;
E. Block 4 – A residential apartment building of 3,869.18m^2 with six storeys and one penthouse storey, total seven storeys containing 7 no. studio, 13 no. one bedroom and 25 no. two-bedroom apartments;
F. Block 5 – A residential apartment building of 5,849.40m^2 with six storey and one penthouse storey total seven storeys containing 14 no. studio, 15 no. one bedroom and 37 no. two-bedroom apartments;
G. Block 6 a residential apartment building of 3,869.18m^2 with six storeys and one penthouse storey, total seven storeys containing 7 no. studio, 13 no. one bedroom and 25 no. two-bedroom apartments;
H. Block 7 a residential apartment building of 4,962m^2 with five storeys and one penthouse storey, total six storeys containing 12 no. studio, 13 no. one bedroom and 31 no. two-bedroom apartments;

I. Community facilities building of 1,336.90m^2 and three storeys with creche, café, management offices and common accommodation for use by apartment dwellers;
J. 18 no. Executive Houses – Consisting of 2 no. detached four-bedroom houses of 194.62m^2 each and 16 no. terraced four-bedroom houses of 177.82m^2 each, with off street parking to front separate from communal parking;
K. 148 Car parking spaces throughout the development and 420 secured bicycle parking spaces throughout the development;
L. Ancillary works comprising; new vehicular entrances onto Pa Healy Road, pedestrian and cycle links to Pa Healy road, Park road and City Canal, bin storage for all developments adjacent to all entrances, New public park of 0.5ha along city canal, communal open space and communal roof gardens for all apartments, all ancillary drainage, civil and landscape works, public lighting within estate and Electricity Sub-station to rear of Block 1.

The total number of units is as follows;
Build to rent apartments - 363 (66x studio, 64 x one bedroom, 233 x two bedroom); Student apartments - 61 (9 x two-bedroom, 37 x three bedroom and 15 x four bedroom, totalling 189 student bed spaces); 18 Dwelling houses.

Overall total of residential units is 442. Overall Gross floor area of development proposed is 45,478.65m^2 on a site of circa 4ha.

A Natura Impact Statement (NIS) and Environmental Impact Assessment Report (EIAR) have been prepared in respect of the proposed development.

1.3 Project Background and Objectives

Verde was retained to complete a detailed environmental due diligence assessment of site conditions, establishing the soil and groundwater quality on-site. A Generic Quantitative Risk Assessment (GQRA) was developed evaluating environmental risk presented by site conditions and proposing mitigation to manage any identified risks. The assessment also determines whether there are environmental liability considerations and evaluates potential limitations to the proposed future development of the site for mixed commercial / residential use.

1.4 Scope of Works

To complete the assessment and meet the objective of the brief, the following scope of works was completed:

- Phase I Environmental Desk Study
- Trail pitting, soil sampling, monitoring well drilling & Installation
- Groundwater sampling, surface water sampling , permeability testing and topographical surveying
- Phase 2 reporting and completion of a GQRA.

2 ENVIRONMENTAL DESK STUDY

2.1 Site Location and Zoning

The site is located on Pa Healy Road in Limerick. The site is triangular in shape and is bordered by a combination of residential and commercial properties. The Ordnance Survey of Ireland (OSI) x, y coordinates for the site are 558775, 657535. The adjacent land uses are listed in Table 2.1 below.

Land use surrounding the site is a mixture of undeveloped land, recreational land with addition of commercial and residential properties. The site location is presented in Figure 1.

Table 2.1 – Adjacent Land Uses

BOUNDARY	LAND USE
North	The site is bounded by the Park Canal to the north. The canal banks are a public walkway and are part of the Lough Derg Way (walking/hiking trail) which starts in Limerick City to the west of the site. Undeveloped wetland and sport grounds are located on the opposite side of the Canal.
South	A single warehouse of Clancy Lewis fruit distribution is located to the south east of the site. Pa Healy Road borders the site to the south which is bounded by commercial properties, undeveloped land recreational grounds of O'Brien's Park.
East	The eastern boundary of the site is bordered by the Park Road, which is further bounded by a mixture of commercial (Musgraves Cash & Carry, Park Road Recycling Centre, David Mead Fitted Furniture) and detached residential premises.
West	The site narrows down towards the west. There is a bridge crossing the canal located to the west of the site. Sport grounds are located further West

2.2 Site Description & Walkover

The site comprises approximately 46,750m² at Pa Healy Road, Limerick City and is triangular in shape and bounded by Pa Healy Road at the south, Park Road at the East and The Canal at the north. The site is mostly vacant; however there is a steel frame warehouse present in the eastern part of the site. The central part is occupied by remaining structures of former storage yard. The northern edge of the site, along the Park Canal is overgrown with semi-mature trees. The central-western portion of the site is overgrown with young trees and bushes. There are several small stockpiles present on site comprising mainly of demolition material including concrete and brick.

Currently the entrance to the site is from Park Road to the concrete yard in front of the warehouse. The warehouse is utilised by the neighbouring furniture fitting company to store the materials. The historic use of the warehouse is unknown, however the recent asbestos survey of the warehouse reviled a presence of a cold room within the building. The warehouse area is separated from the rest of the site by chain link fence and metal gate. The entrance from the Pa Healy Road is currently blocked with a mound of soil and Kelly blocks.

The site layout is presented in Figure 2. A selection of photographs taken on site during the site are presented in Appendix A. Main site features are outlined in Table 2.2 below.

Table 2.2 – Site Infrastructure

INFRASTRUCTURE	DETAILS & COMMENTS
Underground Storage Tanks (UST's)	No USTs were observed on site during the walkover.
Above Ground Storage Tanks (AST's)	No ASTs was present on site during the site walkover.
Surface Drainage	Surface water drainage comprises of road gullies located on the open yard in front of the warehouse building .No surface water drainage was observed in the remaining portion of the site.
Connections to Water	The site is connected to mains water which is understood to enter the site from Park Road. A blue water main was unearthed during the site investigation works in the area of trial pit TP-102 located in the north-eastern portion of the site.
Connections to Foul Sewer	The connection to the foul sewer is not known; however it is expected that the warehouse is connected to the foul sewers located beneath the Park Road According to service maps received from the client a line of Limerick Main Drainage (LMD) Sewer is located along the northern site boundary. This was confirmed during the site walkover when three sets of manholes were observed over the sewer line.
Topography	The topography of the site is currently generally flat with a slight gradient towards the West. The site topography is expected to be significantly altered by historic deposition of various type of fill material.
Nearest surface water bodies	The Park Canal, located north of the site is the nearest surface water body. The Abbey River is located approximately 580m to the west of the site. The canal is raised in relation to the site.

2.3 Site History

Primary sources used to research the history of the site included available extracts from historical Ordnance Survey Ireland (OSI) maps, aerial photographs and planning information from Myplan.ie.

Historic 6 Inch Map (1837-1900) – The site is shown to have a building called Canal House in the north east corner of the site. The rest of the site is undeveloped possible agricultural land. The site is marked as "Liable to Flooding" on this map.

Historic 25 Inch Map (1888-1913) – The canal house building and adjacent gardens are still in place in the north eastern corner of the site. The remainder of the site remains undeveloped. According to the 6 inch Cassini Map – The site remains unchanged from previous maps.

It is noted from aerial photos taken in 1995, 2000 and 2005 that the site was largely undeveloped land for much of its history. There are warehouses shown on eastern portion of the site which have stood since at least 1995. The Pa Healy Road was not constructed until 2007.

The Digital Globe Precision Aerial imagery captured between 2011 and 2013 show the presence of a fenced off storage yard in the centre of the site. According to anecdotal information the site was used as a temporary storage yard and for the parking of construction machinery parking during development projects carried in the Limerick city centre.

2.4 Site Physical Setting

Details of the site physical setting are outlined in Table 2.3. Information on the site location, hydrology, geology hydrogeology and ecology of the area has been obtained from records held by the Geological Survey of Ireland (GSI), Environmental Protection Agency (EPA), Ordnance Survey of Ireland (OSI), Water Framework Directive Maps, National Parks and Wildlife Service (NPWS) databases and on-line resources of Department of Environment, Community and Local Government (myplan.ie).

Table 2.3 – Site Physical Setting

FEATURE	DETAILS & COMMENTS
Topography	Site topography is relatively flat. The wider regional topography of the landscape undulates with the meanders of the River Shannon. .
Geology	Overburden: The GSI describes the subsoils underlying the site as Made Ground with marine/estuarine silts and clays located in the north western corner.
	Solid Geology: According to GSI data, the majority of the site is located on top of undifferentiated limestones. The south west corner of the site is underlain by volcanoclastic rocks among limestones.
Hydrogeology	Regional Classification: According to GSI data, the bedrock aquifer underlying the majority of the site is classified as Lm, Locally Important aquifer which is generally moderately productive. The maximum recharge capacity of such an aquifer is 200mm/year.
	Vulnerability: The GSI classification of the bedrock aquifer beneath the majority of the site is described as having a vulnerability rating of (L) Low. This suggests that bedrock will not be encountered in the first 10mBGL. The eastern boundary has a vulnerability rating of (M) Moderate. This suggests that bedrock will not be encountered in the first 10mBGL in this area also.
	Well Search: According to the GSI database there is one well located within 1km of the site. This well is located approximately 0.39km to the south west of the site and was drilled in 1978 by Shamrock to a depth of 73.2m. This well produces good yields of approximately 288m^3d and is defined as being of industrial use.
Hydrology/Ecology	Surface Water Courses/ Abstractions The Park Canal is located along the northern boundary of the site and connects the Abbey River to the River Shannon flowing in an easterly direction. The Abbey River is located approximately 580m to the west of the site and flows in a southerly direction joining the River Shannon lower approximately 1.1km

	to the west of the site.
	Water Framework Directive status: The River Shannon Lower has not been assigned a status under the Water Framework Directive (WFD); It is defined as being "Not At Risk" of deteriorating in the future. The groundwater body beneath the site is classed as having "Poor" status and is at risk of deteriorating in the future. *(Ground waterbody Name: Limerick City East, Code: IE_SH_G_138)*
	Protected Areas: According to National Parks and Wildlife Service (NWPS) records the Lower River Shannon Special Area of Conservation (SAC) is located approximately 30m north of the site on the northern bank of the canal. *(Site code: 002185).* This protected site includes also Abbey River.
	Flooding: According to OPW resources, the entire site is prone to coastal flooding in extreme events. The northern part of the site is, adjacent to the canal, might be prone to pluvial flooding.

2.5 Ecological Screening and Asbestos Survey

Two independent assessments of the site were completed simultaneously including the Appropriate Assessment Stage 2 Natura Impact Statement and an Asbestos R&D Survey of the warehouse building present on site.

2.5.1 Appropriate Assessment Stage 2 Natura Impact Statement

Appropriate Assessment Stage 2 Natura Impact Statement was completed by SLR Consulting in December 2019 to support the application.

2.5.2 Asbestos R&D Survey Report

The asbestos survey completed for the warehouse in site identified presence of ACM in roof panels, upper wall panels, front rain water guttering and as fragments on the ground.

3 PRELIMINARY QUALITATIVE RISK ASSESSMENT (PQRA)

3.1 Risk Assessment Methodology

The process adopted for the contaminated land assessment is based on the principles presented in the Irish EPA's 2013 document "Framework for the Management of Contaminated Land and Groundwater at EPA Licensed Facilities", which puts forward a risk-based approach for the management of such sites. This approach is largely based on the equivalent CLR11 guidance used in the UK (DEFRA and Environment Agency, 2004). This framework provides for a proportionate approach to site characterisation, risk assessment and corrective action, taking account of the site context.

3.2 Pollutant Linkage Concept

In the context of land contamination, there are three essential elements to any risk:

A contamination source – a substance that is in, on, or under the land, and has the potential to cause harm or to cause pollution of water bodies.

A receptor – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body.

A pathway – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of contaminant–pathway–receptor is described as a pollutant linkage.

3.3 Risk Assessment

Risk assessment of the site is undertaken using a phased approach as follows:

- **Preliminary Risk Assessment (PRA)** – a desk study consisting of a review of documentary, anecdotal and site walk over evidence.
- **Generic Quantitative Risk Assessment (GQRA)** - comparison of contaminant concentrations with generic assessment criteria.
- **Detailed Quantitative Risk Assessment (DQRA)** – comparison of contaminant concentrations with site-specific assessment criteria.

There is an element of iteration within and between these activities and an assessment may cease at any stage once a robust conclusion has been derived. The Preliminary Risk Assessment (PRA) provides information to enable the development of a robust conceptual site model (CSM) that identifies contaminant linkages, relative level of risk and the most appropriate further investigation, if any is required. The subsequent assessment tiers incorporate more site-specific data, allowing for semi-quantitative and quantitative assessments of risk at increasing levels of detail. Following

this process, it may be concluded that corrective (remedial) action is necessary. This section presents the Preliminary Risk Assessment phase of the process described above.

3.4 Conceptual Site Model

An important thread throughout the overall process of risk assessment is the need to formulate and develop a conceptual model for the site, which supports the identification and assessment of pollutant linkages. A conceptual model represents the characteristics of the site in diagrammatic or written form that shows the possible relationships between contaminants, pathways and receptors (pollutant linkages).

Using the data summarised in the previous sections, a Conceptual Site Model for the Site on Pa Healy Road has been collated in line with BS10175, CLR 11 and the Irish EPA guidance that identifies sources of contamination, receptors that could be impacted together with pathways that connect the two, which is termed a potentially complete pollutant linkage. When a potentially complete pollutant linkage is identified, an estimation of risk should be made which may involve further investigation or risk assessment. Based on the information gained through the Desk Study the following presents the preliminary site conceptual model and has been developed in full consideration of the proposed commercial/residential development.

Contamination Sources

Potential contamination sources are summarised as follows:

- Chemicals associated with fill material imported to the site;
- Potential fuel spills from vehicles and construction machinery operating and stored on site;
- Possible asbestos in soils originating from demolition material visible in certain areas of the site. Also due to known infilling process which took place on site in the past, there is strong indication that demolition material can be also buried beneath the surface of the site.

Contamination Pathways

The primary contamination pathways identified are:

- Vertical and lateral migration of contaminants within groundwater and bedrock aquifer.
- Leaching of contaminants from soils and buried waste material to groundwater.
- Inhalation of asbestos fibres
- Direct contact – ingestion, inhalation of dust and dermal contact
- Direct chemical attack of concrete/foundations of future development;
- Permeation through water supply pipes to future residential and commercial development

Sensitive Receptors

The sensitive receptors are taken as

- Groundwater beneath the site
- Future site buildings and adjacent Site Users.
- The Park Canal and Lower River Shannon (including Abbey River) Special Area of Conservation (SAC)
- Human Health – future site residents, employees of retail units and re-development construction workers.

By considering the sources, pathways and receptors (pollutant linkages), an assessment of the human health/environmental risks is made with reference to the significance and degree of risk. This assessment is based on consideration of whether the contamination source contamination can reach a receptor and hence whether it is of major or minor significance.

The risk assessment has been undertaken with reference to BS10175:2011+A1:2013 and CIRIA Document C552: Contaminated Land Risk assessment 'A Guide to Good Practice'. Although some historical analysis data is available for the site, detailed historical contamination data is not available for the site therefore a preliminary risk assessment must assume that there is some hazardous contamination present on site. Table 3.1 summarises possible pollutant linkages which will be discussed further and updated later in the report.

Table 3.1 –Pollutant Linkage Assessment (Preliminary)

SOURCE	PATHWAY	RECEPTOR	COMMENTS
Chemicals and asbestos fibres associated with infilling the site with imported material	Leaching to groundwater	Groundwater beneath the site;	Further assessment required at the site to understand hydrogeological regime (including groundwater flow and tidal influence, and potential impact to groundwater and wider water environment.
Potential fuel spill associated with historic storage and operation of vehicle and construction machinery including, BTEX, TPH CWG	Groundwater flow (Lateral flow)	The Park Canal & River Shannon and Abbey River	Further assessment required at the site to determine if soil, groundwater and hazardous Further ground investigation and characterisation including quantification of samples where asbestos positively identified.
	Inhalation of asbestos fibres	Future site users, residents and construction workers	

	Direct Contact (ingestion, inhalation of dust and dermal contact)	Future Site Residents, Personnel and Workers undertaking re-development works	
	Direct chemical attack of concrete and foundations of future development	Future residential/commercial development foundations	Further characterisation of soils to inform development design
	Permeation through water supply pipes	Future residents/ site users of residential/commercial development	Further characterisation of soils, although pipe work will likely be required to be lain in clean service corridors using barrier pipes

4 SITE INVESTIGATION

On the basis of the conceptual model developed as part of the PRA assessment, the fieldwork for the purposes of this Phase 2 site investigation consisted of the following;

- Trial Pitting
- Soil Sampling
- Monitoring Well Drilling &Installation
- Groundwater Sampling
- Well Survey
- Permeability Testing

4.1 Trial Pits Excavation

Fifteen trial pits were excavated across the site on 10th & 11th of January using a 14 tonne tracked excavator with four of these trial pits located within the footprint of the proposed buildings (TP101, TP106, TP110 & TP113). Site photographs from the investigation works are presented in Appendix A.

Each excavation location was cleared for the presence of underground services using a Cable Avoidance Tool (CAT). Trial pits were excavated to a maximum depth of 3.5 mBGL. A Verde environmental scientist was present to supervise the excavation, log the findings and to take soil samples. The trial pits were located across the site to give a spatial representation of the shallow subsurface soils.

The general ground conditions encountered from the trial pits excavated on site comprised of brown silty top soil to a maximum depth of 0.3mBGL underlain by made ground comprising brown, light brown or brownish-grey sandy, clay or clayey sand & gravel with an abundance of demolition concrete, frequent red brick fragment and occasional limestone cobbles, metal and glass fragments to the maximum depth of 3.1mBGL. The thickness of man made deposits was greater in the trial pits located in the central and western portions of the site.

These anthropogenic deposits were underlain by natural soils comprising dark grey or black peaty clay or peat, light brown clayey gravelly sand with large limestone cobbles and boulders and light brown or brownish-grey sandy clay to a maximum depth of 3.4m. Bedrock was not encountered during trial pitting on site.

During trial pit excavation entries of shallow groundwater were observed in the man-made deposits and natural sand and clay at depths between 0.7 and 2.8mbgl. In one location (TP-109) water entry was observed at 0.2mbgl and can be associated with surface water lodging in the permeable surface fill material. Volumes of encountered shallow groundwater were significant in some locations including TP-106 and TP-110.

Detailed descriptions of geological and hydrogeological conditions are presented in Table 4.1 below and are described in the trial pit logs included in Appendix B

4.2 Monitoring Well Drilling &Installation

Four groundwater monitoring wells were drilled using a truck mounted air-rotary drilling rig. All four wells were installed as permanent groundwater monitoring wells (MW101 to MW104) in the limestone bedrock aquifer. Each of the wells was completed with a 50mm diameter standpipe to a maximum depth of 10.8mBGL with a slotted screen installed in the bottom 0.55-1.0 metres to capture the groundwater present in the bedrock aquifer. A bentonite seal was installed at the interface between overburden and bedrock to prevent any surface water or shallow groundwater ingress. The monitoring wells were completed with upright heavy duty covers and concrete plinths.

The general ground conditions encountered during drilling the monitoring wells comprised man made deposits of grey gravels and cobbles with some addition of concrete and red brick fragments to a maximum depth 4.0mbgl. The made ground deposits were underlain by brown peaty clay followed by light grey or brownish-grey silty clay to a maximum depth of 8.8mbgl. Weathered, grey limestone bedrock was encountered during drilling at depths between 6.2mBGL and 8.7mbgl.

Small groundwater strikes were observed during drilling in the overburden at depths between 2.5 and 3.5mbgl and on the interface between the overburden and the bedrock or in the bedrock at the depths between 6.2 and 10.2mbgl.

The monitoring well locations are presented in Figure 2 and the construction details for the installed wells are described in the borehole logs provided in Appendix B.

4.3 Soil Sampling

Soil recovered from the trial pits was physically examined for signs of contamination (e.g. odours, staining and iridescence). Samples were collected at intervals from each of the excavated trial pits and each sample was placed in laboratory supplied containers and was stored at less than 9°C prior to dispatch to the laboratory for analysis. Representative soil samples from each trial pit were selected by Verdé for submission to an independent UKAS accredited laboratory for analysis. The soil analytic suite included the following parameters:

- Heavy Metals
- Speciated Total Petroleum Hydrocarbons (TPH-CWG)
- MTBE & BTEX
- Poly aromatic hydrocarbons (PAHs)
- Volatile organic compounds (VOCs) - including Tentatively Identified Compounds (TICs)
- Semi-volatile organic compounds – including Tentatively Identified Compounds (TICs)

- Cyanide
- Asbestos
- Other soil chemistry parameters

4.4 Groundwater Sampling & Surface Water Sampling

Groundwater sampling and surface water sampling was carried out on the 21st January 2019. Four monitoring wells and two surface water locations at Park Canal were sampled during the site visit. Prior to the groundwater sampling all wells were examined with an interface probe for the potential presence of floating or sinking hydrocarbon products (LNAPL & DNAPL). Water level and the total depth of each well were also measured, and a specific purge volume calculated. Following this each well was purged by removing of at least three well volumes. Wells were subsequently sampled using dedicated bailers. Surface water samples were obtained from The Park Canal with a telescopic sampling pole. Water samples taken were then placed into laboratory supplied containers and stored at less than 9°C prior to dispatch to the laboratory for analysis. Groundwater samples and surface water samples were tested for the following parameters:

- Heavy Metals
- Anions
- Speciated Total Petroleum Hydrocarbons (TPH-CWG)
- MTBE & BTEX
- Free and Total Cyanide
- Polyaromatic hydrocarbons (PAHs)
- Volatile Organic Compounds - including Tentatively Identified Compounds (TICs)
- Semi-volatile Organic Compounds - including Tentatively Identified Compounds (TICs)
- Other parameters including: Total Alkalinity, Chemical Oxygen Demand (COD), pH, Electrical Conductivity, and Total Organic Carbon (TOC).

In addition, one shallow groundwater sample was obtained directly from trial pit TP107 on 10th of January during the site investigation works. The shallow groundwater was sampled using a disposable bailer and subsequently transferred into laboratory supplied containers and stored at less than 9°C prior to dispatch to the laboratory for analysis. This sample was tested for the hydrocarbon parameters including: TPH-CWG and MTBE/BTEX compounds.

Groundwater and surface water sampling logs are included in Appendix C.

4.5 Encountered Conditions

Physical Observations (Soil)

A summary of encountered physical conditions during the drilling works is included in Table 4.2 and observations are summarised as follows:

- A hydrocarbon sheen, mild hydrocarbon odour and PID readings of 2.9ppm were observed in sandy clay fill in trial pit TP-102 at depths between 1.5 and 2.0mbgl. The same soil strata also contained fragments of metal panels and old car parts;
- A small fragment roof tile potentially containing ACM was present in sandy clay fill in Trail pit TP-103 at a depth between 0.2 and 1.4mbgl;
- A chemical odour, but no elevated PID readings, were noted in sandy clay made ground in the almost entire soil profile of TP-105;
- Moderate hydrocarbon odours and a PID reading of 30.9ppm were observed in the sandy gravel fill at the depth between 1.4 and 3.1mbgl in TP-108. Natural sandy clay soils beneath the fill were observed to be only mildly impacted by hydrocarbons. The PID reading for the natural ground was 1.3ppm;
- An ammoniacal type odour and no elevated PID readings was present in sandy, gravelly clay fill in TP-110 at the depth of 2.4mbgl.

Physical Observations (Ground Water)

A summary of encountered physical conditions during trial pitting and drilling works is included in Table 4.2 and observations are summarised as follows:

- Shallow groundwater entries were observed in 12 of 15 excavated trial pits;
- Groundwater was present in all four monitoring wells;
- A hydrocarbon sheen was observed in the groundwater entering TP-107
- No free product in the form of LNAPL or DNAPL and no hydrocarbon sheen were observed in the remaining trial pit water strikes or any of the monitoring wells

A summary of encountered geological and hydrogeological conditions is presented below in Table 4.2.

Table 4.2- Summary of Geological & Hydrogeological Conditions

GEOLOGY	DETAILS	AVERAGE DEPTH (*mBGL*)	PHYSICAL CONTAMINATION	HYDROGEOLOGY AND OTHER OBSERVATIONS
Hard standing	Concrete surface (only in front of warehouse building)	Unknown	None observed	N/A
Made Ground	Silty top soil followed by sandy clay or clayey sand with significant addition of demolition waste, and occasional wood, metal & glass	0.0-2.5	Hydrocarbon sheen observed in TP-102, ingle suspected ACM present in TP-103, hydrocarbon odours and elevated PID in TP-108 and ammoniacal odour in TP-110	Shallow groundwater with hydrocarbon sheen observed in TP-107
Natural Ground	Peaty CLAY or PEAT, clayey, gravelly SAND with limestone cobbles and boulders, sandy CLAY and silty CLAY	2.5-7.7	Mild hydrocarbon odours and low PID readings present in TP-108	Shallow groundwater in natural soil deposits was observed not to be contaminated
Bedrock	Weathered limestone BEDROCK	7.7	No contamination observed	No contamination observed

4.6 Well Surveying

The groundwater monitoring wells were GPS surveyed by a site engineer to provide levels from the top of each well standpipe to Ordnance Datum (OD). Table 4.3 shows details of measurements taken from the wells.

Table 4.3- Groundwater Levels

Well ID	Easting	Northing	OD Elevation (mtoc)	Groundwater Level (mbtoc)	Groundwater Level (mOD)
Date				**21/01/2019**	
MW101	558627.0	657536.4	5.059	3.25	1.81
MW102	558776.7	657538.7	5.393	3.56	1.83
MW103	558794.9	657591.2	5.839	4.02	1.82
MW104	558743.3	657507.9	5.523	3.68	1.84
Well ID	**Easting**	**Northing**	**OD Elevation (mtoc)**	**Groundwater Level (mbtoc)**	**Groundwater Level (mOD)**
Date				**14/10/2021**	
MW101	558627.0	657536.4	5.059	3.28	1.779
MW102	558776.7	657538.7	5.393	3.60	1.793
MW103	558794.9	657591.2	5.839	4.05	1.789

MW104	558743.3	657507.9	5.523	3.71	1.813

Notes:
mOD = metres Ordnance Datum (Malin Head)
mtoc = metres top of casing
mbtoc = metres below top of casing

As anticipated the groundwater flow follows the regional and local topography and is in a north-westerly direction towards River Abbey as presented in Figure 3 with levels recorded in January 2019. Groundwater levels were also obtain in October 2021 with the same groundwater flow direction observed, as presented in Figure 4.

4.7 Permeability Testing

A series of rising head permeability tests were undertaken on the four bedrock monitoring well installations. Automatic dataloggers were used to measure the groundwater recovery following displacement of the water column. The results of the tests as presented in Appendix E indicate limestone permeability values of approximately;

- MW-101, 28.4m/day
- MW-102, 3.7m/day
- MW-103, 1.4m/day
- MW-104, 5.2m/day

Groundwater recovery rates were seen to be noticeably faster in MW-101 which is installed in a fractured weathered bedrock zone where a large groundwater strike was encountered.

5 GENERIC QUANTATIVE RISK ASSESSMENT

The report findings are based on information gathered from visual site inspection, the site investigation as detailed in Section 4 of this report and information supplied by parties referenced in this report. The content of the report relates to the condition of the site at the time of Verde's investigations.

5.1 Generic Assessment Criteria

In order to assess the human health and environmental risks posed by potential contaminants within the underlying soils and groundwater, Verde undertook a comparison of the laboratory analysis against Generic Assessment Criteria (GAC).

The risk to construction workers is not considered under the CLEA (Contaminated Land Exposure Assessment) methodology because it is assumed that health and safety guidelines relating to construction will be adhered to and suitable health and safety measures and controls implemented.

Soils-Derivation of GAC

In order to assess the soil analysis results with regard to potential human health risks, Verde assessed them against GACs in accordance with the UK framework outlined by the UK Environment Agency (EA) and the Department for Environment, Food and Rural Affairs (DEFRA) and S4ULs derived by Land Quality Management Limited (LQM).

To date, SGVs (Screening Guidance Values) have been published for only a limited suite of contaminants, with current SGVs derived for the following different land use scenarios, namely:

- Residential with home-grown produce (further referred as Residential HP)
- Residential without home-grown produce (further referred as Residential)
- Commercial use

The 2015 S4ULs values are obtained from "*The LQM/CIEH S4ULs for Human Health Risk Assessment, Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3484*", and we have added three further categories of;

- Allotments
- Public Open Spaces near residential housing ($POS_{residential}$)
- Public Parks (POS_{park})

It is understood that the subject site will be redeveloped for mixed residential and commercial use with some lands being designated for green landscaping and roadways as presented in Figure 5. Based on this Verde have made comparisons with the following assessment criteria:

- Commercial – Retail areas located within proposed Block 2 and also a separate Café/Creche Unit proposed for the western section of the site
- Residential with home grown produce – Three rows of terraced houses with private gardens proposed to be constructed in the eastern and central part of the site
- Residential without home-grown produce – 6 No. of Apartment Blocks located along the Park Canal with one apartment complex (Block 2) planned for south-eastern corner of the site

Contaminant concentrations below the GACs are considered not to warrant further risk assessment. However, concentrations of potential contaminants above the GAC may require further consideration through statistical analysis and possibly Detailed Quantitative Risk Assessment (DQRA).

Groundwater

In order to assess the groundwater analysis results with regard to potential human environmental and health risks, Verde assessed them against the following screening values:

- EPA (Draft) Guidance on Authorisation of Discharges to Groundwater, 2011

  This document was published by the EPA in December 2011 to provide guidance on the protection of discharges to groundwater and incorporates the requirements of the Water Framework Directive (2000/60/EC) (WFD) and the Groundwater Directive (2006/118/EC) (GWD). This guidance addresses both direct and indirect discharges (inputs) to groundwater which can originate from various sources of potential pollution including industrial/commercial releases. This is a draft document and is currently a work in progress with consideration being made for the low limits of detection which can be accurately achieved in the laboratory. Threshold values relate mainly to groundwater for use as a drinking water source and as listed in the European Communities (Drinking Water) No. 2) Regulations 2014 (S.I. No. 122 of 2014) and reference is also made to the European Communities Environmental Objectives (Groundwater) Regulations 2016 (S.I. No. 366/2016). It is noted that the comparison of groundwater analytical results with the Groundwater Regulations may not be representative of actual risk but is used as a guide to the potential risks posed.

- EPA Interim Guideline Values (IGVs)

  In 2003, the EPA published the interim report "Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report". The document presents proposals for the setting of environmental quality objectives and standards for groundwater through the use of 'guideline values'. These values were used when a screening value was not provided in the EPA 2011 document. The values are used to assist with the characterisation of groundwater bodies and to establish the need for additional investigations or further actions in the event of the guideline values being exceeded. The document does not propose restoration target values or clean up levels for groundwater, although the published IGVs can be used as an example of 'good' groundwater chemical status.

- In addition, groundwater results were compared to residential and commercial values outlined in Generic Assessment Criteria (GAC) for Assessing Vapour Inhalation Risks from Groundwater Sources. These GACs were developed by Society of Brownfield Risk Assessment (SoBRA) in February 2017.

Surface Water

Considering the site is located in close proximity to the Park Canal and up-gradient of the River Abbey, water quality standards for inland surface waters have been selected for assessment purposes. The water quality standards are from legislation containing Environmental Quality Standards – SI No. 272 of 2009 & SI No. 386, 2015. These water quality standards relate to surface water bodies and Regulations to prevent deterioration of surface water bodies under the guidance of the Water Framework Directive 2000/60/EC.

5.2 Soil Assessment

The results of the soil analysis are summarised below and presented in Tables 1to 5 in which they are compared against GACs standards as outlined in section 5.1 above. Full soil laboratory certificates are presented in Appendix D.

5.2.1 Metals

All metals were below the relevant GACs for all land use categories with the exception of Beryllium and Lead.

Very slightly elevated Beryllium (1.8mg/kg) concentrations were reported in the deeper natural soils obtained from trial pit TP-108B at 3.1-3.4mbgl. The recorded concentrations exceeded both Residential HP and Residential GAC of 1.7mg/kg. Concentrations Beryllium in the made ground soils sampled in this trial pits at the depth between 1.4 and 3.1mbgl did not exceed any of the relevant standards.

Very elevated concentrations of Lead (6,371mg/kg) were reported in TP-110 in the made ground sample taken from between 2.4 and 2.8mbgl. This concentration exceeds all available GAC standards.

5.2.2 Speciated Total Petroleum Hydrocarbons (TPH-CWG)

Low concentrations of hydrocarbon were reported in 12 of 15 excavated trial pits; however the majority of the hydrocarbon concentrations were reported below the all GAC standards.

Elevated concentrations of hydrocarbons were reported in the soil sample TP-108A obtained from made ground taken between 1.4 and 3.1mbgl. The concentration exceeded Residential HP and Residential GACs. Hydrocarbon concentrations in a deeper sample taken from this trial pit at the depth between 3.1-3.4mbgl, although being slightly elevated, did not exceed any of the GAC standards. In both cases, encountered TPH contamination was interpreted by the analytical laboratory as degraded diesel.

5.2.3 MTBE & BTEX

All concentrations of MTBE in all analysed samples were reported below the laboratory limit of detection (LOD) and all relevant GAC standards

All BTEX compounds in all analysed samples were reported below all relevant GAC standards, with majority of compounds reported below the LOD. A very low detection of Toluene (7µg/kg) was reported in sample TP-114 at depths between 0.1 and 2.8mbgl.

5.2.4 Poly aromatic hydrocarbons (PAHs)

No exceedance of PAH compounds was reported in majority of analyses soil samples with the exception of a single sample TP-115 taken from the depth between 0.1 and 2.4mbgl.

In the soil sample TP-115 an elevated concentration of Benzo(b)fluoranthene of 3,549µg/kg was reported which exceeded the Residential HP GAC standard. The concentrations of Benzo(a)pyrene (4,330µg/kg) were also elevated above both the Residential and Residential HP GAC standards. An exceedance of Dibenzo(ah)anthracene was also reported in the sample from TP-115 with a concentration of 768µg/kg. This concentration exceeds all available GAC standards including both residential, commercial and public open spaces GAC.

5.2.5 Volatile organic compounds (VOCs) - including Tentatively Identified Compounds (TICs)

In 15 of 20 analysed soil samples the concentrations of VOCs were reported below the LOD and, where available their respective GAC standards.

Some low concentrations of VOCs were reported in samples TP-106, TP-108A, TP-108B, TP-110 & TP-114; however the reported concentrations were below all the available GAC standards.

VOC TICs were reported in only one soil sample TP-108A. The reported concentrations ranged between 138µg/kg for Naphthalene, decahydro-, trans- and 275µg/kg for Benzene, (1-methyl-1-butenyl)-. There are no available GAC standards for VOC TICs parameters.

5.2.6 Semi-volatile organic compounds – including Tentatively Identified Compounds (TICs)

Semi-volatile organic compounds analysis included PAH (discussed in chapter 5.2.4), Phenols, Phtalates and other SVOCs

Phenols and Phthalate concentrations in all 20 analysed soil samples were reported below the LOD and available GAC standards.

Other low concentrations SVOC were reported in majority of the soil samples and included Carbazole and Dibenzofuran. There are no available GAC standards for these compounds.

SVOC TICs were reported in all soil samples taken during site investigation. The highest number of identified compounds was reported in sample TP-108. There are no available GAC standards for the SVOC TICs reported in the soil samples.

5.2.7 Cyanide

Free cyanide was reported below the LOD and all GAC standards in all analysed soil samples.

5.2.8 Other soil chemistry parameters

Total sulphate was analysed to assess a potential negative impact of this parameter in relation to future concrete structures which might come in contact with soils on the site.

Total sulphate was analysed in all soil samples with the reported concentrations ranging between 243mg/kg in TP-102B to 1,095mg/kg in TP-109. The reported concentrations were below the GAC standard for all proposed land use.

Soil pH was reported below the upper limit of 9 pH units for majority of the samples excluding sample TP-109 (9.21pH units) and TP-110 (9.54 pH units). In these two samples slightly elevated PH value exceeded the GAC standard for Residential, Residential HP and Commercial land use.

5.2.9 Asbestos

Free asbestos fibres were present in 12 of 15 excavated trial pit locations on site. The laboratory identified the fibres mainly as Chrysotile and Crocidolite and quantified as less than 0.1%. Further specialist testing is recommended to confirm these results.

5.3 Groundwater Assessment

The results of the groundwater analysis are summarised below and presented in Tables 6 to 8, in which results are compared to the relevant generic assessment criteria as outlined in section 5.1. Groundwater sampling logs are presented in Appendix C with physical observations and the laboratory analytical certificates presented in Appendix D.

5.3.1 Metals

The majority of the groundwater samples had no elevated metal parameters with the exception of elevated barium and arsenic.

Elevated Barium was reported in groundwater samples obtained from all four monitoring wells and ranged between 104µg/l in MW-101 and 1215µg/l in MW104 exceeding the IGV standard.

Localised, slightly elevated Arsenic (17.3µg/l) exceeding all relevant standards was reported in MW-104; however in the remaining three wells arsenic was reported below the LOD.

5.3.2 Anions

All analysed anions including sulphate, chloride, nitrite, nitrate and ammonia were reported below the available standards

Ortho phosphate, free & total cyanide and sulphide were reported below the LOD and available standards

5.3.3 Speciated Total Petroleum Hydrocarbons (TPH-CWG)

Samples obtained from four monitoring wells and an additional sample representing shallow groundwater taken from TP-107were analysed for presence of hydrocarbons. There were no elevated concentrations of hydrocarbons reported in all five analysed samples with all concentrations reported below the LOD and available standards.

5.3.4 MTBE & BTEX

In all analysed groundwater samples, MTBE and BTEX compounds were reported below the LOD and available standards.

5.3.5 Polyaromatic hydrocarbons (PAHs)

All four groundwater samples were free of PAH contamination with the reported concentrations below the LOD and all available standards.

5.3.6 Volatile Organic Compounds (VOCs)

All concentrations of VOCs were reported in all four analysed groundwater samples below the LOD and available standards.

5.3.7 Semi Volatile Organic Compounds (SVOCs)

All concentrations of SVOCs were reported in all four analysed groundwater samples below the LOD and available standards.

5.3.8 Other Parameters

Total Alkalinity parameter analysed in the groundwater samples on site ranged between 498mg/l and 1,100mg/l.

Chemical Oxygen Demand ranged between <7mg/l and 18mg/l

The groundwater pH measured on site ranged between 7.23 and 7.48, which is within acceptable range for groundwater

The electrical conductivity (EC) ranged between 808 µS/cm and 906µS/cm., which is within acceptable range for groundwater.

Total Organic Carbon reported in groundwater samples ranged between 6mg/l and 7mg/l.

5.4 Surface Water Assessment

The results of the surface water analysis are summarised below and presented in Tables 9 to 11, in which results are compared to the relevant generic assessment criteria as outlined in section 5.1. Surface water sampling logs are presented in Appendix C with physical observations and the laboratory analytical certificates presented in Appendix D.

5.4.1 Metals

No elevated metals were reported in both surface water samples taken from the Park Canal.

5.4.2 Anions

Analysed anions included sulphate, chloride, nitrite, nitrate, ammonia, ortho phosphate, free & total cyanide and sulphide. Currently there are no available standards for concentrations of these parameters in the surface waters. A comparison of concentrations of above parameters in the upstream and downstream locations show that there is no significant change between the reported concentrations in both locations

5.4.3 Speciated Total Petroleum Hydrocarbons (TPH-CWG)

No elevated hydrocarbon concentrations were reported in both samples obtained from the Park Canal with all the concentrations reported below the LOD.

5.4.4 MTBE & BTEX

In all analysed surface water MTBE and BTEX compounds were reported below the LOD and available standards.

5.4.5 Polyaromatic hydrocarbons (PAHs)

Bothe surface water samples were free of PAH contamination with the reported concentrations below the LOD and all available standards.

5.4.6 Volatile Organic Compounds (VOCs)

All concentrations of VOCs were reported in both surface water samples below the LOD and available standards.

5.4.7 Semi Volatile Organic Compounds (SVOCs)

All concentrations of SVOCs were reported in both analysed surface water samples below the LOD and available standards.

5.4.3 Other Parameters

Total Alkalinity parameter analysed in the surface water samples on site ranged slightly between 164mg/l and 166mg/l.

Chemical Oxygen Demand ranged between 22mg/l and 24mg/l

The surface water pH measured on site ranged between 7.47 and 7.64, which is within acceptable range for surface water

The electrical conductivity (EC) ranged between 395 µS/cm and 425µS/cm.

Total Organic Carbon reported in surface water samples ranged between 9mg/l and 10mg/l.

5.5 Revised Site Conceptual Model

Based on the information gained through the Phase I Environmental Desk Study (PQRA) and subsequent Phase II Site Investigations and GQRA, it is now possible and appropriate to revise the preliminary conceptual site model (CSM) outlined previously in Section 3.4.

5.5.1 Contamination Sources

Contamination sources for soil and water are summarised as follows:

Soil

- It is our understanding that the site will be redeveloped and that the work will involving the construction of residential dwellings with and without private gardens, commercial properties, surface car parking and landscaped areas. We also understand that the construction plan does not involve any excavations for basements. It is most likely that redevelopment of the site will involve importing soils to raise levels on the site. Should the import of clean soils be implemented, the majority of the contamination linkages outlined below can be excluded from the risk assessment;
- Elevated Lead concentrations reported in the sample collected from TP-110 at 2.4 and 2.8mbgl and exceeded Residential, Residential HP and Commercial GAC. The extent of the Lead contamination in the vicinity of TP110 should be further investigated, especially the shallow made ground strata;
- A slightly elevated concentration Beryllium was reported in the deeper natural soils in TP-108B (3.1-3.4mgl) exceeding Residential HP and Residential GACs. Elevated beryllium was not present in shallow made ground

sample TP-108A taken at depths between 1.4 and 3.1mbgl. For that reason Beryllium is excluded as a risk to human health through dermal contact and ingestion;

- Elevated concentrations of TPH hydrocarbons were reported in made ground in TP-108 location (1.4-3.1mbgl) exceeding Residential HP and Residential GAC. The lateral extent of hydrocarbons should be further investigated, especially in the eastern direction from current TP-108, where large mixed use Block 2 is planned to be erected;
- Elevated concentrations of PAHs were reported in trial pit TP-115 between 0.1 and 2.4mBGL exceeding Residential, Residential HP, Public Opens Spaces and on occasion Commercial GAC. The extent of PAH contamination should be further investigated as TP-115 is locate din the close proximity of future residential area which include dwellings with private gardens;
- Soil pH was reported exceeding the upper 9pH units limit in two locations including TP-109 (0.2-2.8mbgl) and in TP110 (2.4-2.8mbgl)
- Asbestos fibres were present 12 of 15 excavated trial pits; with only one trial pit (TP-103) with physical evidence of ACM observed on site. Further delineation and quantification of asbestos contamination is required to appropriately assess the potential risks;

Groundwater

- Shallow groundwater on site is present at depths between 0.7mBGL to 2.8mgl. A suspected hydrocarbon impact to a shallow groundwater in TP-107 was dismissed by laboratory analysis undertaken on the sample.
- Results indicate that groundwater in the limestone bedrock aquifer beneath the site is of general good quality with only exceedance reported for Barium in all four monitoring wells. Barium in groundwater samples is considered to be naturally occurring in the bedrock aquifer, especially in the volcanic type bedrock, which is present in the close proximity of MW-104. Distribution of Barium concentrations in the made ground and natural soils on site is similar and lower than a median value provided by National Soils Database. Therefore potential leaching of Barium from made ground/natural soils effecting in the increased concentrations in groundwater is excluded.
- Localised elevated Arsenic concentrations are confined to well MW-104 and are also considered occurring naturally in the nearby volcanic bedrock
- In regard to human health, groundwater in the bedrock is not considered a plausible contamination source as no exceedance of values for the residential or commercial SoBRA GACs were reported. Therefore the inhalation of hydrocarbon vapour does not present any potential risks to the future residential or commercial site users.

5.5.2 Contamination Pathways

The contamination pathways identified for the site are as follows:

- Vertical migration of dissolved-phase contamination from made ground and slightly contaminated natural subsoil into shallow groundwater beneath the site;

- Lateral migration of contamination in groundwater at shallow depth;
- Direct contact with shallow soils (ingestion, inhalation and dermal exposure);
- Inhalation of potential asbestos fibres;
- VOC migration into future site buildings and other confined spaces;
- Permeation of contaminates through plastic water mains.

5.5.3 Sensitive Receptors

The following receptors have been identified for the site:

- Human health – on site workers (development stage of the project), future site occupiers and maintenance workers
- Limestone bedrock aquifer beneath the site
- Park Canal – The canal is an engineered feature lined with impermeable barrier to prevent escape of the water. In addition the site and the canal are buffered by a deep drainage ditch. Both the site and canal are not considered to be hydrologically connected; therefore The Park Canal is deemed not to be a plausible environmental receptor
- Lower River Shannon (including Abbey River) SAC

By considering the sources, pathways and receptors (contaminant linkages), an assessment of the human health/ environmental risks is made with reference to the significance and degree of risk. This assessment is based on consideration of whether the source contamination can reach a receptor and hence whether it is of major or minor significance.

Table 5.3- Potential Hazard Severity Definition

CATEGORY	DEFINITIONS
Severe	Acute risks to human health, catastrophic damage to buildings, major risk to an environmental receptor such as a river
Medium	Chronic risk to human health, pollution of sensitive environmental receptor, significant damage to buildings and structures.
Mild	Pollution of non-sensitive waters, minor damage to buildings or structures
Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non-sensitive ecosystems or species

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given below.

Table 5.4- Probability of Risk Definition

CATEGORY	DEFINITIONS
High likelihood	Pollutant linkages may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term
Low likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so
Unlikely	Pollutant linkage may be present but the circumstances under which harm would occur and improbable

The potential severity of the risk and probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard.

Table 5.5 - Level of Risk Definition

PROBABILITY OF RISK	POTENTIAL SEVERITY s			
	Severe	Medium	Mild	Minor
High likelihood	Very high	High	Moderate	Low/Moderate
Likely	High	Moderate	Low/Moderate	Low
Low likelihood	Moderate	Low/Moderate	Low	Very low
Unlikely	Low/Moderate	Low	Very Low	Very low

The assessment is discussed below in terms of plausible contaminant linkages. A complete assessment of the contaminant linkages is presented in Table 5.6 with an outline of measures considered appropriate.

5.6 Contaminant Linkage Assessment

The qualitative contaminant linkage assessment has identified a number of linkages to be present on the site. The GQRA has been undertaken based on an assumed proposed commercial, residential without and with home grown produce and public open space (residential) use. If the proposed future use of the site changes then the level of risk would be altered.

Those contaminant linkages assessed are summarised in Table 5.6 presented below:

Table 5.6 –Pollutant Linkage Assessment

SOURCE	PATHWAY	RECEPTOR	SEVERITY	LIKELIHOOD	RISK LEVEL	COMMENTS I& RECOMMENDATIONS
Localised heavy metals, TPH, PAH contamination and localised elevated pH of soils	Leaching and migration in groundwater	Local abstraction borehole and limestone bedrock aquifer	Minor	Unlikely	Very Low	The nearest well is located approximately 400m south-west and up gradient of the site. Analysis of the groundwater present in the bedrock aquifer beneath the site shows no impact from the contaminated soils present on site to the bedrock aquifer. Migration of the contamination from fill material and shallow natural soils is restricted by presence of silty clays. Presence of localised Lead &TPH hotspot in the southern and northern portions of the site should be addressed prior to piling works planed for the site
	Volatile Compounds migration	Future residents & commercial users	Minor	Unlikely	Very Low	Hydrocarbon and PAH contamination present in two hotspots on site (TP108 & TP115 are unlikely to produce volatile gases ; in addition import of clean soils and installation of standard impermeable barriers beneath the proposed buildings will mitigate the risks
	Direct dermal contact, ingestion and inhalation	Future residents & commercial users	Minor	Unlikely	Very Low	Remediation required by providing landscaping of green areas an appropriate capping system to break the pollution pathways.
	Inhalation of asbestos fibres	Future residents & commercial users	Medium	Unlikely	Low	Asbestos fibres were identified in twelve locations. Import of clean soils and capping existing surfaces with uncontaminated soils will mitigate all asbestos associated risk for the future site users and residents.
	Inhalation of asbestos fibres	Construction workers	Medium	Low Likelihood	Low/ Moderate	Asbestos fibres were identified in twelve locations. It is recommended to further assess the occurrence and

						quantify presence of the fibres During construction work, workers should be vigilant for the presence of asbestos associated with deposited demolition waste and fill material and if encountered, works should stop immediately, risk assessments undertaken and remedial works completed if deemed necessary.
Localised TPH and PAH contamination in shallow soils	Permeation through plastic pipes	Future site residents and users	Minor	Unlikely	Very Low	All proposed water pipes should be laid in clean suitable material at the depth not exceeding the occurrence of groundwater on site
Groundwater Barium and localised Arsenic contamination	Migration in groundwater	Local abstraction borehole and limestone bedrock aquifer	Minor	Unlikely	Very Low	The nearest well is located approximately 400m south-west and up gradient of the site. There are no known groundwater users down-gradient of the site
	Horizontal off-site migration	Lower River Shannon (incl. Abbey River) SAC	Minor	Unlikely	Very Low	Elevated concentrations of Barium are considered to arise from groundwater migration from nearby volcanic bedrock into the limestone aquifer beneath the site and further down towards the protected sites. Downgradient wells MW-101, MW102 & MW103 show only slightly exceeded concentrations of Barium. Elevated arsenic is present only in one well MW104 and is also considered naturally occurring.

5.7 Summary of GQRA

The GQRA was completed considering current identified soil and groundwater contamination with regard to commercial, residential (without and without home grown produce) and public open spaces (residential) land use Site

investigations revealed that soil and groundwater quality at the site poses the following potential risks to environmental and human health receptors that require further consideration, assessment and or remediation:

Human Health

- A Very Low risk to future site residents from the volatile compounds migration into the future residential dwellings;
- A Very Low risk to future site residents from the dermal contact, ingestion and inhalation of contaminated soils
- Low to Moderate risk from exposure to asbestos fibres for workers undertaking redevelopment of the site
- Low risk from exposure to asbestos fibres for future site residents and commercial users
- Very Low risk to future site residents and commercial users from prolonged exposure to contaminates permeating through the potable water pipes;

Although the risks are considered low some suggested remediation work is recommended to protect the end site users as a result of the above pollutant linkages.

Groundwater

- Very Low risk from leaching of contamination from the contaminated soils to the limestone aquifer and the nearest abstraction borehole
- Very Low risk from groundwater Barium contamination to the limestone aquifer, the nearest abstraction borehole and to the Protected Areas in the vicinity of the site.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Verde has completed a Phase 1 and Phase 2 Site Investigation at the subject site. This report assumes that the site will be covered with imported clean soil material to elevate the site levels. Subsequently the site will be developed for mixed use including residential housing with associated private gardens, residential apartments, student accommodation, and commercial units. Approximately 50% of the site will be occupied by soft landscaping and also by areas of car parking and roadways covered by hardstanding which will constitute residential public open spaces as presented on Figure 5.

For most of the known site history the site has been undeveloped and idle. The recent historic use included facilitating storage of building materials and construction machinery. The site investigation completed on site in January 2019 revealed that the site was infilled with imported materials comprising mainly demolition waste.

Currently the site is mainly vacant accommodating only a single steel frame warehouse present in the eastern portion of the site. The site is located over a Locally Important aquifer of low vulnerability only one industrial use well, located within 1km radius of the site; however, this well is located up-gradient of the site and is not considered to be a viable receptor of potential contamination.

The site is neighbouring The Park Canal which is located beyond the site's northern boundary; however there is no proven hydrological connection between the site and the canal. The Abbey River is located approximately 580m to the west of the site. Lower River Shannon Special Area of Conservation (SAC) is located approximately 30m north of the site on the northers banks of the canal.

Recent site investigation works encountered a significant layer of made ground comprising sandy clay or clayey sand with abundance of demolition concrete, frequent red brick fragment and occasional limestone cobbles, metal and glass fragments. These anthropogenic deposits were underlain by natural deposits of peaty clay, peat and sandy or silty clay.

From a contamination and proposed re-development perspective, the following summary applies:

- Based on the completed assessment of risk to human health and environment the site will be suitable for the development as a mixed use property including residential with and without home grown produce, commercial and as areas of public open spaces in residential use, following the implementation of some remediation works:
- Human health risks are driving the GQRA risk assessment that has been completed in the previous sections, with the following exceedances of specific GAC Standards:
    - Lead –exceedance of Residential, Residential HP and Commercial GAC standards

- TPHs – exceedance of Residential and Residential HP GACs,
- PAHs – exceedance of Residential and Residential HP and on occasion, Commercial and POS Residential GAC standards,
- soil pH – exceedance of Residential and Residential HP and Commercial GAC standards,
- Asbestos - exceeding the Residential, Residential HP, POS Residential and Commercial GACs

- Groundwater beneath the site is of good quality with the exception of elevated concentrations of Barium and localised elevated Arsenic. Barium and arsenic groundwater compounds are confined to the bedrock aquifer and considered not to interfere with proposed development plans. Groundwater in the bedrock beneath the site is free of volatile substances and does not pose an inhalation risk to the future site users

6.2 Recommendations

Based on the findings and conclusions from the Phase 2 site investigation and GQRA the following recommendations are made:

- Localised hotspots of Lead, TPH and PAH contamination on site require further investigation of lateral and vertical extent. However based on the review of the current results the contamination issues can be managed by capping with a suitable layer of clean soils to act as a barrier to receptors.
- Presence of asbestos fibres in soils on site requires further delineation and quantification. This also can be potentially resolved by importing of clean soils and capping off the existing soil surfaces.

6.3 Summary of Remediation Options

Excavation of Contaminated Soils

This remedial option is focusing on minimising the potential risks by removal of the source of contamination. The advantage of this approach is an immediate and permanent beneficial effect of this action. The limitations include labour intensive activities, generation of large volumes of waste soil and raising the associated costs.

Capping Layer

The aim of the capping layer is to address risks posed to future site users from Lead, TPH, PAH and asbestos contamination present within soils to break the associated pollutant linkage.

It is considered that the emplacement of a clean cover system (capping layer) in all landscaped areas of the future development will remove the risks by breaking the pathway. Where buildings or hardstanding such as car parking, paved areas or roads are proposed, capping remedial works are not considered necessary as these features will effectively encapsulate contaminant concentrations preventing end users from coming into direct contact with soils.

The aim of the cover system/capping layer is to create an engineered horizontal layer of "uncontaminated" material on site to sever the source-pathway pollutant linkage and thus prevent direct contact between human (health) receptors, and the contaminated soil. It is considered sufficient to provide private domestic gardens with a capping layer consisting of a minimum of 600mm of clean material, comprising of a 200mm capillary break layer overlain by a minimum of 400mm 'clean' soil.

Sufficient and suitable top soils are not present on site and consequently this will need to be imported onto site for use in landscaped areas. These soils will be validated as detailed below.

Remedial Works for VOCs, Vapour Protection Measures

The human health land contamination risk assessments show that potential risks associated with the potential for inhalation of indoor vapours from VOCs mainly hydrocarbons. In case that removal of contamination source by excavation will be determined being not feasible, vapour protection measures can be incorporated into the foundations of the proposed residential and commercial buildings planed for the locations TP108 and TP115. The vapour protection will prevent any potential upward migration of ground vapours, breaking the pollutant linkage.

As a minimum, the recommended vapour protection measures will include:

- A hydrocarbon vapour reinforced proprietary membrane to prevent ingress into buildings of hydrocarbons. Only a membrane which has been tested for hydrocarbon contaminants shall be installed. The membrane shall be installed and certified by a specialist contractor. In addition to the membrane the protection measures will also include:
- All sub-surface service entrance points, joints and penetrations will be adequately sealed;
- A ventilated sub-floor will be provided with a height minimum of 150mm and capability of providing a complete volume change every 24 hours. Documentation will be provided which demonstrates complete volume change every 24 hours through calculations completed in accordance "BS5925:1991 Code of Practice for Ventilation Principles and Designing for Natural Ventilation, BSI".

<u>Membrane</u>

Membranes provide a low-permeability barrier preventing the ingress of gas from the ground into the building. The low permeability of the membrane resists the flow of gas which is encouraged to migrate to the atmosphere outside of the structure. The membrane will be laid continuously over the whole plan area of the building, including over any external cavity walls.

The performance of a vapour resistant membrane is dependent upon its ability to withstand the rigours of installation rather than permeability. Therefore the membrane will be resistant to puncture, abrasion and tearing and will be protected during its installation. The membrane will be installed on a flat surface clear of any grit, residual mortar,

etc, which may puncture the membrane. Walking on the membrane should be kept to a minimum. All folds should be removed and where possible. Laying the membrane out for a period before installation is beneficial. The use of bricks / pallets (with splinters and exposed nails) will be avoided as tearing / puncturing can easily occur. Lengths of timber or rubber bases should be used for the securing of membranes prior to pouring of floor concrete. Further detail about the installation of the membrane is included in the Environmental Management Plan.

Mitigation Measures to Minimise Environmental Impacts

The following measures should be employed on site to minimise the impact of the remedial works and prevent cross contamination of clean areas or off site receptors.

- Where off-site disposal of contaminated soils (waste) is required, all lorry loads will be sheeted once loaded and before leaving site to reduce dust generation. Provision will be made for washing vehicles' wheels at the site entrance to prevent any mud being deposited on local roads.
- During potential excavations in the hydrocarbon area there is a possibility to encounter of the potentially hydrocarbon contaminated perched groundwater. On site treatment of hydrocarbon contaminated water might include installation of Oil/Water separators and/or activated carbon filtration. Effectiveness of any treatment testing should be established prior to any discharge to the ground or surface water drainage etc. A discharge licence will be required if treated water is redirected to the surface water drainage. Optionally small volumes of hydrocarbon contaminated water might be managed by removal by tankers to the licenced facility.
- Any stockpiles, compounds and treatment areas will be positioned so as to minimise impact on neighbouring properties. In particular any stock piles containing contaminated soils will be placed on an impermeable surface while awaiting the results of validation testing. The stockpiles will be sheeted to minimise dust emissions and also to minimise the potential for leaching rainwater and run off contaminating clean areas
- Adequate precautions will be taken during site works to prevent surface water run-off from the site affecting the local surface waters and drainage network.
- Dust monitoring and dust suppression will be carried out during any remedial works. As a minimum this will include visual inspections to identify dust generating activities and damping down such sources as when required. The aim should be to prevent the generation of dust and any potential risk to site workers and neighbouring properties.
- Monitoring for airborne asbestos fibres will also be completed during any earthworks and routinely during construction works until the capillary break of the capping layers/ hardstanding have been laid. This will include within any areas where earthworks are being undertaken and at the site boundaries. Where asbestos fibres are identified above detection limits, mitigation measures will be taken to mitigate and prevent the release of fibres to include damping down of sources and in particular any vehicle haul routes. This monitoring will be undertaken in conjunction with monitoring specified below in regard to dust.

Remediation to Protect Services

Elevated contaminants have been identified in places and can permeate plastic water supply pipes. Consequently, all services should be laid in trenches backfilled with material considered to be clean and not contaminated.

Health and Safety Measures for Construction Workers

The risks posed to construction workers through short term exposure to the reduced quality soils containing elevated concentrations of heavy metals hydrocarbons, PAH and asbestos can be minimised through adherence to the relevant health and safety regulations / guidance.

The health and safety implications of working with potentially contaminated soils should be fully considered prior to the commencement of any earthworks through the development of an appropriate health and safety plan. It is considered that the measures adopted to minimise the exposure of construction workers to contaminants should include following as a minimum:

- Hygiene facilities
- Provision should be made for washing and toilet facilities; clean and dirty collection, laundering and storage facilities for protective clothing; and wash facility for footwear.
- Personal hygiene
- Restrictions should be adopted for eating, drinking and smoking on site.
- Personal protective equipment (PPE)

Asbestos Considerations

The site investigation, soil analysis and GQRA identified asbestos within shallow soils on site. In order to ensure there are no significant risks to construction workers on site and off site occupiers, a watching brief will be maintained to visually identify suspect ACM fragments. A strategy of asbestos monitoring for fibres in air and use of personal monitoring will also be completed. For this purpose, a specialist contractor should be employed. It is likely that this will be completed daily during the start of any earthworks for a period, down scaled to regular periodic monthly monitoring should asbestos not be identified or should monitored airborne fibres not be identified above detection limits. The contractor will be required to monitor weather conditions, complete site inspections for visual dust generation. Where asbestos is identified, or unsatisfactory air monitoring results are returned or visual evidence of dust is noted, a risk assessment may need to be completed and additional mitigations and or remediation undertaken.

Additional Remediation Recommendations

It is recommended that an environmental management plan should be developed and implemented prior to the redevelopment of the site to assess and mitigate any environmental human health risks, or risks.

Any soil or waste removal of from the site will need to be undertaken in strict accordance with waste management legislation, ensuring that selected soil recovery or disposal facilities have the appropriate authorisation (Waste Facility Licence or Permit) and ensuring that all hauliers are fully authorised;

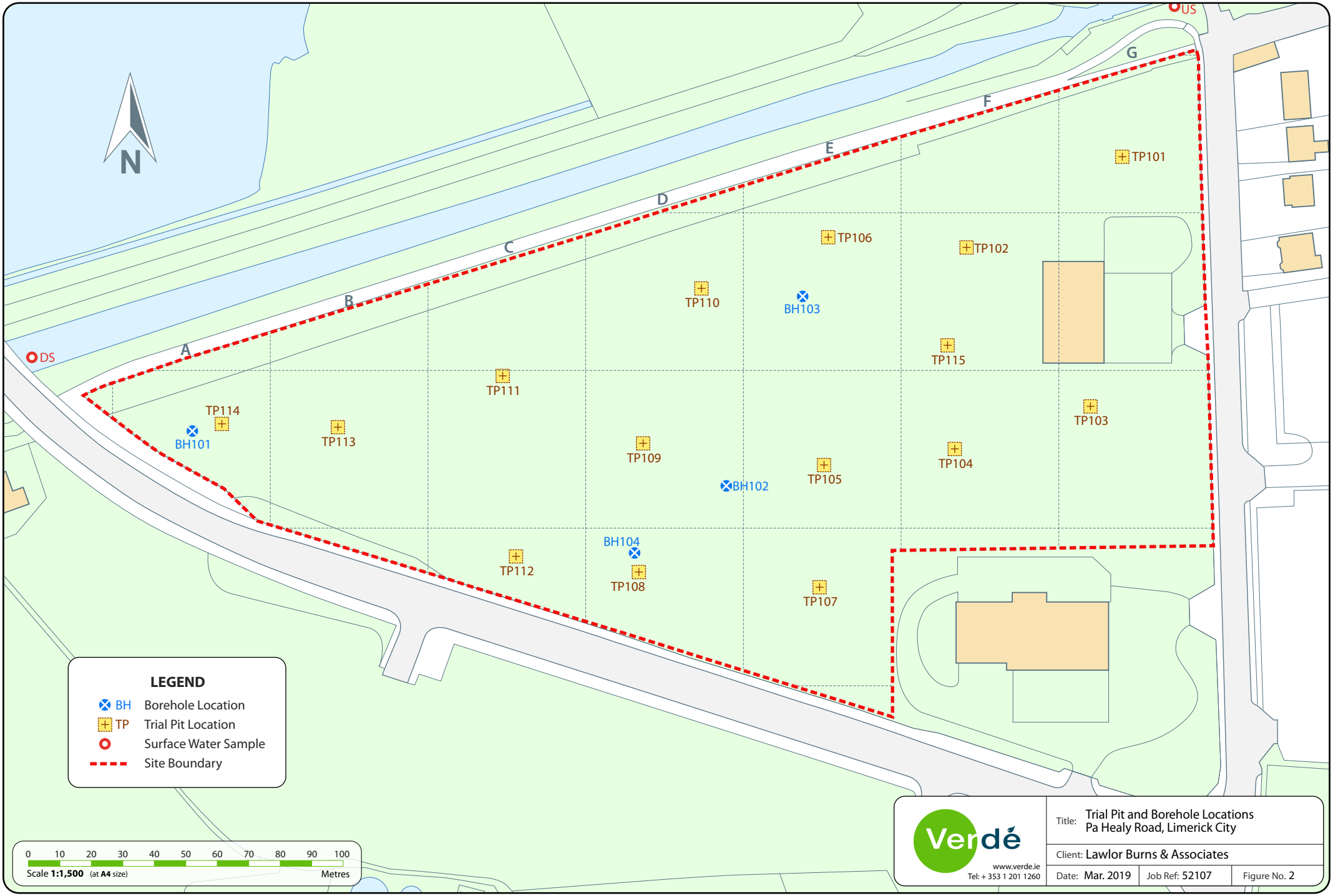
Material excavation, segregation and removal should be managed and supervised by a competent person to ensure correct procedures are followed and that wastes are appropriately logged and tracked according to waste management requirements and legislation.

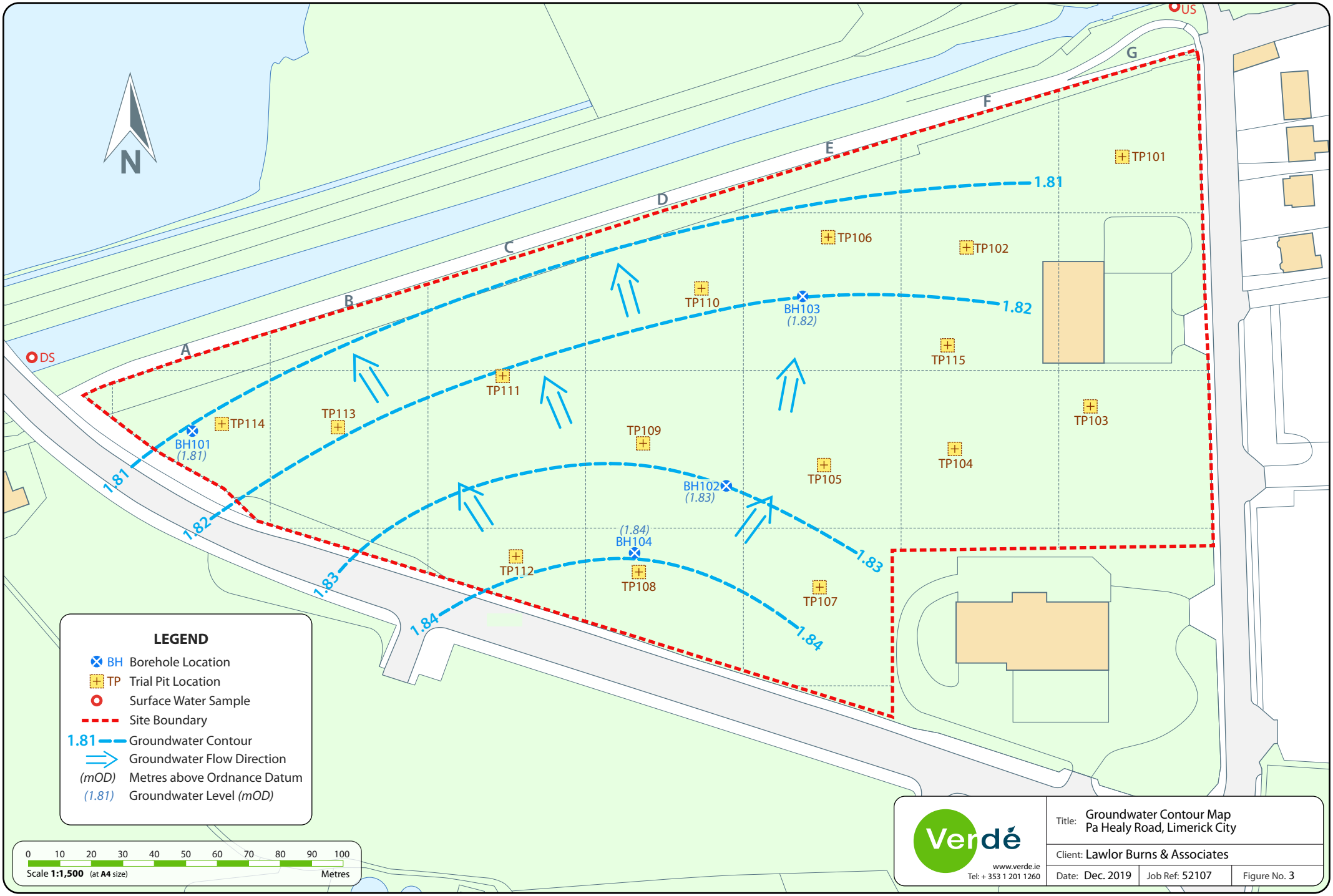
7 REFERENCES

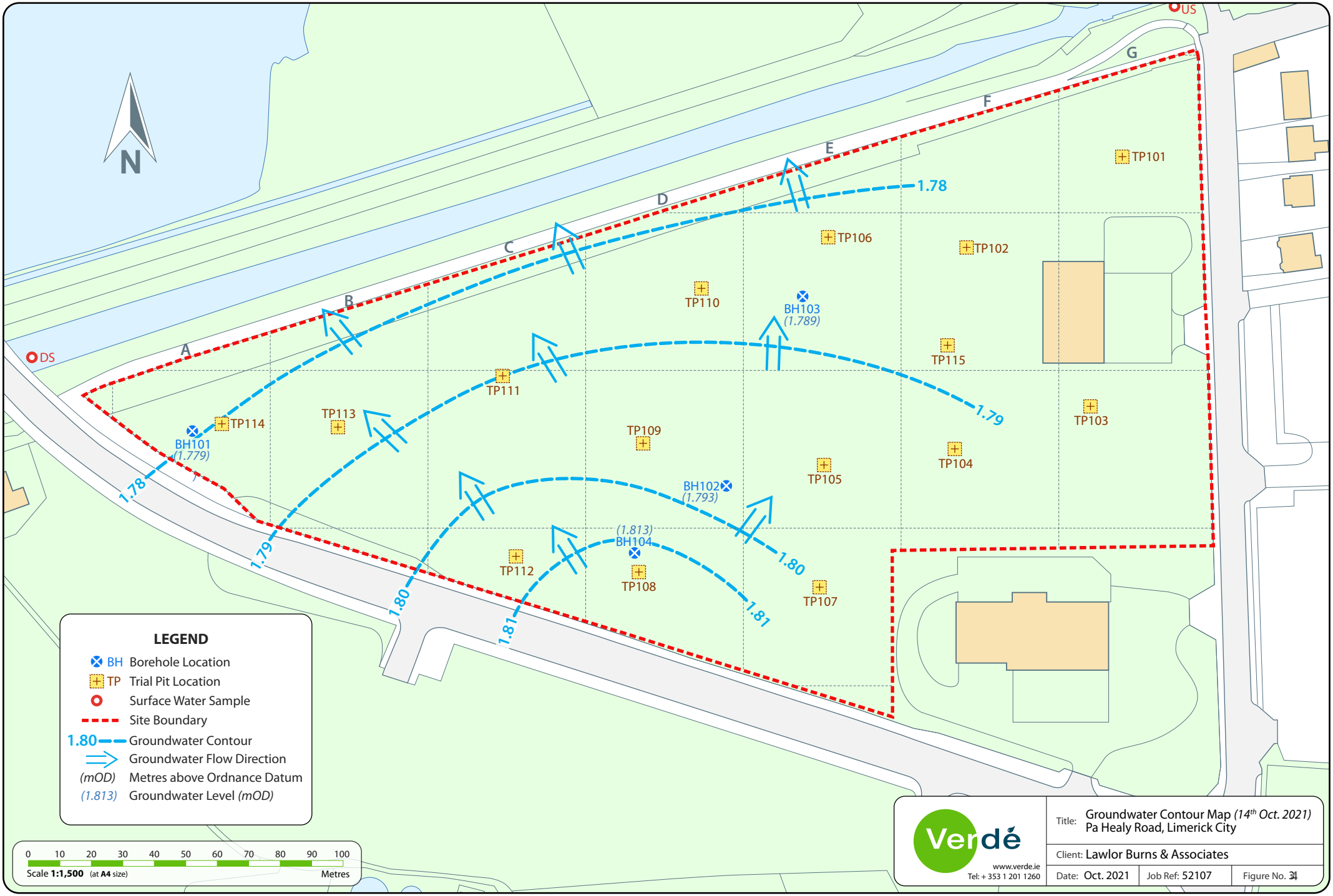
- Geological Survey of Ireland, Online geological and groundwater databases;
- Ordinance Survey Ireland, Online historic maps and aerial photographs;
- Environmental Protection Agency, Online Envision Map databases;
- National Parks & Wildlife, Online Envision Map databases;
- Investigation of potentially contaminated sites – Code of Practice, BS 10175:2011+A1:2013;
- "Model Procedures for the Management of land Contamination" Contaminated Land Report 11 (CLR 11); published by the UK Environment Agency & DEFRA;
- Framework for the Management of Contaminated Land and Groundwater at EPA Licensed Facilities, EPA 2013;
- CIRIA Document C552: Contaminated Land Risk assessment 'A Guide to Good Practice;
- EPA Landfill Monitoring Manual 2003- trigger levels for boreholes outside the waste body; (EPA Ireland);
- CIRIA. Assessing Risks Posed by Hazardous Ground Gases to Buildings. Report C665, 2007;
- 2010 - Guidance on monitoring landfill gas surface emissions LFTGN07 v2, Environment Agency(UK) Guidance for monitoring landfill gas engine emissions LFTGN08 v2, Environment Agency (UK), 2010;
- BS 8576:2013. Guidance on Investigations for Ground Gas - Permanent Gases and Volatile Organic Compounds (VOCs);
- BS 8485:2015. Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- Land Quality Management Ltd. – The LQM/CIEH S4ULs for Human Health Risk Assessment - 2015
- Generic Assessment Criteria (GAC) for Assessing Vapour Inhalation Risks from Groundwater Sources. This GACs are developed by Society of Brownfield Risk Assessment (SoBRA) I - February 2017.
- Asbestos R&D Survey Report at Limerick Transport, Park Rd, Rhebogue, Limerick, Ireland For Verde Environmental Consultants Ltd – Precision Group- February 2019
- AA Stage 2 NIS document (SLR Consulting, December 2019).

FIGURES


BALLYGRENNAN
CLONCONANE
R464
Ballynanty
SHANNABOOLY
Caherdavin
R445
LIMERICK
R463
GILLOGE
STRAWICKEEN
BALLYVOLLANE
GARRAUN
CLOONCARHY
N
Sreelane
Castletroy
RIVERS
Dromroe
Newcastle
DUBLIN RD
Site Location
R445
Garryowen
RIVER SHANNON
BLACKBOY RD
CHILDERS RD
Singland
Newtown
TO DUBLIN
DOCK RD
R510
Towlerton
M7
BALLYMORRIS RD
R527
R509
Galvone
Railway
BALLINACURRA RD
KILMATTOCK RD
Ballykeeffe
Ballincurra
BALLYSIMON
MILLTOWN
BANEMORE
Railway
M7
WHITEHALL
INCHMORE
GOULDAVOHER
ROXBOROUGH RD
BALLYBRENNAN
BALLYSHEEDY EAST
SLUGGARY
BALLYSHEEDY WEST
RATHURD
0
1
2
3
4
Scale 1:50,000 (at A4 size)
Kilometres
Verdé
www.verde.ie
Tel: + 353 1 201 1260
Title: Site Location Map
Client: Lawlor Burns & Associates
Date: Mar. 2019
Job Ref: 52107
Figure No. 1


N
US
DS
A
B
C
D
E
F
G
TP101
TP106
TP102
TP110
BH103
TP115
TP111
TP114
BH101
TP113
TP103
TP109
TP105
TP104
BH102
BH104
TP112
TP108
TP107
LEGEND
BH Borehole Location
TP Trial Pit Location
Surface Water Sample
Site Boundary
0 10 20 30 40 50 60 70 80 90 100
Scale 1:1,500 (at A4 size)
Metres
Verdé
www.verde.ie
Tel: + 353 1 201 1260
Title: Trial Pit and Borehole Locations
Pa Healy Road, Limerick City
Client: Lawlor Burns & Associates
Date: Mar. 2019
Job Ref: 52107
Figure No. 2


N
US
DS
A
B
C
D
E
F
G
TP101
TP102
TP103
TP104
TP105
TP106
TP107
TP108
TP109
TP110
TP111
TP112
TP113
TP114
TP115
BH101
(1.81)
BH102
(1.83)
BH103
(1.82)
(1.84)
BH104
1.81
1.82
1.83
1.84
LEGEND
BH Borehole Location
TP Trial Pit Location
Surface Water Sample
Site Boundary
1.81 Groundwater Contour
Groundwater Flow Direction
(mOD) Metres above Ordnance Datum
(1.81) Groundwater Level (mOD)
0 10 20 30 40 50 60 70 80 90 100
Scale 1:1,500 (at A4 size)
Metres
Verdé
www.verde.ie
Tel: + 353 1 201 1260
Title: Groundwater Contour Map
Pa Healy Road, Limerick City
Client: Lawlor Burns & Associates
Date: Dec. 2019
Job Ref: 52107
Figure No. 3


N
US
DS
A
B
C
D
E
F
G
TP101
TP102
TP103
TP104
TP105
TP106
TP107
TP108
TP109
TP110
TP111
TP112
TP113
TP114
TP115
BH101
(1.779)
BH102
(1.793)
BH103
(1.789)
BH104
(1.813)
1.78
1.79
1.80
1.81
LEGEND
BH Borehole Location
TP Trial Pit Location
Surface Water Sample
Site Boundary
1.80 Groundwater Contour
Groundwater Flow Direction
(mOD) Metres above Ordnance Datum
(1.813) Groundwater Level (mOD)
0 10 20 30 40 50 60 70 80 90 100
Scale 1:1,500 (at A4 size)
Metres
Verdé
www.verde.ie
Tel: + 353 1 201 1260
Title: Groundwater Contour Map (14th Oct. 2021)
Pa Healy Road, Limerick City
Client: Lawlor Burns & Associates
Date: Oct. 2021
Job Ref: 52107
Figure No. 3

LEGEND

- SUBJECT SITE BOUNDARY
- PROPOSED FENCE / GATE TO THE PUBLICK OPEN SPACE
- PROPOSED FENCE / GATE TO THE COMMUNAL OPEN SPACE
- EXISTING WAREHOUSE TO BE DEMOLISHED
- PROPOSED COMMUNITY FACILITIES BUILDING
- PROPOSED STUDENT ACCOMMODATION BLOCK & RETAIL AT GF
- PROPOSED RESIDENTIAL BLOCK
- PROPOSED HOUSES
- PUBLIC OPEN SPACE 5136 SQM
- COMMUNAL OPEN SPACE 8186 SQM
- PRIVATE OPEN SPACE

LANDSCAPING & SURFACES

- PROPOSED TREES & HEDGES
- PROPOSED PUBLIC OPEN SPACE
- CONCRETE PEDESTRIAN PATH
- PAVED PATH/DRIVEWAY - COBBLESTONE
- ROAD MATERIAL - ASPHALT
- EXISTING STONE WALL TO BE RETAINED
- EXISTING BLOCK WALL TO BE DEMOLISHED

ROADS LEGEND

PROPOSED ROAD NUMBER	ROAD 1
ROAD CENTRELINE	
PROPOSED ROAD LEVEL	28.163
TACTILE PAVING (UNCONTROLLED)	
PROPOSED SIGHT LINE	

TOTAL AREA OF SITE - 40 251 sqm - 4.025ha - 100%

TOTAL PUBLIC OPEN SPACE - 5136 sqm - 17%

N

1 PROPOSED SITE LAYOUT

1 : 500

PROJECT ■ CANAL BANKS AT PA HEALY ROAD/PARK ROAD, LIMERICK

CLIENT ■ REVINGTON DEVELOPMENTS LTD rev.

TITLE ■ PROPOSED SITE LAYOUT

■ SCALE: 1:500 @A0 ■ DATE: JAN 2019 ■ DRWG. No. 1248-18-03 ■ DRN. BY OLIVER CARTY

OCA ■ ARCHITECTS
44-45 LR CAMDEN ST DUBLIN 2
Tel 01 4763922 Fax 01 4780028 Email info@ocaarchitects.ie

TABLES

Table 1: Pa Healy Road. Soil Analytical Results - Metals, Anions & Other Parameters

Sample ID:	Units	LQM S4U Levels **Residential** (without homegrown produce)	LQM S4U Levels **Residential** (with homegrown produce)	LQM S4U Levels **Comercial**	Public Open Spaces Residential	TP-101A	TP-101B	TP-102A	TP-102B	TP-103	TP-104A	TP-104B	TP-105	TP-106	TP-107
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19
Depth:						0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30	2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80
METALS															
Arsenic	mg/kg	40	37	635	79	7.5	6.3	7.3	6.2	7	7.3	8.1	7.9	6.5	7.3
Barium	mg/kg	-	-	-	-	130	141	136	107	184	169	151	109	126	125
Beryllium	mg/kg	1.7	1.7	12	2.2	0.8	0.7	0.7	0.8	0.7	0.6	0.9	0.7	0.6	0.6
Cadmium	mg/kg	85	11	190	120	0.3	0.2	0.4	0.3	0.5	0.3	0.1	0.3	0.2	0.4
Chromium III	mg/kg	910	910	8600	1500	51	41.6	23.1	21.6	21.5	20	54.6	44.6	17.5	24.9
Hexavalent Chromium	mg/kg	6	6	33	7.7	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Copper	mg/kg	7100	2400	68000	12000	35	13	41	24	21	49	13	26	26	41
Lead	mg/kg	310	200	2300	-	92	26	77	69	96	178	39	66	64	112
Mercury	mg/kg	56	40	1100	120	0.3	<0.1	<0.1	0.3	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	180	180	980	230	30.3	26.8	32.3	27.1	26	22.2	23.9	25.7	19.8	30.7
Selenium	mg/kg	430	250	12000	1100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vanadium	mg/kg	1200	410	9000	2000	33	27	33	22	25	22	26	27	21	34
Water Soluble Boron	mg/kg	-	-	-	-	1.5	0.5	1.1	1.3	0.5	1	0.5	1	1.8	0.9
Zinc	mg/kg	40000	3700	730000	81000	118	45	169	71	235	139	41	205	100	125
Anions & Other Parameters															
Total Sulphate as SO4	mg/kg	2400 (See note)	2400 (See note)	2400 (See note)	-	857	293	961	243	1068	958	381	773	885	1186
Sulphate as SO4 (2:1 Ext)	g/l	-	-	-	-	0.1087	0.0167	0.065	0.045	0.0189	0.0731	0.0415	0.1151	0.072	0.0759
Free Cyanide	mg/kg	34	34	1400	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Natural Moisture Content	%	-	-	-	-	26.1	15.7	17.3	28.5	24.2	15.7	25.5	11.4	18.5	24.1
pH	pH units	<5 or >9	<5 or >9	<5 or >9	-	7.59	7.88	8.33	7.86	8.54	8.28	7.88	8.34	7.96	7.95
Asbestos Screen & Identification															
Asbestos Level Screen	None	Fibres Present	Fibres Present	Fibres Present	Fibres Present	NAD	NAD	less than 0.1%	less than 0.1%	less than 0.1%	less than 0.1%	NAD	NAD	less than 0.1%	less than 0.1%

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

NAD - No Asbestos Detected

BRE (2005). Sulphate is not considered to pose a potential risk to human health under normal circumstances – this GAC applies to construction cases only and is set at the upper limit for DS-1 Design Sulphate Class concrete.

Table 1: Pa Healy Road. Soil Analytical Results - Metals, Anions & Other Parameters

Sample ID:	Units	LQM S4U Levels **Residential** (without homegrown produce)	LQM S4U Levels **Residential** (with homegrown produce)	LQM S4U Levels **Comercial**	Public Open Spaces Residential	TP-108A	TP-108B	TP-109	TP-110	TP-111A	TP-111B	TP-112	TP-113	TP-114	TP-115
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19
Depth:						1.40-3.10	3.10-3.40	0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40
METALS															
Arsenic	mg/kg	40	37	635	79	8.8	12.9	8.6	9	6.9	6	8.3	6.5	6.3	4.9
Barium	mg/kg	-	-	-	-	82	150	171	175	142	69	151	117	102	108
Beryllium	mg/kg	1.7	1.7	12	2.2	0.8	*1.8*	0.7	0.6	0.7	<0.5	0.7	0.8	0.7	<0.5
Cadmium	mg/kg	85	11	190	120	0.2	0.6	0.9	0.5	0.2	0.2	0.3	0.2	0.2	0.2
Chromium III	mg/kg	910	910	8600	1500	56.8	33.2	25.7	21.1	57.4	17.3	22.7	37	53.6	17.9
Hexavalent Chromium	mg/kg	6	6	33	7.7	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Copper	mg/kg	7100	2400	68000	12000	19	33	36	75	31	19	25	41	23	24
Lead	mg/kg	310	200	2300	-	42	47	153	*6371*	52	46	158	49	27	66
Mercury	mg/kg	56	40	1100	120	0.2	<0.1	0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	180	180	980	230	39	42.8	35.1	28.6	35.7	20.5	23.5	42.4	33.1	20.1
Selenium	mg/kg	430	250	12000	1100	<1	1	<1	<1	1	<1	<1	1	1	<1
Vanadium	mg/kg	1200	410	9000	2000	26	33	36	19	39	18	23	49	36	23
Water Soluble Boron	mg/kg	-	-	-	-	0.7	1	1.2	4.5	1.1	0.8	1.3	0.7	0.7	0.6
Zinc	mg/kg	40000	3700	730000	81000	67	81	292	644	98	51	180	108	94	102
Anions & Other Parameters															
Total Sulphate as SO4	mg/kg	2400 (See note)	2400 (See note)	2400 (See note)	-	612	332	1095	935	527	545	712	469	527	730
Sulphate as SO4 (2:1 Ext)	g/l	-	-	-	-	0.0518	0.0121	0.04	<0.0015	0.0368	0.0057	0.079	0.0645	0.0988	0.0385
Free Cyanide	mg/kg	34	34	1400	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Natural Moisture Content	%	-	-	-	-	14.7	26.3	16.5	20.6	15.5	19.1	15.4	14.9	14.3	14.6
pH	pH units	<5 or >9	<5 or >9	<5 or >9	-	8.55	7.99	9.21	9.54	8.01	8.27	8.46	8.14	7.97	8.63
Asbestos Screen & Identification															
Asbestos Level Screen	None	Fibres Present	Fibres Present	Fibres Present	Fibres Present	NAD	less than 0.1%	less than 0.1%	Asbestos level cannot be determined from Screen. Quantification required.	NAD	less than 0.1%	Asbestos level cannot be determined from Screen. Quantification required.	less than 0.1%	NAD	less than 0.1%

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

NAD - No Asbestos Detected

BRE (2005). Sulphate is not considered to pose a potential risk to human health under normal circumstances – this GAC applies to construction cases only and is set at the upper limit for DS-1 Design Sulphate Class concrete.

Table 2: Pa Healy Road. Soil Analytical Results - TPH, MTBE & BTEX

Sample ID:	Units	LQM S4U Levels **Residential** (without homegrown produce)	LQM S4U Levels **Residential** (with homegrown produce)	LQM S4U Levels **Comercial**	**Public Open Spaces** Residential	TP-101A	TP-101B	TP-102A	TP-102B	TP-103	TP-104A	TP-104B	TP-105	TP-106	TP-107
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19
Depth:						0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30	2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80
PETROLEUM HYDROCARBONS															
ALIPHATICS															
>C5-C6	mg/kg	42	42	2400	570000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>C6-C8	mg/kg	100	100	5300	600000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>C8-C10	mg/kg	27	27	1300	13000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>C10-C12	mg/kg	130	130	6100	13000	<0.2	<0.2	29.9	<0.2	<0.2	<0.2	<0.2	3.7	<0.2	<0.2
>C12-C16	mg/kg	1100	1100	43000	13000	<4	<4	59	<4	<4	<4	<4	18	<4	<4
>C16-C21	mg/kg	65000	65000	>1 x 10^6	250000	<7	<7	115	<7	<7	<7	<7	32	14	<7
>C21-C35	mg/kg					121	52	294	<7	<7	95	<7	237	105	<7
Total aliphatics C5-35	mg/kg	-	-	-	-	121	52	498	<19	<19	95	<19	291	119	<19
AROMATICS															
>C5-EC7	mg/kg	370	70	15000	56000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC7-EC8	mg/kg	860	130	33000	56000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC8-EC10	mg/kg	47	47	2200	5000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC10-EC12	mg/kg	250	250	11000	5000	<0.2	<0.2	3.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>EC12-EC16	mg/kg	1800	140	35000	5100	<4	<4	29	<4	<4	<4	<4	11	<4	<4
>EC16-EC21	mg/kg	1900	260	28000	3800	<7	<7	81	<7	<7	24	<7	33	14	<7
>EC21-EC35	mg/kg	1900	1100	28000	3800	207	157	284	<7	<7	239	<7	224	146	63
Total aromatics C5-35	mg/kg	-	-	-	-	207	157	397	<19	<19	263	<19	268	160	63
Total aliphatics and aromatics(C5-35)	mg/kg	-	-	-	-	328	209	895	<38	<38	358	<38	559	279	63
MTBE	ug/kg	39000	31000	7400000	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Benzene	ug/kg	380	87	14940	72000	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Toluene	ug/kg	880000	130000	33000000	56000000	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Ethylbenzene	ug/kg	83000	47000	3200000	24000000	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
m/p-Xylene	ug/kg	total xylenes 79000	total xylenes 56000	total xylenes 3200000	total xylenes 41000000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
o-Xylene	ug/kg					<3	<3	<3	<3	<3	<3	<3	<3	<3	<3

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 2: Pa Healy Road. Soil Analytical Results - TPH, MTBE & BTEX

Sample ID:	Units	LQM S4U Levels **Residential** (without homegrown produce)	LQM S4U Levels **Residential** (with homegrown produce)	LQM S4U Levels **Comercial**	Public Open Spaces Residential	TP-108A	TP-108B	TP-109	TP-110	TP-111A	TP-111B	TP-112	TP-113	TP-114	TP-115
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19
Depth:						1.40-3.10	3.10-3.40	0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40
PETROLEUM HYDROCARBONS															
ALIPHATICS															
>C5-C6	mg/kg	42	42	2400	570000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>C6-C8	mg/kg	100	100	5300	600000	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>C8-C10	mg/kg	27	27	1300	13000	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>C10-C12	mg/kg	130	130	6100	13000	*305.7*	11.5	<0.2	<0.2	<0.2	5.2	<0.2	<0.2	<0.2	<0.2
>C12-C16	mg/kg	1100	1100	43000	13000	773	37	8	<4	<4	20	<4	<4	<4	<4
>C16-C21	mg/kg	65000	65000	>1 x 10^6	250000	875	38	13	<7	<7	31	<7	<7	<7	<7
>C21-C35	mg/kg					301	<7	54	70	<7	51	28	32	<7	72
Total aliphatics C5-35	mg/kg	-	-	-	-	2256	87	75	70	<19	107	28	32	<19	72
AROMATICS															
>C5-EC7	mg/kg	370	70	15000	56000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC7-EC8	mg/kg	860	130	33000	56000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC8-EC10	mg/kg	47	47	2200	5000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC10-EC12	mg/kg	250	250	11000	5000	134.8	7.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>EC12-EC16	mg/kg	1800	140	35000	5100	*493*	21	<4	<4	<4	<4	<4	<4	<4	<4
>EC16-EC21	mg/kg	1900	260	28000	3800	*642*	33	19	10	<7	<7	<7	<7	<7	<7
>EC21-EC35	mg/kg	1900	1100	28000	3800	237	10	105	110	35	<7	<7	<7	41	132
Total aromatics C5-35	mg/kg	-	-	-	-	1507	71	124	120	35	<19	<19	<19	41	132
Total aliphatics and aromatics(C5-35)	mg/kg	-	-	-	-	3763	158	199	190	<38	107	<38	<38	41	204
MTBE	ug/kg	39000	31000	7400000	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Benzene	ug/kg	380	87	14940	72000	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Toluene	ug/kg	880000	130000	33000000	56000000	<3	<3	<3	<3	<3	<3	<3	<3	7	<3
Ethylbenzene	ug/kg	83000	47000	3200000	24000000	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
m/p-Xylene	ug/kg	total xylenes 79000	total xylenes 56000	total xylenes 3200000	total xylenes 41000000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
o-Xylene	ug/kg					<3	<3	<3	<3	<3	<3	<3	<3	<3	<3

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 3: Pa Healy Road. Soil Analytical Results - VOCs

Sample ID:		LQM S4U Levels Residential (without homegrown produce)	LQM S4U Levels Residential (with homegrown produce)	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-101A	TP-101B	TP-102A	TP-102B	TP-103	TP-104A
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19
Depth:						0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30
	Units										
VOCS											
Dichlorodifluoromethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2
Methyl Tertiary Butyl Ether	ug/kg	33000	310000	7400000	-	<2	<2	<2	<2	<2	<2
Chloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Vinyl Chloride	ug/kg	0.77	0.64	59	3500	<2	<2	<2	<2	<2	<2
Bromomethane	ug/kg	-	-	-	-	<1	<1	<1	<1	<1	<1
Chloroethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2
Trichlorofluoromethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2
1,1-Dichloroethene (1,1 DCE)	ug/kg	150	150	24000	-	<6	<6	<6	<6	<6	<6
Dichloromethane (DCM)	ug/kg	1200	470	250000	-	<30	<30	<30	<30	<30	<30
trans-1-2-Dichloroethene	ug/kg	120	110	21000	-	<3	<3	<3	<3	<3	<3
1,1-Dichloroethane	ug/kg	1400	1400	260000	-	<3	<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	ug/kg	69	66	14000	-	<3	<3	<3	<3	<3	<3
2,2-Dichloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
Bromochloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Chloroform	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
1,1,1-Trichloroethane	ug/kg	9000	8800	660000	140000000	<3	<3	<3	<3	<3	<3
1,1-Dichloropropene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Carbon tetrachloride	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,2-Dichloroethane	ug/kg	9.2	7.1	670	29000	<4	<4	<4	<4	<4	<4
Benzene	ug/kg	380	87	14940	72000000	<3	<3	<3	<3	<3	<3
Trichloroethene (TCE)	ug/kg	17	16	1200	1200000	<3	<3	<3	<3	<3	<3
1,2-Dichloropropane	ug/kg	-	-	-	-	<6	<6	<6	<6	<6	<6
Dibromomethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Bromodichloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
cis-1-3-Dichloropropene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
Toluene	ug/kg	880000	130000	33000000	56000000	<3	<3	<3	<3	<3	<3
trans-1-3-Dichloropropene	ug/kg	-				<3	<3	<3	<3	<3	<3
1,1,2-Trichloroethane	ug/kg	510	390	89000	-	<3	<3	<3	<3	<3	<3
Tetrachloroethene (PCE)	ug/kg	180	180	190	1400000	<3	<3	<3	<3	<3	<3
1,3-Dichloropropane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Dibromochloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
1,2-Dibromoethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Chlorobenzene	ug/kg	460	460	56000	11000000	<3	<3	<3	<3	<3	<3
1,1,1,2-Tetrachloroethane	ug/kg	1500	1200	110000	1400000	<3	<3	<3	<3	<3	<3
Ethylbenzene	ug/kg	83000	47000	3200000	24000000	<3	<3	<3	<3	<3	<3
p/m-Xylene	ug/kg	total xylene	total xylene	total xylene	totla xylene	<5	<5	<5	<5	<5	<5
o-Xylene	ug/kg	79000	56000	3200000	41000000	<3	<3	<3	<3	<3	<3
Styrene	ug/kg	21000	6900	3100000	-	<3	<3	<3	<3	<3	<3
Bromoform	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Isopropylbenzene	ug/kg	6800	6600	1300000	-	<3	<3	<3	<3	<3	<3
1,1,2,2-Tetrachloroethane	ug/kg	3900	1600	270000	1400000	<3	<3	<3	<3	<3	<3
Bromobenzene	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
Propylbenzene	ug/kg	23000	21000	3800000	-	<4	<4	<4	<4	<4	<4
2-Chlorotoluene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
4-Chlorotoluene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
tert-Butylbenzene	ug/kg	-	-	-	-	<5	<5	<5	<5	<5	<5
1,2,4-Trimethylbenzene	ug/kg	240	220	39000	-	<6	<6	<6	<6	<6	<6
sec-Butylbenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
4-Isopropyltoluene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,3-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,4-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
n-Butylbenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,2-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,2-Dibromo-3-chloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,2,4-Trichlorobenzene	ug/kg	-	-	-	-	<7	<7	<7	<7	<7	<7
Hexachlorobutadiene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
Naphthalene	ug/kg	-	-	-	-	<27	<27	<27	<27	<27	<27
1,2,3-Trichlorobenzene	ug/kg	-	-	-	-	<7	<7	<7	<7	<7	<7
VOC TICs						ND	ND	ND	ND	ND	ND
Methyl Tertiary Butyl Ether	ug/kg	33000	310000	7400000	-	<2	<2	<2	<2	<2	<2
Benzene	ug/kg	380	87	14940	72000000	<3	<3	<3	<3	<3	<3
Toluene	ug/kg	880000	130000	33000000	56000000	<3	<3	<3	<3	<3	<3
Ethylbenzene	ug/kg	83000	47000	3200000	24000000	<3	<3	<3	<3	<3	<3
p/m-Xylene	ug/kg	total xylene	total xylene	total xylene	totla xylene	<5	<5	<5	<5	<5	<5
o-Xylene	ug/kg	79000	56000	3200000	41000000	<3	<3	<3	<3	<3	<3
Naphthalene, decahydro-, trans-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzeneacetaldehyde, .alpha.-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
p-Cymene	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 2-ethyl-1,4-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1-methyl-2-(2-propenyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-
trans-Decalin, 2-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, decahydro-2-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, (1-methyl-1-butenyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 3: Pa Healy Road. Soil Analytical Results - VOCs

Sample ID:		LQM S4U Levels Residential (without homegrown produce)	LQM S4U Levels Residential (with homegrown produce)	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-104B	TP-105	TP-106	TP-107	TP-108A	TP-108B
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19
Depth:						2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80	1.40-3.10	3.10-3.40
	Units										
VOCS											
Dichlorodifluoromethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2
Methyl Tertiary Butyl Ether	ug/kg	33000	310000	7400000	-	<2	<2	<2	<2	<2	<2
Chloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Vinyl Chloride	ug/kg	0.77	0.64	59	3500	<2	<2	<2	<2	<2	<2
Bromomethane	ug/kg	-	-	-	-	<1	<1	<1	<1	<1	<1
Chloroethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2
Trichlorofluoromethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2
1,1-Dichloroethene (1,1 DCE)	ug/kg	150	150	24000	-	<6	<6	<6	<6	<6	<6
Dichloromethane (DCM)	ug/kg	1200	470	250000	-	<30	<30	<30	<30	<30	<30
trans-1-2-Dichloroethene	ug/kg	120	110	21000	-	<3	<3	<3	<3	<3	<3
1,1-Dichloroethane	ug/kg	1400	1400	260000	-	<3	<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	ug/kg	69	66	14000	-	<3	<3	26	<3	<3	<3
2,2-Dichloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
Bromochloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Chloroform	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
1,1,1-Trichloroethane	ug/kg	9000	8800	660000	140000000	<3	<3	<3	<3	<3	<3
1,1-Dichloropropene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Carbon tetrachloride	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,2-Dichloroethane	ug/kg	9.2	7.1	670	29000	<4	<4	<4	<4	<4	<4
Benzene	ug/kg	380	87	14940	72000000	<3	<3	<3	<3	<3	<3
Trichloroethene (TCE)	ug/kg	17	16	1200	1200000	<3	<3	<3	<3	<3	<3
1,2-Dichloropropane	ug/kg	-	-	-	-	<6	<6	<6	<6	<6	<6
Dibromomethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Bromodichloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
cis-1-3-Dichloropropene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
Toluene	ug/kg	880000	130000	33000000	56000000	<3	<3	<3	<3	<3	<3
trans-1-3-Dichloropropene	ug/kg	-				<3	<3	<3	<3	<3	<3
1,1,2-Trichloroethane	ug/kg	510	390	89000	-	<3	<3	<3	<3	<3	<3
Tetrachloroethene (PCE)	ug/kg	180	180	190	1400000	<3	<3	<3	<3	<3	<3
1,3-Dichloropropane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Dibromochloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
1,2-Dibromoethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Chlorobenzene	ug/kg	460	460	56000	11000000	<3	<3	<3	<3	<3	<3
1,1,1,2-Tetrachloroethane	ug/kg	1500	1200	110000	1400000	<3	<3	<3	<3	<3	<3
Ethylbenzene	ug/kg	83000	47000	3200000	24000000	<3	<3	<3	<3	<3	<3
p/m-Xylene	ug/kg	total xylene	total xylene	total xylene	totla xylene	<5	<5	<5	<5	<5	<5
o-Xylene	ug/kg	79000	56000	3200000	41000000	<3	<3	<3	<3	<3	<3
Styrene	ug/kg	21000	6900	3100000	-	<3	<3	<3	<3	<3	<3
Bromoform	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
Isopropylbenzene	ug/kg	6800	6600	1300000	-	<3	<3	<3	<3	31	<3
1,1,2,2-Tetrachloroethane	ug/kg	3900	1600	270000	1400000	<3	<3	<3	<3	<3	<3
Bromobenzene	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
Propylbenzene	ug/kg	23000	21000	3800000	-	<4	<4	<4	<4	56	5
2-Chlorotoluene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	ug/kg	-	-	-	-	<3	<3	<3	<3	5	<3
4-Chlorotoluene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3
tert-Butylbenzene	ug/kg	-	-	-	-	<5	<5	<5	<5	<5	<5
1,2,4-Trimethylbenzene	ug/kg	240	220	39000	-	<6	<6	<6	<6	71	9
sec-Butylbenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	116	8
4-Isopropyltoluene	ug/kg	-	-	-	-	<4	<4	25	<4	18	<4
1,3-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,4-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
n-Butylbenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	148	15
1,2-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,2-Dibromo-3-chloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
1,2,4-Trichlorobenzene	ug/kg	-	-	-	-	<7	<7	<7	<7	<7	<7
Hexachlorobutadiene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4
Naphthalene	ug/kg	-	-	-	-	<27	<27	<27	<27	67	<27
1,2,3-Trichlorobenzene	ug/kg	-	-	-	-	<7	<7	<7	<7	<7	<7
VOC TICs						ND	ND	ND	ND	Detected	ND
Methyl Tertiary Butyl Ether	ug/kg	33000	310000	7400000	-	<2	<2	<2	<2	<2	<2
Benzene	ug/kg	380	87	14940	72000000	<3	<3	<3	<3	<3	<3
Toluene	ug/kg	880000	130000	33000000	56000000	<3	<3	<3	<3	<3	<3
Ethylbenzene	ug/kg	83000	47000	3200000	24000000	<3	<3	<3	<3	<3	<3
p/m-Xylene	ug/kg	total xylene	total xylene	total xylene	totla xylene	<5	<5	<5	<5	<5	<5
o-Xylene	ug/kg	79000	56000	3200000	41000000	<3	<3	<3	<3	<3	<3
Naphthalene, decahydro-, trans-	ug/kg	-	-	-	-	-	-	-	-	138	-
Benzeneacetaldehyde, .alpha.-methyl-	ug/kg	-	-	-	-	-	-	-	-	178	-
p-Cymene	ug/kg	-	-	-	-	-	-	-	-	214	-
Benzene, 2-ethyl-1,4-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	189	-
Benzene, 1-methyl-2-(2-propenyl)-	ug/kg	-	-	-	-	-	-	-	-	155	-
trans-Decalin, 2-methyl-	ug/kg	-	-	-	-	-	-	-	-	255	-
Naphthalene, decahydro-2-methyl-	ug/kg	-	-	-	-	-	-	-	-	145	-
Benzene, (1-methyl-1-butenyl)-	ug/kg	-	-	-	-	-	-	-	-	275	-

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 3: Pa Healy Road. Soil Analytical Results - VOCs

Sample ID:		LQM S4U Levels Residential (without homegrown produce)	LQM S4U Levels Residential (with homegrown produce)	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-109	TP-110	TP-111A	TP-111B	TP-112	TP-113	TP-114	TP-115
Sampling date:						10/01/19	10/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19
Depth:						0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40
	Units												
VOCs													
Dichlorodifluoromethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Methyl Tertiary Butyl Ether	ug/kg	33000	310000	7400000	-	<2	<2	<2	<2	<2	<2	<2	<2
Chloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Vinyl Chloride	ug/kg	0.77	0.64	59	3500	<2	<2	<2	<2	<2	<2	<2	<2
Bromomethane	ug/kg	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Trichlorofluoromethane	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,1-Dichloroethene (1,1 DCE)	ug/kg	150	150	24000	-	<6	<6	<6	<6	<6	<6	<6	<6
Dichloromethane (DCM)	ug/kg	1200	470	250000	-	<30	<30	<30	<30	<30	<30	<30	<30
trans-1-2-Dichloroethene	ug/kg	120	110	21000	-	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethane	ug/kg	1400	1400	260000	-	<3	<3	<3	<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	ug/kg	69	66	14000	-	<3	<3	<3	<3	<3	<3	<3	<3
2,2-Dichloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
Bromochloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Chloroform	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,1,1-Trichloroethane	ug/kg	9000	8800	660000	140000000	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloropropene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Carbon tetrachloride	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
1,2-Dichloroethane	ug/kg	9.2	7.1	670	29000	<4	<4	<4	<4	<4	<4	<4	<4
Benzene	ug/kg	380	87	14940	72000000	<3	<3	<3	<3	<3	<3	<3	<3
Trichloroethene (TCE)	ug/kg	17	16	1200	1200000	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichloropropane	ug/kg	-	-	-	-	<6	<6	<6	<6	<6	<6	<6	<6
Dibromomethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Bromodichloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
cis-1-3-Dichloropropene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
Toluene	ug/kg	880000	130000	33000000	56000000	<3	<3	<3	<3	<3	<3	7	<3
trans-1-3-Dichloropropene	ug/kg	-				<3	<3	<3	<3	<3	<3	<3	<3
1,1,2-Trichloroethane	ug/kg	510	390	89000	-	<3	<3	<3	<3	<3	<3	<3	<3
Tetrachloroethene (PCE)	ug/kg	180	180	190	1400000	<3	<3	<3	<3	<3	<3	<3	<3
1,3-Dichloropropane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Dibromochloromethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dibromoethane	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Chlorobenzene	ug/kg	460	460	56000	11000000	<3	<3	<3	<3	<3	<3	<3	<3
1,1,1,2-Tetrachloroethane	ug/kg	1500	1200	110000	1400000	<3	<3	<3	<3	<3	<3	<3	<3
Ethylbenzene	ug/kg	83000	47000	3200000	24000000	<3	<3	<3	<3	<3	<3	<3	<3
p/m-Xylene	ug/kg	total xylene	total xylene	total xylene	totla xylene	<5	<5	<5	<5	<5	<5	<5	<5
o-Xylene	ug/kg	79000	56000	3200000	41000000	<3	<3	<3	<3	<3	<3	<3	<3
Styrene	ug/kg	21000	6900	3100000	-	<3	<3	<3	<3	<3	<3	<3	<3
Bromoform	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Isopropylbenzene	ug/kg	6800	6600	1300000	-	<3	<3	<3	<3	<3	<3	<3	<3
1,1,2,2-Tetrachloroethane	ug/kg	3900	1600	270000	1400000	<3	<3	<3	<3	<3	<3	<3	<3
Bromobenzene	ug/kg	-	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
Propylbenzene	ug/kg	23000	21000	3800000	-	<4	<4	<4	<4	<4	<4	<4	<4
2-Chlorotoluene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
4-Chlorotoluene	ug/kg	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
tert-Butylbenzene	ug/kg	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5
1,2,4-Trimethylbenzene	ug/kg	240	220	39000	-	<6	<6	<6	<6	<6	<6	<6	<6
sec-Butylbenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
4-Isopropyltoluene	ug/kg	-	-	-	-	<4	45	<4	<4	<4	<4	<4	<4
1,3-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
1,4-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
n-Butylbenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
1,2-Dichlorobenzene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
1,2-Dibromo-3-chloropropane	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
1,2,4-Trichlorobenzene	ug/kg	-	-	-	-	<7	<7	<7	<7	<7	<7	<7	<7
Hexachlorobutadiene	ug/kg	-	-	-	-	<4	<4	<4	<4	<4	<4	<4	<4
Naphthalene	ug/kg	-	-	-	-	<27	<27	<27	<27	<27	<27	<27	<27
1,2,3-Trichlorobenzene	ug/kg	-	-	-	-	<7	<7	<7	<7	<7	<7	<7	<7
VOC TICs						ND	ND	ND	ND	ND	ND	ND	ND
Methyl Tertiary Butyl Ether	ug/kg	33000	310000	7400000	-	<2	<2	<2	<2	<2	<2	<2	<2
Benzene	ug/kg	380	87	14940	72000000	<3	<3	<3	<3	<3	<3	<3	<3
Toluene	ug/kg	880000	130000	33000000	56000000	<3	<3	<3	<3	<3	<3	7	<3
Ethylbenzene	ug/kg	83000	47000	3200000	24000000	<3	<3	<3	<3	<3	<3	<3	<3
p/m-Xylene	ug/kg	total xylene	total xylene	total xylene	totla xylene	<5	<5	<5	<5	<5	<5	<5	<5
o-Xylene	ug/kg	79000	56000	3200000	41000000	<3	<3	<3	<3	<3	<3	<3	<3
Naphthalene, decahydro-, trans-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzeneacetaldehyde, .alpha.-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
p-Cymene	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 2-ethyl-1,4-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1-methyl-2-(2-propenyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
trans-Decalin, 2-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, decahydro-2-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, (1-methyl-1-butenyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 4: Pa Healy Road. Soil Analytical Results - PAH, SVOC & Phenols

Sample ID:		LQM S4U Levels Residential (without homegrown produce)	LQM S4U Levels Residential (with homegrown produce)	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-101A	TP-101B	TP-102A	TP-102B	TP-103	TP-104A
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19
Depth:						0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30
	Units										
SVOCs											
PAHS MS											
2-Chloronaphthalene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2-Methylnaphthalene	ug/kg	-	-	-	-	25	<10	80	<10	<10	25
Naphthalene	ug/kg	2300	2300	190000	4900000	<10	<10	<10	<10	<10	<10
Acenaphthene	ug/kg	3000000	210000	84000000	15000000	<10	<10	<10	<10	<10	<10
Acenaphthylene	ug/kg	2900000	170000	83000000	15000000	44	<10	59	<10	22	60
Fluorene	ug/kg	2800000	170000	63000000	9900000	33	<10	57	<10	<10	44
Phenanthrene	ug/kg	1300000	95000	22000000	3100000	330	<10	503	69	96	309
Anthracene	ug/kg	31000000	2400000	52000000	74000000	52	<10	164	32	26	103
Fluoranthene	ug/kg	1500000	280000	23000000	3100000	631	20	957	132	222	767
Pyrene	ug/kg	3700000	620000	54000000	7400000	465	16	766	116	194	659
Benzo(a)anthracene	ug/kg	11000	7200	170000	29000	282	<10	472	<10	154	458
Chrysene	ug/kg	30000	15000	350000	57000	314	<10	460	82	147	436
Benzo(bk)fluoranthene	ug/kg	-	-	-	-	512	<10	802	127	253	886
Benzo(a)pyrene	ug/kg	3200	2200	35000	5700	296	<10	470	84	139	518
Indeno(123cd)pyrene	ug/kg	45000	27000	500000	82000	148	<10	251	27	76	292
Dibenzo(ah)anthracene	ug/kg	310	240	350	570	66	<10	91	<10	14	106
Benzo(ghi)perylene	ug/kg	360000	320000	3900000	640000	175	<10	304	28	94	331
Benzo(b)fluoranthene	ug/kg	3900	2600	44000	7100	369	<10	577	91	182	638
Benzo(k)fluoranthene	ug/kg	110000	77000	1200000	190000	143	<10	225	36	71	248
Phenols											
2-Chlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2-Methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2-Nitrophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	ug/kg	200000	18000	15000000	-	<10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Nitrophenol	ug/kg					<10	<10	<10	<10	<10	<10
Pentachlorophenol	ug/kg	27000	210	400000	-	<10	<10	<10	<10	<10	<10
Phenol	ug/kg	750000	280000	760000	760000	<10	<10	<10	<10	<10	<10
Phthalates											
Bis(2-ethylhexyl) phthalate	ug/kg	3900000	290000	85000000	-	<100	<100	<100	<100	<100	<100
Butylbenzyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Di-n-butyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Di-n-Octyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Diethyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Dimethyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Other SVOCs											
1,2-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
3-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Bromophenylphenylether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Chloroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Chlorophenylphenylether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Azobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Bis(2-chloroethoxy)methane	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Bis(2-chloroethyl)ether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Carbazole	ug/kg	-	-	-	-	24	<10	50	<10	17	45
Dibenzofuran	ug/kg	-	-	-	-	19	<10	43	<10	<10	24
Hexachlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Hexachloroethane	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Isophorone	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
N-nitrosodi-n-propylamine	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Nitrobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 4: Pa Healy Road. Soil Analytical Results - PAH, SVOC

Sample ID:		LQM S4U Levels Residential (without homegrown produce)	LQM S4U Levels Residential (with homegrown produce)	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-104B	TP-105	TP-106	TP-107	TP-108A	TP-108B
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19
Depth:						2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80	1.40-3.10	3.10-3.40
	Units										
SVOCs											
PAHS MS											
2-Chloronaphthalene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2-Methylnaphthalene	ug/kg	-	-	-	-	<10	56	26	22	<10	<10
Naphthalene	ug/kg	2300	2300	190000	4900000	<10	<10	<10	<10	<10	<10
Acenaphthene	ug/kg	3000000	210000	84000000	15000000	<10	144	<10	40	535	<10
Acenaphthylene	ug/kg	2900000	170000	83000000	15000000	<10	91	65	66	<10	<10
Fluorene	ug/kg	2800000	170000	63000000	9900000	<10	101	28	38	1350	39
Phenanthrene	ug/kg	1300000	95000	22000000	3100000	<10	309	224	204	2080	71
Anthracene	ug/kg	31000000	2400000	52000000	74000000	<10	144	85	83	<10	<10
Fluoranthene	ug/kg	1500000	280000	23000000	3100000	93	1048	681	427	600	30
Pyrene	ug/kg	3700000	620000	54000000	7400000	77	1055	600	352	524	28
Benzo(a)anthracene	ug/kg	11000	7200	170000	29000	98	424	465	282	252	<10
Chrysene	ug/kg	30000	15000	350000	57000	59	460	391	251	252	<10
Benzo(bk)fluoranthene	ug/kg	-	-	-	-	89	1018	780	571	333	<10
Benzo(a)pyrene	ug/kg	3200	2200	35000	5700	49	616	474	347	193	<10
Indeno(123cd)pyrene	ug/kg	45000	27000	500000	82000	<10	336	254	205	95	<10
Dibenzo(ah)anthracene	ug/kg	310	240	350	570	<10	110	91	71	21	<10
Benzo(ghi)perylene	ug/kg	360000	320000	3900000	640000	13	436	307	231	115	<10
Benzo(b)fluoranthene	ug/kg	3900	2600	44000	7100	64	733	562	411	240	<10
Benzo(k)fluoranthene	ug/kg	110000	77000	1200000	190000	25	285	218	160	93	<10
Phenols											
2-Chlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2-Methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2-Nitrophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	ug/kg	200000	18000	15000000	-	<10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Nitrophenol	ug/kg					<10	<10	<10	<10	<10	<10
Pentachlorophenol	ug/kg	27000	210	400000	-	<10	<10	<10	<10	<10	<10
Phenol	ug/kg	750000	280000	760000	760000	<10	<10	<10	<10	<10	<10
Phthalates											
Bis(2-ethylhexyl) phthalate	ug/kg	3900000	290000	85000000	-	<100	<100	<100	<100	<100	<100
Butylbenzyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Di-n-butyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Di-n-Octyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Diethyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Dimethyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100
Other SVOCs											
1,2-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
3-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Bromophenylphenylether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Chloroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Chlorophenylphenylether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
4-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Azobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Bis(2-chloroethoxy)methane	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Bis(2-chloroethyl)ether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Carbazole	ug/kg	-	-	-	-	<10	51	27	34	<10	<10
Dibenzofuran	ug/kg	-	-	-	-	<10	56	18	20	282	<10
Hexachlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Hexachloroethane	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Isophorone	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
N-nitrosodi-n-propylamine	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10
Nitrobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 4: Pa Healy Road. Soil Analytical Results - PAH, SVOC & Phenols

Sample ID:		LQM S4U Levels Residential (without homegrown produce)	LQM S4U Levels Residential (with homegrown produce)	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-109	TP-110	TP-111A	TP-111B	TP-112	TP-113	TP-114	TP-115
Sampling date:						10/01/19	10/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19
Depth:						0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40
	Units												
SVOCs													
PAHS MS													
2-Chloronaphthalene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2-Methylnaphthalene	ug/kg	-	-	-	-	69	34	<10	13	18	22	<10	<10
Naphthalene	ug/kg	2300	2300	190000	4900000	<10	<10	<10	<10	<10	<10	<10	<10
Acenaphthene	ug/kg	3000000	210000	84000000	15000000	146	57	<10	<10	<10	<10	<10	<10
Acenaphthylene	ug/kg	2900000	170000	83000000	15000000	118	77	17	15	17	24	<10	63
Fluorene	ug/kg	2800000	170000	63000000	9900000	133	63	<10	<10	<10	<10	26	91
Phenanthrene	ug/kg	1300000	95000	22000000	3100000	727	344	70	60	77	116	131	584
Anthracene	ug/kg	31000000	2400000	52000000	74000000	332	121	30	20	29	33	66	253
Fluoranthene	ug/kg	1500000	280000	23000000	3100000	2043	788	199	214	180	230	406	1059
Pyrene	ug/kg	3700000	620000	54000000	7400000	1623	672	172	183	155	221	385	935
Benzo(a)anthracene	ug/kg	11000	7200	170000	29000	1002	429	142	138	129	208	304	772
Chrysene	ug/kg	30000	15000	350000	57000	973	405	120	116	111	191	285	1108
Benzo(bk)fluoranthene	ug/kg	-	-	-	-	1647	806	238	187	197	353	642	4929
Benzo(a)pyrene	ug/kg	3200	2200	35000	5700	954	484	124	96	108	205	422	*4330*
Indeno(123cd)pyrene	ug/kg	45000	27000	500000	82000	495	273	65	54	58	106	240	2810
Dibenzo(ah)anthracene	ug/kg	310	240	350	570	169	80	14	<10	<10	25	65	*768*
Benzo(ghi)perylene	ug/kg	360000	320000	3900000	640000	599	345	77	66	70	122	309	3718
Benzo(b)fluoranthene	ug/kg	3900	2600	44000	7100	1186	580	171	135	142	254	462	*3549*
Benzo(k)fluoranthene	ug/kg	110000	77000	1200000	190000	461	226	67	52	55	99	180	1380
Phenols													
2-Chlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2-Methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2-Nitrophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	ug/kg	200000	18000	15000000	-	<10	<10	<10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
4-Methylphenol	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
4-Nitrophenol	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol	ug/kg	27000	210	400000	-	<10	<10	<10	<10	<10	<10	<10	<10
Phenol	ug/kg	750000	280000	760000	760000	<10	<10	<10	<10	<10	<10	<10	<10
Phthalates													
Bis(2-ethylhexyl) phthalate	ug/kg	3900000	290000	85000000	-	<100	<100	<100	<100	<100	<100	<100	<100
Butylbenzyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100	<100	<100
Di-n-butyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100	<100	<100
Di-n-Octyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100	<100	<100
Diethyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100	<100	<100
Dimethyl phthalate	ug/kg	-	-	-	-	<100	<100	<100	<100	<100	<100	<100	<100
Other SVOCs													
1,2-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
3-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
4-Bromophenylphenylether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
4-Chloroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
4-Chlorophenylphenylether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
4-Nitroaniline	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Azobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroethoxy)methane	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroethyl)ether	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Carbazole	ug/kg	-	-	-	-	100	40	<10	<10	<10	<10	<10	110
Dibenzofuran	ug/kg	-	-	-	-	83	25	<10	<10	<10	<10	<10	99
Hexachlorobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Hexachloroethane	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Isophorone	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
N-nitrosodi-n-propylamine	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Nitrobenzene	ug/kg	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 5: Pa Healy Road. Soil Analytical Results - SVOC TICs

Sample ID:		LQM S4U Levels Residential (without homegrown	LQM S4U Levels Residential (with homegrown	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-101A	TP-101B	TP-102A	TP-102B	TP-103	TP-104A
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19
Depth:						0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30
	Units										
SVOC TICs						Detected	Detected	Detected	Detected	Detected	Detected
Nonane, 3-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1-ethyl-2-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 4-ethyl-1,2-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Decane, 4-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Cyclohexane, butyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1-methyl-3-propyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1-ethyl-3,5-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1-methyl-2-propyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
o-Cymene	ug/kg	-	-	-	-	-	-	-	-	-	-
Cycloheptane, methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1,2,4,5-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Undecane, 5-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1,2,3,4-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1-methyl-4-(1-methylpropyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-
2-Butene, 3-chloro-1-phenyl-, (Z)-	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1,2,3,4-tetrahydro-6-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
n-Heptadecanol-1	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzene, 1-(1-methylethenyl)-3-(1-	ug/kg	-	-	-	-	-	-	-	-	-	-
Nonane, 3,7-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1,6-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, 2,3-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, 2,6-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, 2,7-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Hexadecane, 2,6,10,14-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	-	170
Hexathiane	ug/kg	-	-	-	-	1107	-	929	-	-	1005
Undecane	ug/kg	-	-	-	-	-	-	-	-	-	-
Dodecane	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1-(1-methylethyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1,6,7-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1,4,6-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Hexadecane	ug/kg	-	-	-	-	-	-	-	-	-	207
Tridecane	ug/kg	-	-	-	-	-	-	382	-	-	274
[1,1'-Biphenyl]-4-carboxaldehyde	ug/kg	-	-	-	-	-	-	-	-	-	-
Pentadecane, 2,6,10-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Dodecane, 2-methyl-8-propyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Nonadecane, 9-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Tetradecane	ug/kg	-	-	-	-	-	-	-	-	-	-
Heptadecane	ug/kg	-	-	-	-	-	-	-	-	-	-
Pentadecane, 2,6,10,14-tetramethyl-	ug/kg	-	-	-	-	-	-	386	-	-	-
Dodecane, 2,6,11-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Ethyl 5-chloro-2-nitrobenzoate	ug/kg	-	-	-	-	-	-	-	-	-	-
4-n-Hexylthiane, S,S-dioxide	ug/kg	-	-	-	-	-	-	-	-	-	-
Octadecane	ug/kg	-	-	-	-	-	-	235	-	-	-
Hexacosane	ug/kg	-	-	-	-	-	-	-	-	-	-
4-Methylnaphtho[1,2-b]thiophene	ug/kg	-	-	-	-	-	-	-	-	-	-
Eicosane	ug/kg	-	-	-	-	291	-	565	-	-	309
Nonadecane	ug/kg	-	-	-	-	-	-	-	-	-	386
Nonadecane, 1-chloro-	ug/kg	-	-	-	-	-	-	491	-	-	-
Phenanthrene, 1-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Phenanthrene, 4-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Anthracene, 1-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
2,6-Dimethyldibenzothiophene	ug/kg	-	-	-	-	-	-	-	-	-	-
Octadecane, 1-chloro-	ug/kg	-	-	-	-	-	-	-	-	-	-
Pentadecane	ug/kg	-	-	-	-	-	-	-	-	-	-
Cyclic octaatomic sulfur	ug/kg	-	-	-	-	-	-	911	-	-	590
di-p-Tolylacetylene	ug/kg	-	-	-	-	-	-	-	-	-	-
Phenanthrene, 2,5-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
3-(N-Methylamino)-9-methylcarbazole	ug/kg	-	-	-	-	-	-	-	-	-	-
[14]Annulene, 1,6:8,13-bis(methano)-, syn	ug/kg	-	-	-	-	-	-	-	-	-	-
4,4'-Bis(tetrahydrothiopyran)	ug/kg	-	-	-	-	-	-	-	-	-	-
Heptacosane, 1-chloro-	ug/kg	-	-	-	-	-	-	-	-	-	-
10,18-Bisnorabieta-5,7,9(10),11,13-pentaene	ug/kg	-	-	-	-	-	-	-	-	-	-
Cyclopentadecane	ug/kg	-	-	-	-	-	423	-	-	-	-
Cyclohexadecane	ug/kg	-	-	-	-	-	-	-	-	-	443
1-Nonadecene	ug/kg	-	-	-	-	484	-	-	-	-	-
Cyclotetracosane	ug/kg	-	-	-	-	-	-	805	-	-	-
5-Eicosene, (E)-	ug/kg	-	-	-	-	-	-	-	641	-	-
5-Octadecene, (E)-	ug/kg	-	-	-	-	-	-	-	-	-	-
1-Octadecene	ug/kg	-	-	-	-	-	-	-	-	-	-
Docosane	ug/kg	-	-	-	-	-	-	-	-	-	-
Tetracosane	ug/kg	-	-	-	-	-	-	348	-	-	522
2-Bromo-4,5-dimethoxycinnamic acid	ug/kg	-	-	-	-	-	-	-	-	-	-
11H-Benzo[b]fluorene	ug/kg	-	-	-	-	-	-	-	-	-	-
Pyrene, 1-methyl-	ug/kg	-	-	-	-	136	-	-	-	-	244
Eicosane, 9-cyclohexyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Behenyl chloride	ug/kg	-	-	-	-	-	-	-	-	-	-
Octacosane	ug/kg	-	-	-	-	-	-	-	-	-	-
Pyridine-3-carboxamide, oxime, N-(2-trifluoromethylphenyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-
1-Bromo-11-iodoundecane	ug/kg	-	-	-	-	-	-	-	-	-	-
Octadecanoic acid, butyl ester	ug/kg	-	-	-	-	-	-	-	-	-	-
1-Docosene	ug/kg	-	-	-	-	-	-	413	-	-	-
Heneicosane	ug/kg	-	-	-	-	-	-	507	-	-	-
11-Methylnonacosane	ug/kg	-	-	-	-	-	-	-	-	-	-
Chrysene, 1-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
9-Octadecenamide, (Z)-	ug/kg	-	-	-	-	-	-	4649	4589	4217	3137
13-Docosenamide, (Z)-	ug/kg	-	-	-	-	4323	-	-	-	-	-
3,5,6-Trimethyl-p-quinone, 2-(2,5-dioxotetrahydrofuran-3-yl)thio-	ug/kg	-	-	-	-	-	-	-	-	-	568
Benzo[e]pyrene	ug/kg	3200	2200	35000	5700	-	-	-	-	-	-
Antra-9,10-quinone, 1-(3-hydrohy-3-phenyl-1-triazenyl)-	ug/kg	-	-	-	-	849	-	-	-	-	-

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 5: Pa Healy Road. Soil Analytical Results - SVOC TICs

Sample ID:		LQM S4U Levels Residential (without homegrown produce)	LQM S4U Levels Residential (with homegrown produce)	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-104B	TP-105	TP-106	TP-107	TP-108A	TP-108B
Sampling date:						10/01/19	10/01/19	10/01/19	10/01/19	10/01/19	10/01/19
Depth:						2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80	1.40-3.10	3.10-3.40
	Units										
SVOC TICs						Detected	Detected	Detected	Detected	Detected	Detected
Nonane, 3-methyl-	ug/kg	-	-	-	-	-	-	-	-	1090	-
Benzene, 1-ethyl-2-methyl-	ug/kg	-	-	-	-	-	-	-	-	838	-
Benzene, 4-ethyl-1,2-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	1148	-
Decane, 4-methyl-	ug/kg	-	-	-	-	-	-	-	-	5199	-
Cyclohexane, butyl-	ug/kg	-	-	-	-	-	-	-	-	3045	-
Benzene, 1-methyl-3-propyl-	ug/kg	-	-	-	-	-	-	-	-	3901	-
Benzene, 1-ethyl-3,5-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	1671	-
Benzene, 1-methyl-2-propyl-	ug/kg	-	-	-	-	-	-	-	-	1574	-
o-Cymene	ug/kg	-	-	-	-	-	-	-	-	4474	-
Cycloheptane, methyl-	ug/kg	-	-	-	-	-	-	-	-	1429	-
Benzene, 1,2,4,5-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	2793	-
Undecane, 5-methyl-	ug/kg	-	-	-	-	-	-	-	-	2320	-
Benzene, 1,2,3,4-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	4301	-
Benzene, 1-methyl-4-(1-methylpropyl)-	ug/kg	-	-	-	-	-	-	-	-	2518	-
2-Butene, 3-chloro-1-phenyl-, (Z)-	ug/kg	-	-	-	-	-	-	-	-	2125	-
Naphthalene, 1,2,3,4-tetrahydro-6-methyl-	ug/kg	-	-	-	-	-	-	-	-	4534	-
n-Heptadecanol-1	ug/kg	-	-	-	-	-	-	-	-	1651	-
Benzene, 1-(1-methylethenyl)-3-(1-methylethyl)-	ug/kg	-	-	-	-	-	-	-	-	8491	-
Nonane, 3,7-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	15962	-
Naphthalene, 1,6-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	6873	-
Naphthalene, 2,3-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	13909	-
Naphthalene, 2,6-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	12006	-
Naphthalene, 2,7-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	5390	-
Hexadecane, 2,6,10,14-tetramethyl-	ug/kg	-	-	-	-	-	1032	-	-	37899	629
Hexathiane	ug/kg	-	-	-	-	-	862	1434	-	-	-
Undecane	ug/kg	-	-	-	-	-	-	-	-	14194	-
Dodecane	ug/kg	-	-	-	-	-	762	-	-	-	-
Naphthalene, 1-(1-methylethyl)-	ug/kg	-	-	-	-	-	-	-	-	8739	-
Naphthalene, 1,6,7-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	7203	-
Naphthalene, 1,4,6-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	12573	249
Hexadecane	ug/kg	-	-	-	-	-	1028	559	-	2846	-
Tridecane	ug/kg	-	-	-	-	-	-	-	-	8464	-
[1,1'-Biphenyl]-4-carboxaldehyde	ug/kg	-	-	-	-	-	-	-	-	2786	-
Pentadecane, 2,6,10-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	18750	-
Dodecane, 2-methyl-8-propyl-	ug/kg	-	-	-	-	-	500	-	-	-	-
Nonadecane, 9-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	384
Tetradecane	ug/kg	-	-	-	-	-	799	-	-	7098	-
Heptadecane	ug/kg	-	-	-	-	-	-	267	-	-	-
Pentadecane, 2,6,10,14-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Dodecane, 2,6,11-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	854
Ethyl 5-chloro-2-nitrobenzoate	ug/kg	-	-	-	-	-	-	-	-	5542	-
4-n-Hexylthiane, S,S-dioxide	ug/kg	-	-	-	-	-	208	-	-	-	-
Octadecane	ug/kg	-	-	-	-	-	-	333	-	-	-
Hexacosane	ug/kg	-	-	-	-	-	-	-	-	26704	-
4-Methylnaphtho[1,2-b]thiophene	ug/kg	-	-	-	-	-	-	-	-	2404	-
Eicosane	ug/kg	-	-	-	-	-	871	566	-	3073	366
Nonadecane	ug/kg	-	-	-	-	-	1203	538	-	-	-
Nonadecane, 1-chloro-	ug/kg	-	-	-	-	-	652	387	-	2736	232
Phenanthrene, 1-methyl-	ug/kg	-	-	-	-	-	-	-	-	3586	-
Phenanthrene, 4-methyl-	ug/kg	-	-	-	-	-	-	-	-	2174	-
Anthracene, 1-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
2,6-Dimethyldibenzothiophene	ug/kg	-	-	-	-	-	-	-	-	1498	-
Octadecane, 1-chloro-	ug/kg	-	-	-	-	-	-	-	-	-	158
Pentadecane	ug/kg	-	-	-	-	-	-	-	-	4972	-
Cyclic octaatomic sulfur	ug/kg	-	-	-	-	-	496	365	-	-	-
di-p-Tolylacetylene	ug/kg	-	-	-	-	-	-	-	-	3867	-
Phenanthrene, 2,5-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
3-(N-Methylamino)-9-methylcarbazole	ug/kg	-	-	-	-	-	-	-	-	-	346
[14]Annulene, 1,6:8,13-bis(methano)-, syn	ug/kg	-	-	-	-	-	-	-	-	-	-
4,4'-Bis(tetrahydrothiopyran)	ug/kg	-	-	-	-	-	-	596	-	-	-
Heptacosane, 1-chloro-	ug/kg	-	-	-	-	-	-	513	-	-	-
10,18-Bisnorabieta-5,7,9(10),11,13-pentaene	ug/kg	-	-	-	-	-	-	-	-	-	-
Cyclopentadecane	ug/kg	-	-	-	-	-	-	-	-	-	-
Cyclohexadecane	ug/kg	-	-	-	-	-	-	-	-	-	-
1-Nonadecene	ug/kg	-	-	-	-	326	-	-	474	-	794
Cyclotetracosane	ug/kg	-	-	-	-	-	976	-	-	-	-
5-Eicosene, (E)-	ug/kg	-	-	-	-	-	-	-	-	-	-
5-Octadecene, (E)-	ug/kg	-	-	-	-	-	-	-	-	-	-
1-Octadecene	ug/kg	-	-	-	-	-	-	450	-	-	-
Docosane	ug/kg	-	-	-	-	-	-	-	-	-	-
Tetracosane	ug/kg	-	-	-	-	-	975	750	-	-	-
2-Bromo-4,5-dimethoxycinnamic acid	ug/kg	-	-	-	-	-	-	-	150	-	-
11H-Benzo[b]fluorene	ug/kg	-	-	-	-	-	-	-	-	-	-
Pyrene, 1-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
Eicosane, 9-cyclohexyl-	ug/kg	-	-	-	-	-	469	-	-	-	-
Behenyl chloride	ug/kg	-	-	-	-	-	-	-	-	-	-
Octacosane	ug/kg	-	-	-	-	-	-	453	-	-	-
Pyridine-3-carboxamide, oxime, N-[2-trifluoromethylphenyl]-	ug/kg	-	-	-	-	-	339	-	-	-	-
1-Bromo-11-iodoundecane	ug/kg	-	-	-	-	-	319	-	-	-	-
Octadecanoic acid, butyl ester	ug/kg	-	-	-	-	-	-	-	-	-	370
1-Docosene	ug/kg	-	-	-	-	-	-	-	-	-	-
Heneicosane	ug/kg	-	-	-	-	-	-	-	-	-	-
11-Methylnonacosane	ug/kg	-	-	-	-	-	-	-	552	-	-
Chrysene, 1-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-
9-Octadecenamide, (Z)-	ug/kg	-	-	-	-	-	-	-	-	-	3409
13-Docosenamide, (Z)-	ug/kg	-	-	-	-	3471	-	-	3961	-	-
3,5,6-Trimethyl-p-quinone, 2-(2,5-dioxotetrahydrofuran-3-yl)thio-	ug/kg	-	-	-	-	-	-	-	-	-	-
Benzo[e]pyrene	ug/kg	3200	2200	35000	5700	-	-	-	-	-	-
Antra-9,10-quinone, 1-(3-hydrohy-3-phenyl-1-triazenyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015).

Values exceeding S4U Residential (without homegrown produce) are underlined
Values exceeding S4U Residential (with homegrown produce) are *italic*
Values exceeding S4U Commercial are shaded
Values exceeding S4U Public Open Spaces Residential are **bold**

Table 5: Pa Healy Road. Soil Analytical Results - SVOC TICs

Sample ID:		LQM S4U Levels Residential (without homegrown produce)	LQM S4U Levels Residential (with homegrown produce)	LQM S4U Levels Comercial	Public Open Spaces Residential	TP-109	TP-110	TP-111A	TP-111B	TP-112	TP-113	TP-114	TP-115
Sampling date:						10/01/19	10/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19	11/01/19
Depth:						0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40
	Units												
SVOC TICs						Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
Nonane, 3-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1-ethyl-2-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 4-ethyl-1,2-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Decane, 4-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane, butyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1-methyl-3-propyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1-ethyl-3,5-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1-methyl-2-propyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
o-Cymene	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Cycloheptane, methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1,2,4,5-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Undecane, 5-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1,2,3,4-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1-methyl-4-(1-methylpropyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
2-Butene, 3-chloro-1-phenyl-, (Z)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1,2,3,4-tetrahydro-6-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
n-Heptadecanol-1	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1-(1-methylethenyl)-3-(1-methylpropyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nonane, 3,7-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1,6-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, 2,3-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, 2,6-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, 2,7-dimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Hexadecane, 2,6,10,14-tetramethyl-	ug/kg	-	-	-	-	594	-	-	-	-	-	-	-
Hexathiane	ug/kg	-	-	-	-	-	1372	501	-	-	-	823	1620
Undecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Dodecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1-(1-methylethyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1,6,7-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene, 1,4,6-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Hexadecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Tridecane	ug/kg	-	-	-	-	515	-	-	-	-	-	-	-
[1,1'-Biphenyl]-4-carboxaldehyde	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Pentadecane, 2,6,10-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Dodecane, 2-methyl-8-propyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nonadecane, 9-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Tetradecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Heptadecane	ug/kg	-	-	-	-	-	-	-	-	441	-	-	-
Pentadecane, 2,6,10,14-tetramethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Dodecane, 2,6,11-trimethyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Ethyl 5-chloro-2-nitrobenzoate	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
4-n-Hexylthiane, S,S-dioxide	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Octadecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Hexacosane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylnaphtho[1,2-b]thiophene	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Eicosane	ug/kg	-	-	-	-	644	388	-	-	-	-	-	-
Nonadecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nonadecane, 1-chloro-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene, 1-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene, 4-methyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene, 1-methyl-	ug/kg	-	-	-	-	204	-	-	-	-	-	-	-
2,6-Dimethyldibenzothiophene	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Octadecane, 1-chloro-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Pentadecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Cyclic octaatomic sulfur	ug/kg	-	-	-	-	298	206	-	-	190	-	157	-
di-p-Tolylacetylene	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene, 2,5-dimethyl-	ug/kg	-	-	-	-	217	-	-	-	-	-	-	-
3-(N-Methylamino)-9-methylcarbazole	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
[14]Annulene, 1,6:8,13-bis(methano)-, syn	ug/kg	-	-	-	-	453	-	-	-	-	-	-	-
4,4'-Bis(tetrahydrothiopyran)	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Heptacosane, 1-chloro-	ug/kg	-	-	-	-	-	620	-	-	-	-	-	-
10,18-Bisnorabieta-5,7,9(10),11,13-pentaene	ug/kg	-	-	-	-	-	321	-	-	-	-	-	-
Cyclopentadecane	ug/kg	-	-	-	-	-	502	-	-	-	-	-	-
Cyclohexadecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
1-Nonadecene	ug/kg	-	-	-	-	715	-	584	555	-	-	677	-
Cyclotetracosane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
5-Eicosene, (E)-	ug/kg	-	-	-	-	-	-	-	-	-	455	-	-
5-Octadecene, (E)-	ug/kg	-	-	-	-	-	-	-	-	475	-	-	-
1-Octadecene	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Docosane	ug/kg	-	-	-	-	419	-	-	-	-	-	-	-
Tetracosane	ug/kg	-	-	-	-	-	-	-	-	336	-	453	-
2-Bromo-4,5-dimethoxycinnamic acid	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
11H-Benzo[b]fluorene	ug/kg	-	-	-	-	-	-	-	-	-	-	190	-
Pyrene, 1-methyl-	ug/kg	-	-	-	-	676	251	-	-	-	-	-	410
Eicosane, 9-cyclohexyl-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Behenyl chloride	ug/kg	-	-	-	-	312	274	-	-	-	-	-	-
Octacosane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine-3-carboxamide, oxime, N-(2-trifluoromethylphenyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
1-Bromo-11-iodoundecane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Octadecanoic acid, butyl ester	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
1-Docosene	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Heneicosane	ug/kg	-	-	-	-	-	-	400	-	-	-	466	-
11-Methylnonacosane	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene, 1-methyl-	ug/kg	-	-	-	-	363	-	-	-	-	-	-	-
9-Octadecenamide, (Z)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-
13-Docosenamide, (Z)-	ug/kg	-	-	-	-	-	-	4099	-	3048	3102	-	-
3,5,6-Trimethyl-p-quinone, 2-(2,5-dioxotetrahydrofuran-3-yl)thio-	ug/kg	-	-	-	-	1117	-	-	-	-	-	-	-
Benzo[e]pyrene	ug/kg	3200	2200	35000	5700	-	-	-	-	-	-	-	*3303*
Antra-9,10-quinone, 1-(3-hydrohy-3-phenyl-1-triazenyl)-	ug/kg	-	-	-	-	-	-	-	-	-	-	-	-

Notes

Except where otherwise stated, criteria have been derived using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil

Values exceeding S4U Residential (without homegrown produce) are underlined

Values exceeding S4U Residential (with homegrown produce) are *italic*

Values exceeding S4U Commercial are shaded

Values exceeding S4U Public Open Spaces Residential are **bold**

Table 6: Pa Healy Road - Groundwater Analytical Results - Metals, PAH, MTBE&BTEX, TPH, Phenols, Anions & Other Parameters

Sample Identity:		LOD	TP-107	MW-101	MW-102	MW-103	MW-104	Groundwater		Drinking Water Regs	EQS (MAC)	SoBRA Human Health GACs - Commercial	SoBRA Human Health GACs - Residential
Date:			10/1/19	21/1/19	21/1/19	21/1/19	21/1/19	GW 2016	EPA IGV				
	Units												
Dissolved Arsenic	ug/l	<0.9	-	<0.9	<0.9	<0.9	***17.3***	7.5	10	10	-	-	-
Dissolved Barium	ug/l	<1.8	-	*104.0*	*172.1*	*142.8*	*1215.0*	-	100	-	-	-	-
Dissolved Beryllium	ug/l	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
Dissolved Boron	ug/l	<12	-	56	38	45	55	750	1000	1000	-	-	-
Dissolved Cadmium	ug/l	<0.03	-	<0.03	<0.03	<0.03	<0.03	3.75	5	5	<0.45	-	-
Total Dissolved Chromium	ug/l	<0.2	-	0.3	<0.2	0.4	1.0	37.5	30	50	-	-	-
Dissolved Copper	ug/l	<3	-	<3	<3	<3	<3	1500	30	2000	-	-	-
Dissolved Lead	ug/l	<0.4	-	<0.4	<0.4	<0.4	<0.4	7.5	-	10	14	-	-
Dissolved Mercury	ug/l	<0.5	-	<0.5	<0.5	<0.5	<0.5	0.75	1	1	0.07	-	-
Dissolved Nickel	ug/l	<0.2	-	2.7	1.9	2.8	2.7	15	20	20	34	-	-
Dissolved Selenium	ug/l	<1.2	-	<1.2	<1.2	<1.2	<1.2	-	-	10	-	-	-
Dissolved Vanadium	ug/l	<0.6	-	<0.6	0.9	1.4	1.9	-	-	-	-	-	-
Dissolved Zinc	ug/l	<1.5	-	14.2	6.5	11.3	7.7	75	100	-	-	-	-
PAH MS												-	-
Naphthalene	ug/l	<0.1	-	<0.1	<0.1	<0.1	<0.1	-	1	-	130	210000	220
Acenaphthylene	ug/l	<0.013	-	<0.013	<0.013	<0.013	<0.013	-	-	-	-	20000000	220000
Acenaphthene	ug/l	<0.013	-	<0.013	<0.013	<0.013	<0.013	-	-	-	-	15000000	170000
Fluorene	ug/l	<0.014	-	<0.014	<0.014	<0.014	<0.014	-	-	-	0.12	18000000	210000
Phenanthrene	ug/l	<0.011	-	<0.011	<0.011	<0.011	<0.011	-	-	-	-	-	-
Anthracene	ug/l	<0.013	-	<0.013	<0.013	<0.013	<0.013	-	10000	-	0.4	-	-
Fluoranthene	ug/l	<0.012	-	<0.012	<0.012	<0.012	<0.012	-	1	-	1	-	-
Pyrene	ug/l	<0.013	-	<0.013	<0.013	<0.013	<0.013	-	-	-	-	-	-
Benzo(a)anthracene	ug/l	<0.015	-	<0.015	<0.015	<0.015	<0.015	-	-	-	-	-	-
Chrysene	ug/l	<0.011	-	<0.011	<0.011	<0.011	<0.011	-	-	-	-	-	-
Benzo(bk)fluoranthene	ug/l	<0.018	-	<0.018	<0.018	<0.018	<0.018	-	0.5	0.1	-	-	-
Benzo(a)pyrene	ug/l	<0.016	-	<0.016	<0.016	<0.016	<0.016	0.0075	0.01	0.01	0.1	-	-
Indeno(123cd)pyrene	ug/l	<0.011	-	<0.011	<0.011	<0.011	<0.011	-	0.05	0.1	-	-	-
Dibenzo(ah)anthracene	ug/l	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	0.05	-	-	-	-
Benzo(ghi)perylene	ug/l	<0.011	-	<0.011	<0.011	<0.011	<0.011	-	0.05	0.1	0.0082	-	-
PAH 16 Total	ug/l	<0.195	-	<0.195	<0.195	<0.195	<0.195	0.075	0.1	-	-	-	-
Benzo(b)fluoranthene	ug/l	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	0.5	-	0.017	-	-
Benzo(k)fluoranthene	ug/l	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	0.05	-	0.017	-	-
												-	-
Methyl Tertiary Butyl Ether	ug/l	<0.1	<5	<0.1	<0.1	<0.1	<0.1	10	30	-	-		
Benzene	ug/l	<0.5	<5	<0.5	<0.5	<0.5	<0.5	0.75	1	1	50	20000	210
Toluene	ug/l	<5	<5	<5	<5	<5	<5	525	10	-	-	21000000	230000
Ethylbenzene	ug/l	<1	<5	<1	<1	<1	<1	-	10	-	-	960000	10000
p/m-Xylene	ug/l	<2	<5	<2	<2	<2	<2	-	10	-	-	940000	9500
o-Xylene	ug/l	<1	<5	<1	<1	<1	<1	-	10	-	-	-	-
Aliphatics													
>C5-C6	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	190000	1900
>C6-C8	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	150000	1500
>C8-C10	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	5700	57
>C10-C12	ug/l	<5	<5	<5	<5	<5	<5	-	10	-	-	3600	37
>C12-C16	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	-	-
>C16-C21	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	-	-
>C21-C35	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	-	-
Total aliphatics C5-35	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	-	-
Aromatics													
>C5-EC7	ug/l	<10	<10	<10	<10	<10	<10	-	0.75**	-	-	20000000	210000
>EC7-EC8	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	21000000	220000
>EC8-EC10	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	190000	1900
>EC10-EC12	ug/l	<5	<5	<5	<5	<5	<5	-	10	-	-	6800	6800
>EC12-EC16	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	39000	39000
>EC16-EC21	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	-	-
>EC21-EC35	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	-	-
Total aromatics C5-35	ug/l	<10	<10	<10	<10	<10	<10	-	10	-	-	-	-
Total aliphatics and aromatics(C5-35)	ug/l	<10	<10	<10	<10	<10	<10	7.5	10	-	-	-	-
Sulphate as SO4	mg/l	<0.5	-	59.8	34.7	40.9	3.7	187.5	200	250	-	-	-
Chloride	mg/l	<0.3	-	19.5	*30.6*	*36.4*	*47.0*	187.5	30	250	-	-	-
Nitrate as NO3	mg/l	<0.2	-	6.3	0.7	2.7	<0.2	37.5	25	50	-	-	-
Nitrite as NO2	mg/l	<0.02	-	0.05	<0.02	0.07	<0.02	0.375	0.1	0.5	-	-	-
Ortho Phosphate as P	mg/l	<0.06	-	<0.03	<0.03	<0.03	<0.03	-	0.03	-	-	-	-
Free Cyanide	mg/l	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-
Total Cyanide	mg/l	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	-	0.05	-	-	-
												-	-
Ammoniacal Nitrogen as NH3	mg/l	<0.03	-	0.23	0.15	0.12	0.25	-	150	-	-	-	-
Hexavalent Chromium	ug/l	<2	-	<2	<2	<2	<2	7.5	30	50	-	-	-
Total Dissolved Chromium III	ug/l	<2	-	<2	<2	<2	<2	-	30	50	32		
Sulphide	mg/l	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-
												-	-
Total Alkalinity as CaCO3	mg/l	<1	-	498	1110	678	532	-	-	-	-	-	-
Total Organic Carbon	mg/l	<2	-	7	6	7	7	-	No abnormal change	-	-	-	-
COD (settled)	mg/l	<7	-	8	<7	10	18	-	-	-	-	-	-
pH	pH Units	<0.1	-	7.48	7.33	7.23	7.48	-	6.5-9.5	6.5-9.5	4.5<pH<9	-	-
EC	µS/cm	<1	-	808	887	906	819	1875	1000	2500	-	-	-

Notes

EPA Interim Guideline Values (IGVs) for the protection of groundwater, 2003. The EPA interim guideline value for TPH is considered to "serve as a 'catch-all' and will present results for the

GW 2016 Refers to threshold value for benzene quoted in the European Communities Environmental Objectives (Groundwater) Regulations 2016 (SI No 366 of 2016)

EQS (MAC) - Environmental Quality Standards refer to maximum allowable concentration for inland surface waters - obtained from S.I. No.386 of 2015

Bold Fomatting = exceeds GW 2016 standard

Italic Formatting = exceeds EPA IGV standards

Underlined Formatting = exceeds Drinking Water standards

Shaded Frormating = exceeds EQS standard

Table 7: Pa Healy Road - Groundwater Analytical Results -VOC

Sample Identity:		LOD	MW-101	MW-102	MW-103	MW-104	Groundwater		Drinking Water Regs	EQS	SoBRA Human Health GACs - Commercial	SoBRA Human Health GACs - Residential
Date:			21/1/19	21/1/19	21/1/19	21/1/19	EPA IGV	GW 2016				
	Units											
Dichlorodifluoromethane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
Methyl Tertiary Butyl Ether	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	30	10	-	-	-	-
Chloromethane	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
Vinyl Chloride	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	-	0.375	0.5	-	-	-
Bromomethane	ug/l	<1	<1	<1	<1	<1	-	-	-	-	-	-
Chloroethane	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
Trichlorofluoromethane	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
1,1-Dichloroethene (1,1 DCE)	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
Dichloromethane (DCM)	ug/l	<5	<5	<5	<5	<5	10	15	-	-	-	-
trans-1-2-Dichloroethene	ug/l	<3	<3	<3	<3	<3	3	-	-	-	-	-
1,1-Dichloroethane	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
cis-1-2-Dichloroethene	ug/l	<3	<3	<3	<3	<3	3	-	-	-	-	-
2,2-Dichloropropane	ug/l	<1	<1	<1	<1	<1	-	-	-	-	-	-
Bromochloromethane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
Chloroform	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
1,1,1-Trichloroethane	ug/l	<2	<2	<2	<2	<2	500	-	-	-	-	-
1,1-Dichloropropene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
Carbon tetrachloride	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
1,2-Dichloroethane	ug/l	<2	<2	<2	<2	<2	3	2.25	3	-	-	-
Benzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	1	0.75	1	50	20000	210
Trichloroethene (TCE)	ug/l	<3	<3	<3	<3	<3	70	7.5	10	-	-	-
1,2-Dichloropropane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
Dibromomethane	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
Bromodichloromethane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
cis-1-3-Dichloropropene	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
Toluene	ug/l	<5	<5	<5	<5	<5	10	525	-	-	21000000	230000
trans-1-3-Dichloropropene	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
1,1,2-Trichloroethane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
Tetrachloroethene (PCE)	ug/l	<3	<3	<3	<3	<3	40	7.5	10	-	-	-
1,3-Dichloropropane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
Dibromochloromethane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
1,2-Dibromoethane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
Chlorobenzene	ug/l	<2	<2	<2	<2	<2	1	-	-	-	-	-
1,1,1,2-Tetrachloroethane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
Ethylbenzene	ug/l	<1	<1	<1	<1	<1	10	-	-	-	-	-
p/m-Xylene	ug/l	<2	<2	<2	<2	<2	10	-	-	-	940000	9500
o-Xylene	ug/l	<1	<1	<1	<1	<1	10	-	-	-	-	-
Styrene	ug/l	<2	<2	<2	<2	<2	-	-	-	-	810000	8800
Bromoform	ug/l	<2	<2	<2	<2	<2	-	-	-	-		
Isopropylbenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	86000	850
1,1,2,2-Tetrachloroethane	ug/l	<4	<4	<4	<4	<4	-	-	-	-	-	-
Bromobenzene	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
1,2,3-Trichloropropane	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
Propylbenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
2-Chlorotoluene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
1,3,5-Trimethylbenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
4-Chlorotoluene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
tert-Butylbenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
1,2,4-Trimethylbenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	2200	24
sec-Butylbenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
4-Isopropyltoluene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
1,4-Dichlorobenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
n-Butylbenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
1,2-Dichlorobenzene	ug/l	<3	<3	<3	<3	<3	10	-	-	-	-	-
1,2-Dibromo-3-chloropropane	ug/l	<2	<2	<2	<2	<2	-	-	-	-	-	-
1,2,4-Trichlorobenzene	ug/l	<3	<3	<3	<3	<3	0.4	-	-	-	-	-
Hexachlorobutadiene	ug/l	<3	<3	<3	<3	<3	0.1	-	-	0.6	-	-
1,2,3-Trichlorobenzene	ug/l	<3	<3	<3	<3	<3	-	-	-	-	-	-
Surrogate Recovery Toluene D8	%	<0	104	95	107	101	-	-	-	-	-	-
Surrogate Recovery 4-Bromofluorobenzene	%	<0	107	103	104	101	-	-	-	-	-	-

Notes

EPA Interim Guideline Values (IGVs) for the protection of groundwater, 2003.

GW 2016 Refers to European Communities Environmental Objectives (Groundwater) Regulations 2016 (SI No 366 of 2016)

EQS (MAC) - Environmental Quality Standards refer to maximum allowable concentration for inland surface waters - obtained from S.I. No.386 of 2015

Bold Fomatting = exceeds GW 2016 standard

Italic Formatting = exceeds EPA IGV standards

Underlined Formatting = exceeds Drinking Water standards

Shaded Frormating = exceeds EQS standard

Table 8: Pa Healy Road - Groundwater Analytical Results -SVOC

Sample Identity:		LOD	MW-101	MW-102	MW-103	MW-104	Groundwater		Drinking Water Regs	EQS
Date:			21/1/19	21/1/19	21/1/19	21/1/19	GW 2016	EPA IGV		
	Units									
Phenols										
2-Chlorophenol	ug/l	<1	<1	<1	<1	<1	-	200	200	-
2-Methylphenol	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	500	-	-
2-Nitrophenol	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
2,4-Dichlorophenol	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
2,4-Dimethylphenol	ug/l	<1	<1	<1	<1	<1	-	-	-	-
2,4,5-Trichlorophenol	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
2,4,6-Trichlorophenol	ug/l	<1	<1	<1	<1	<1	-	200	200	-
4-Chloro-3-methylphenol	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	500	-	-
4-Methylphenol	ug/l	<1	<1	<1	<1	<1	-	500	-	-
4-Nitrophenol	ug/l	<10	<10	<10	<10	<10	-	-	-	-
Pentachlorophenol	ug/l	<1	<1	<1	<1	<1	-	2	9	1
Phenol	ug/l	<1	<1	<1	<1	<1	-	500	500	-
PAHs										
2-Chloronaphthalene	ug/l	<1	<1	<1	<1	<1	-	-	-	-
2-Methylnaphthalene	ug/l	<1	<1	<1	<1	<1	-	-	-	-
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l	<5	<5	<5	<5	<5	6	-	-	-
Butylbenzyl phthalate	ug/l	<1	<1	<1	<1	<1	-	-	-	-
Di-n-butyl phthalate	ug/l	<1.5	<1.5	<1.5	<1.5	<1.5	-	2	6	-
Di-n-Octyl phthalate	ug/l	<1	<1	<1	<1	<1	-	-	-	-
Diethyl phthalate	ug/l	<1	<1	<1	<1	<1	-	-	-	-
Dimethyl phthalate	ug/l	<1	<1	<1	<1	<1	-	-	-	-
Other SVOCs										
1,2-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	-	10	1000	-
1,2,4-Trichlorobenzene	ug/l	<1	<1	<1	<1	<1	-	0.4	20	-
1,3-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	-	-	-	-
1,4-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	-	-	-	-
2-Nitroaniline	ug/l	<1	<1	<1	<1	<1	-	-	-	-
2,4-Dinitrotoluene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
2,6-Dinitrotoluene	ug/l	<1	<1	<1	<1	<1	-	-	-	-
3-Nitroaniline	ug/l	<1	<1	<1	<1	<1	-	-	-	-
4-Bromophenylphenylether	ug/l	<1	<1	<1	<1	<1	-	-	-	-
4-Chloroaniline	ug/l	<1	<1	<1	<1	<1	-	-	-	-
4-Chlorophenylphenylether	ug/l	<1	<1	<1	<1	<1	-	-	-	-
4-Nitroaniline	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
Azobenzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
Bis(2-chloroethoxy)methane	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
Bis(2-chloroethyl)ether	ug/l	<1	<1	<1	<1	<1	-	-	-	-
Carbazole	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
Dibenzofuran	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
Hexachlorobenzene	ug/l	<1	<1	<1	<1	<1	-	-	-	0.05
Hexachlorobutadiene	ug/l	<1	<1	<1	<1	<1	-	-	-	0.6
Hexachlorocyclopentadiene	ug/l	<1	<1	<1	<1	<1	-	-	-	-
Hexachloroethane	ug/l	<1	<1	<1	<1	<1	-	-	-	-
Isophorone	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
N-nitrosodi-n-propylamine	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-
Nitrobenzene	ug/l	<1	<1	<1	<1	<1	-	-	-	-

Notes

EPA Interim Guideline Values (IGVs) for the protection of groundwater, 2003.

GW 2016 Refers to European Communities Environmental Objectives (Groundwater) Regulations 2016 (SI No 366 of 2016)

EQS (MAC) - Environmental Quality Standards refer to maximum allowable concentration for inland surface waters - obtained from S.I. No.386 of 2015

Bold Fomatting = exceeds GW 2016 standard

Italic Formatting = exceeds EPA IGV standards

Underlined Formatting = exceeds Drinking Water standards

Shaded Frormating = exceeds EQS standard

Table 9: Pa Healy Road - Surface Water Analytical Results - Metals, PAH, MTBE&BTEX, TPH, Phenols, Anions & Other Parameters

Sample Identity:		LOD	Upstream	Downstream	Groundwater		Drinking Water Regs	EQS (MAC)
Date:			21/1/19	21/1/19	GW 2016	EPA IGV		
	Units							
Dissolved Arsenic	ug/l	<0.9	<0.9	<0.9	7.5	10	10	-
Dissolved Barium	ug/l	<1.8	84.9	85.2	-	100	-	-
Dissolved Beryllium	ug/l	<0.5	<0.5	<0.5	-	-	-	-
Dissolved Boron	ug/l	<12	26	21	750	1000	1000	-
Dissolved Cadmium	ug/l	<0.03	<0.03	<0.03	3.75	5	5	<0.45
Total Dissolved Chromium	ug/l	<0.2	0.3	<0.2	37.5	30	50	-
Dissolved Copper	ug/l	<3	<3	<3	1500	30	2000	-
Dissolved Lead	ug/l	<0.4	<0.4	<0.4	7.5	-	10	14
Dissolved Mercury	ug/l	<0.5	<0.5	<0.5	0.75	1	1	0.07
Dissolved Nickel	ug/l	<0.2	1.7	1.2	15	20	20	34
Dissolved Selenium	ug/l	<1.2	<1.2	<1.2	-	-	10	-
Dissolved Vanadium	ug/l	<0.6	1.1	<0.6	-	-	-	-
Dissolved Zinc	ug/l	<1.5	6.4	6.0	75	100	-	-
PAH MS								
Naphthalene	ug/l	<0.005	<0.005	<0.005	-	1	-	130
Acenaphthylene	ug/l	<0.005	<0.005	<0.005	-	-	-	-
Acenaphthene	ug/l	<0.005	<0.005	<0.005	-	-	-	-
Fluorene	ug/l	<0.005	<0.005	<0.005	-	-	-	0.12
Phenanthrene	ug/l	<0.005	<0.005	<0.005	-	-	-	-
Anthracene	ug/l	<0.005	<0.005	<0.005	-	10000	-	0.4
Fluoranthene	ug/l	<0.005	<0.005	<0.005	-	1	-	1
Pyrene	ug/l	<0.005	<0.005	<0.005	-	-	-	-
Benzo(a)anthracene	ug/l	<0.005	<0.005	<0.005	-	-	-	-
Chrysene	ug/l	<0.005	<0.005	<0.005	-	-	-	-
Benzo(bk)fluoranthene	ug/l	<0.01	<0.01	<0.01	-	0.5	0.1	-
Benzo(a)pyrene	ug/l	<0.0002	<0.0002	<0.0002	0.0075	0.01	0.01	0.1
Indeno(123cd)pyrene	ug/l	<0.005	<0.005	<0.005	-	0.05	0.1	-
Dibenzo(ah)anthracene	ug/l	<0.005	<0.005	<0.005	-	0.05	-	-
Benzo(ghi)perylene	ug/l	<0.005	<0.005	<0.005	-	0.05	0.1	0.0082
PAH 16 Total	ug/l	<0.075	<0.075	<0.075	0.075	0.1	-	-
Benzo(b)fluoranthene	ug/l	<0.01	<0.01	<0.01	-	0.5	-	0.017
Benzo(k)fluoranthene	ug/l	<0.01	<0.01	<0.01	-	0.05	-	0.017
Methyl Tertiary Butyl Ether	ug/l	<0.1	<0.1	<0.1	10	30	-	-
Benzene	ug/l	<0.5	<0.5	<0.5	0.75	1	1	50
Toluene	ug/l	<5	<5	<5	525	10	-	-
Ethylbenzene	ug/l	<1	<1	<1	-	10	-	-
p/m-Xylene	ug/l	<2	<2	<2	-	10	-	-
o-Xylene	ug/l	<1	<1	<1	-	10	-	-
Aliphatics								
>C5-C6	ug/l	<10	<10	<10	-	10	-	-
>C6-C8	ug/l	<10	<10	<10	-	10	-	-
>C8-C10	ug/l	<10	<10	<10	-	10	-	-
>C10-C12	ug/l	<5	<5	<5	-	10	-	-
>C12-C16	ug/l	<10	<10	<10	-	10	-	-
>C16-C21	ug/l	<10	<10	<10	-	10	-	-
>C21-C35	ug/l	<10	<10	<10	-	10	-	-
Total aliphatics C5-35	ug/l	<10	<10	<10	-	10	-	-
Aromatics								
>C5-EC7	ug/l	<10	<10	<10	-	0.75**	-	-
>EC7-EC8	ug/l	<10	<10	<10	-	10	-	-
>EC8-EC10	ug/l	<10	<10	<10	-	10	-	-
>EC10-EC12	ug/l	<5	<5	<5	-	10	-	-
>EC12-EC16	ug/l	<10	<10	<10	-	10	-	-
>EC16-EC21	ug/l	<10	<10	<10	-	10	-	-
>EC21-EC35	ug/l	<10	<10	<10	-	10	-	-
Total aromatics C5-35	ug/l	<10	<10	<10	-	10	-	-
Total aliphatics and aromatics(C5-35)	ug/l	<10	<10	<10	7.5	10	-	-
Sulphate as SO4	mg/l	<0.5	24.3	24.6	187.5	200	250	-
Chloride	mg/l	<0.3	18.8	19.0	187.5	30	250	-
Nitrate as NO3	mg/l	<0.2	6.1	5.8	37.5	25	50	-
Nitrite as NO2	mg/l	<0.02	<0.02	<0.02	0.375	0.1	0.5	-
Ortho Phosphate as P	mg/l	<0.06	<0.03	<0.03	-	0.03	-	-
Free Cyanide	mg/l	<0.01	<0.01	<0.01	-	-	-	-
Total Cyanide	mg/l	<0.01	<0.01	<0.01	-	-	0.05	-
Ammoniacal Nitrogen as NH3	mg/l	<0.03	0.06	0.06	-	150	-	-
Hexavalent Chromium	ug/l	<2	<2	<2	7.5	30	50	-
Total Dissolved Chromium III	ug/l	<2	<2	<2	-	30	50	32
Sulphide	mg/l	<0.01	<0.01	<0.01	-	-	-	-
Total Alkalinity as CaCO3	mg/l	<1	164	166	-	-	-	-
Total Organic Carbon	mg/l	<2	9	10	-	No abnormal change	-	-
COD (settled)	mg/l	<7	22	24	-	-	-	-
pH	pH Units	<0.1	7.64	7.47	-	6.5-9.5	6.5-9.5	4.5<pH<9
EC	µS/cm	<1	395	425	1875	1000	2500	-

Notes

EPA Interim Guideline Values (IGVs) for the protection of groundwater, 2003. The EPA interim guideline value for TPH is considered to "serve as a

GW 2016 Refers to threshold value for benzene quoted in the European Communities Environmental Objectives (Groundwater) Regulations 2016 (SI No 366 of 2016)

EQS (MAC) - Environmental Quality Standards refer to maximum allowable concentration for inland surface waters - obtained from S.I. No.386 of 2015

Bold Fomatting = exceeds GW 2016 standard

Italic Formatting = exceeds EPA IGV standards

Underlined Formatting = exceeds TSV standards

Shaded Frormating = exceeds EQS standard

Table 10: Pa Healy Road - Surface Water Analytical Results -VOC

Sample Identity:		LOD	Upstream	Downstream	Groundwater		Drinking Water Regs	EQS
Date:			21/1/19	21/1/19	EPA IGV	GW 2016		
	Units							
Dichlorodifluoromethane	ug/l	<2	<2	<2	-	-	-	-
Methyl Tertiary Butyl Ether	ug/l	<0.1	<0.1	<0.1	30	10	-	-
Chloromethane	ug/l	<3	<3	<3	-	-	-	-
Vinyl Chloride	ug/l	<0.1	<0.1	<0.1	-	0.375	0.5	-
Bromomethane	ug/l	<1	<1	<1	-	-	-	-
Chloroethane	ug/l	<3	<3	<3	-	-	-	-
Trichlorofluoromethane	ug/l	<3	<3	<3	-	-	-	-
1,1-Dichloroethene (1,1 DCE)	ug/l	<3	<3	<3	-	-	-	-
Dichloromethane (DCM)	ug/l	<5	<5	<5	10	15	-	-
trans-1-2-Dichloroethene	ug/l	<3	<3	<3	3	-	-	-
1,1-Dichloroethane	ug/l	<3	<3	<3	-	-	-	-
cis-1-2-Dichloroethene	ug/l	<3	<3	<3	3	-	-	-
2,2-Dichloropropane	ug/l	<1	<1	<1	-	-	-	-
Bromochloromethane	ug/l	<2	<2	<2	-	-	-	-
Chloroform	ug/l	<2	<2	<2	-	-	-	-
1,1,1-Trichloroethane	ug/l	<2	<2	<2	500	-	-	-
1,1-Dichloropropene	ug/l	<3	<3	<3	-	-	-	-
Carbon tetrachloride	ug/l	<2	<2	<2	-	-	-	-
1,2-Dichloroethane	ug/l	<2	<2	<2	3	2.25	3	-
Benzene	ug/l	<0.5	<0.5	<0.5	1	0.75	1	50
Trichloroethene (TCE)	ug/l	<3	<3	<3	70	7.5	10	-
1,2-Dichloropropane	ug/l	<2	<2	<2	-	-	-	-
Dibromomethane	ug/l	<3	<3	<3	-	-	-	-
Bromodichloromethane	ug/l	<2	<2	<2	-	-	-	-
cis-1-3-Dichloropropene	ug/l	<2	<2	<2	-	-	-	-
Toluene	ug/l	<5	<5	<5	10	525	-	-
trans-1-3-Dichloropropene	ug/l	<2	<2	<2	-	-	-	-
1,1,2-Trichloroethane	ug/l	<2	<2	<2	-	-	-	-
Tetrachloroethene (PCE)	ug/l	<3	<3	<3	40	7.5	10	-
1,3-Dichloropropane	ug/l	<2	<2	<2	-	-	-	-
Dibromochloromethane	ug/l	<2	<2	<2	-	-	-	-
1,2-Dibromoethane	ug/l	<2	<2	<2	-	-	-	-
Chlorobenzene	ug/l	<2	<2	<2	1	-	-	-
1,1,1,2-Tetrachloroethane	ug/l	<2	<2	<2	-	-	-	-
Ethylbenzene	ug/l	<1	<1	<1	10	-	-	-
p/m-Xylene	ug/l	<2	<2	<2	10	-	-	-
o-Xylene	ug/l	<1	<1	<1	10	-	-	-
Styrene	ug/l	<2	<2	<2	-	-	-	-
Bromoform	ug/l	<2	<2	<2	-	-	-	-
Isopropylbenzene	ug/l	<3	<3	<3	-	-	-	-
1,1,2,2-Tetrachloroethane	ug/l	<4	<4	<4	-	-	-	-
Bromobenzene	ug/l	<2	<2	<2	-	-	-	-
1,2,3-Trichloropropane	ug/l	<3	<3	<3	-	-	-	-
Propylbenzene	ug/l	<3	<3	<3	-	-	-	-
2-Chlorotoluene	ug/l	<3	<3	<3	-	-	-	-
1,3,5-Trimethylbenzene	ug/l	<3	<3	<3	-	-	-	-
4-Chlorotoluene	ug/l	<3	<3	<3	-	-	-	-
tert-Butylbenzene	ug/l	<3	<3	<3	-	-	-	-
1,2,4-Trimethylbenzene	ug/l	<3	<3	<3	-	-	-	-
sec-Butylbenzene	ug/l	<3	<3	<3	-	-	-	-
4-Isopropyltoluene	ug/l	<3	<3	<3	-	-	-	-
1,3-Dichlorobenzene	ug/l	<3	<3	<3	-	-	-	-
1,4-Dichlorobenzene	ug/l	<3	<3	<3	-	-	-	-
n-Butylbenzene	ug/l	<3	<3	<3	-	-	-	-
1,2-Dichlorobenzene	ug/l	<3	<3	<3	10	-	-	-
1,2-Dibromo-3-chloropropane	ug/l	<2	<2	<2	-	-	-	-
1,2,4-Trichlorobenzene	ug/l	<3	<3	<3	0.4	-	-	-
Hexachlorobutadiene	ug/l	<3	<3	<3	0.1	-	-	0.6
1,2,3-Trichlorobenzene	ug/l	<3	<3	<3	-	-	-	-
Surrogate Recovery Toluene D8	%	<0	104	95	-	-	-	-
Surrogate Recovery 4-Bromofluorobenzene	%	<0	107	103	-	-	-	-

Notes

EPA Interim Guideline Values (IGVs) for the protection of groundwater, 2003.

GW 2016 Refers to European Communities Environmental Objectives (Groundwater) Regulations 2016 (SI No 366 of 2016)

EQS (MAC) - Environmental Quality Standards refer to maximum allowable concentration for inland surface waters - obtained from S.I. No.386 of 2015

Bold Fomatting = exceeds GW 2016 standard

Italic Formatting = exceeds EPA IGV standards

Underlined Formatting = exceeds Drinking Water standards

Shaded Frormating = exceeds EQS standard

Table 11: Pa Healy Road - Surface Water Analytical Results -SVOC

Sample Identity:		LOD	Upstream	Downstream	Groundwater		Drinking Water Regs	EQS
Date:			21/1/19	21/1/19	GW 2016	EPA IGV		
	Units							
Phenols								
2-Chlorophenol	ug/l	<1	<1	<1	-	200	200	-
2-Methylphenol	ug/l	<0.5	<0.5	<0.5	-	500	-	-
2-Nitrophenol	ug/l	<0.5	<0.5	<0.5	-	-	-	-
2,4-Dichlorophenol	ug/l	<0.5	<0.5	<0.5	-	-	-	-
2,4-Dimethylphenol	ug/l	<1	<1	<1	-	-	-	-
2,4,5-Trichlorophenol	ug/l	<0.5	<0.5	<0.5	-	-	-	-
2,4,6-Trichlorophenol	ug/l	<1	<1	<1	-	200	200	-
4-Chloro-3-methylphenol	ug/l	<0.5	<0.5	<0.5	-	500	-	-
4-Methylphenol	ug/l	<1	<1	<1	-	500	-	-
4-Nitrophenol	ug/l	<10	<10	<10	-	-	-	-
Pentachlorophenol	ug/l	<1	<1	<1	-	2	9	1
Phenol	ug/l	<1	<1	<1	-	500	500	-
PAHs								
2-Chloronaphthalene	ug/l	<1	<1	<1	-	-	-	-
2-Methylnaphthalene	ug/l	<1	<1	<1	-	-	-	-
Phthalates								
Bis(2-ethylhexyl) phthalate	ug/l	<5	<5	<5	6	-	-	-
Butylbenzyl phthalate	ug/l	<1	<1	<1	-	-	-	-
Di-n-butyl phthalate	ug/l	<1.5	<1.5	<1.5	-	2	6	-
Di-n-Octyl phthalate	ug/l	<1	<1	<1	-	-	-	-
Diethyl phthalate	ug/l	<1	<1	<1	-	-	-	-
Dimethyl phthalate	ug/l	<1	<1	<1	-	-	-	-
Other SVOCs								
1,2-Dichlorobenzene	ug/l	<1	<1	<1	-	10	1000	-
1,2,4-Trichlorobenzene	ug/l	<1	<1	<1	-	0.4	20	-
1,3-Dichlorobenzene	ug/l	<1	<1	<1	-	-	-	-
1,4-Dichlorobenzene	ug/l	<1	<1	<1	-	-	-	-
2-Nitroaniline	ug/l	<1	<1	<1	-	-	-	-
2,4-Dinitrotoluene	ug/l	<0.5	<0.5	<0.5	-	-	-	-
2,6-Dinitrotoluene	ug/l	<1	<1	<1	-	-	-	-
3-Nitroaniline	ug/l	<1	<1	<1	-	-	-	-
4-Bromophenylphenylether	ug/l	<1	<1	<1	-	-	-	-
4-Chloroaniline	ug/l	<1	<1	<1	-	-	-	-
4-Chlorophenylphenylether	ug/l	<1	<1	<1	-	-	-	-
4-Nitroaniline	ug/l	<0.5	<0.5	<0.5	-	-	-	-
Azobenzene	ug/l	<0.5	<0.5	<0.5	-	-	-	-
Bis(2-chloroethoxy)methane	ug/l	<0.5	<0.5	<0.5	-	-	-	-
Bis(2-chloroethyl)ether	ug/l	<1	<1	<1	-	-	-	-
Carbazole	ug/l	<0.5	<0.5	<0.5	-	-	-	-
Dibenzofuran	ug/l	<0.5	<0.5	<0.5	-	-	-	-
Hexachlorobenzene	ug/l	<1	<1	<1	-	-	-	0.05
Hexachlorobutadiene	ug/l	<1	<1	<1	-	-	-	0.6
Hexachlorocyclopentadiene	ug/l	<1	<1	<1	-	-	-	-
Hexachloroethane	ug/l	<1	<1	<1	-	-	-	-
Isophorone	ug/l	<0.5	<0.5	<0.5	-	-	-	-
N-nitrosodi-n-propylamine	ug/l	<0.5	<0.5	<0.5	-	-	-	-
Nitrobenzene	ug/l	<1	<1	<1	-	-	-	-

Notes

EPA Interim Guideline Values (IGVs) for the protection of groundwater, 2003.

GW 2016 Refers to European Communities Environmental Objectives (Groundwater) Regulations 2016 (SI No 366 of 2016)

EQS (MAC) - Environmental Quality Standards refer to maximum allowable concentration for inland surface waters - obtained from S.I. No.386 of 2015

Bold Fomatting = exceeds GW 2016 standard

Italic Formatting = exceeds EPA IGV standards

Underlined Formatting = exceeds Drinking Water standards

Shaded Frormating = exceeds EQS standard

APPENDIX A

Site Photographs

Plate 1 - View at the Warehouse Building - visible ACM panells

Plate 2 – Overgrown concrete debris present on site

Plate 3 – Made ground retrived from TP102 including C&D waste & car parts

Plate 4 - TP103 containing large volumes of C&D waste

Plate 5 – TP105 with burried pile fragments

Plate 6 – Shallow groundwater accumulationg in TP107

Plate 7 – Excavation of TP115

Plate 8 – Dilling works at MW-101 location

APPENDIX B

Trial Pit and Borehole Logs

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP101**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
		No PEC 0.0ppm	TP101	0.1		MADE GROUND black gravel.
	SS	No PEC 0.0ppm	TP101	0.2 0.3 0.4 0.5 0.6 0.7 0.8		MADE GROUND dark grey / black silty sandy clay with fragments of concrete block and occasional red brick.
		No PEC 0.0ppm	TP101	0.9 1.0 1.1 1.2 1.3		NATURAL GROUND dark grey / brown silty sandy CLAY.
	SS	No PEC 0.0ppm	TP101	1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9		NATURAL GROUND loose light brown mottled grey, clayey gravelly SANDwith occasional large limestone cobbles.
				3.0 3.1 3.2		End of Trial pit at 3mBGL. Trial pit terminated on possibe large boulders or bedrock. Trial pit collapsing.

Remarks

Soil Samples: TP101A (0.15-0.85m)
TP101B (0.85-3.0m)

No Physical Evidence of Contamination (PEC)

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP102**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
		No PEC	TP102	0.1		MADE GROUND silty top soil.
		No PEC 0.0ppm	TP102	0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4		MADE GROUND brown sandy clay, with frequent fragments of concrete and occasional fragments of red brick. Red electrical cucting present at the edge of the excavation at 0.75mBGL.
	SS	HC/Ch Od 2.9ppm	TP102	1.5 1.6 1.7 1.8 1.9		MADE GROUND brown sandy clay fill, with frequent fragments of concrete and occasional fragments of red brick, car parts, metal panels, plastic pipe and wood.
		Organic Odour	TP102	2.0 2.1 2.2 2.3 2.4 2.5		NATURAL GROUND dark grey peaty CLAY.
	SS	No PEC 0.0ppm	TP102	2.6 2.7 2.8 2.9 3.0 3.1		NATURAL GROUND light brown clayey silty SAND.
				3.2 3.3 3.4		End of Trial Pit at 3.2mBGL.

Remarks

Soil Samples: TP102A (0.25-2.00m)
TP102B (2.00-3.20m)

No Physical Evidence of Contamination (PEC)

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP103**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
		0.0ppm No PEC	TP103	0.1		MADE GROUND brown silty top soil with abuntant fragments of rootlets.
	SS	0.0ppm No PEC	TP103	0.2 – 1.3		MADE GROUND brown / light brown sandy clay with abundant large concrete fragments and red brick, some metal and plastic fragments and possible single fragment of Asbestos Containing Material (ACM).
		0.0ppm No PEC	TP103	1.4 – 1.6		MADE GROUND dark brownish / grey peaty clay.
		0.0ppm No PEC	TP103	1.7 – 2.6		NATURAL GROUND light brown mottled grey clayey gravelly SAND with large cobbles and boulders.
				2.7		End of Trial Pit at 2.7mBGL. Obstruction on boulders.

Remarks

Soil Sample: TP103A (0.2-1.4m)

No Physical Evidence of Contamination (PEC)

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP104**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
	SS	0.0ppm No PEC	TP104	0.1 – 2.2		MADE GROUND grey gravel. MADE GROUND browninsh / grey very sandy clay with frequent fragments of concrete and red brick, a single fragment of roof tile encountered, occasional fragments of wood and metal. Water encountered at 1.5mBGL.
		0.0ppm Org Od	TP104	2.3 – 2.4		NATURAL GROUND dark brown PEAT with frequent fragments of plant material.
	SS	0.0ppm No PEC	TP104	2.5 – 3.0		NATURAL GROUND grey mottled / light grey mottled CLAY with sand lenses.
				3.1 – 3.3		End of Trial Pit at 3.1mBGL. Trial Pit collapsing due to water entry.

Remarks

Soil Samples: TP104A (0.05-2.3m);
TP104B (2.5-3.1m)

No Physical Evidence of Contamination (PEC)
Water strike at 1.5mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP105**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
				0.1		MADE GROUND grey gravel fill with tarmac bind.
				0.2		MADE GROUND brown sandy clay with abundant fragments of concrete and red brick, presence of piling concrete poles and some large fragments of flat concrete.
				0.3		
				0.4		
				0.5		
				0.6		
				0.7		
				0.8		
				0.9		
				1.0		
				1.1		
				1.2		
	SS	0.0ppm Chem Od	TP105	1.3		
				1.4		
				1.5		
				1.6		
				1.7		
				1.8		
				1.9		
				2.0		
				2.1		
				2.2		
				2.3		
				2.4		
▽				2.5		End of Trial Pit at 2.5mBGL. Obstruction on very large fragments of concrete. Water strike at 2.5mBGL.
				2.6		
				2.7		

Remarks

Soil Sample: TP105 (0.05-2.5m)

Water strike at 2.5mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP106**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
		No PEC	TP106	0.1 0.2		MADE GROUND silty brown topsoil with abundance of roots.
		0.0ppm No PEC	TP106	0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4		MADE GROUND brown clayey gravelly sand.
▽	SS	0.0ppm No PEC	TP106	1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0		MADE GROUND dark greyish-brown slightly sandy clay with frequent red brick, occasional plastic, glass and metal fragments. Loose stone drain structure encountered at 2.1 mBGL with abundance of water.
				3.1 3.2 3.3		End of Trial Pit at 3.1mBGL. Trial pit collapsing due to water entry.

Remarks

Soil Sample: TP106 (0.3-3.1m)

Water strike at 2.1mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP107**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
		No PEC	TP107	0.1		MADE GROUND silty brown topsoil with abundance of roots.
		0.0ppm No PEC	TP107	0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3		MADE GROUND comprising brown clayey gravelly sand.
▽	SS	0.0ppm No PEC	TP107	1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7		MADE GROUND grey sandy clay with abundance of very large fragments of concrete. Some Hydrocarbon sheen on water.
				2.8 2.9 3.0		End of Trial Pit at 2.8mBGL.

Remarks	
Soil Sample: TP107 (0.2-2.8m) Water Sample: TP107 (1.0-4.0mBGL) Water strike at 2.5mBGL.	

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP108**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
				0.1		MADE GROUND grey 804 gravel.
				0.2		
				0.3		MADE GROUND brown sandy gravel.
				0.4		
				0.5		
				0.6		
▽				0.7		MADE GROUND grey / brown sandy gravel with frequent concrete and red brick fragments.
				0.8		
				0.9		
				1.0		
				1.1		
				1.2		
				1.3		
	SS		TP108	1.4		
				1.5		
				1.6		
				1.7		
				1.8		
				1.9		
				2.0		
				2.1		
				2.2		
				2.3		
				2.4		
				2.5		
				2.6		
				2.7		
				2.8		
				2.9		
				3.0		
	SS	1.3ppm Mild HC Od	TP108	3.1		NATURAL GROUND orange sandy CLAY. Mild Hydrocarbon odour.
				3.2		
				3.3		
				3.4		End of Trial Pit at 3.4mBGL. Close to the range of the digger.
				3.5		
				3.6		

Remarks

Soil Sample: TP108A (1.4-3.1m)
TP108B (3.1-3.4m)

Water strike at 0.7mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group

Trial Pit No.: TP109

Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
				0.1		MADE GROUND comprising 804 fill.
	SS	0.0ppm	TP109	0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7		MADE GROUND brown / grey sandy gravelly clay with frequent limestone boulders and cobbles, occasional fragments of red brick and concrete.
				2.8 2.9 3.0		End of Trial Pit at 2.8mBGL. Trial pit partially collapsing.

Remarks

Soil Sample: TP109 (0.2-2.8m)

Water strike at 0.2mBGL (small) and at 2.5mBGL

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP110**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
				0.1		MADE GROUND dark brown silty topsoil.
	SS	0.0ppm / 2.4 Ammonia	TP110	0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7		MADE GROUND dark greyish-brown very sandy gravelly clay with frequent limestone boulders, fragments of red brick and occasional ceramic.
				2.8 2.9 3.0		End of Trial Pit at 2.8mBGL. Trial pit collapsing due to water entry at 2.5mBGL.

Remarks

Soil Sample: TP110 (2.4-2.8m)

Water strike at 2.5mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP111**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** DMC/KP	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
				0.1 0.2 0.3 0.4 0.5 0.6 0.7		MADE GROUND brown sandy gravelly clay with frequent large stones and cobbles.
				0.8 0.9 1.0 1.1 1.2 1.3 1.4		MADE GROUND brown / grey sandy gravelly clay with occasional fragments of red brick, concrete, metal, ceramics and glass.
	SS		TP111A	1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7		MADE GROUND grey / brown sandy gravel with fragments of metal sheeting, plastic and concrete poles present.
	SS		TP111B	2.8 2.9 3.0 3.1 3.2 3.3 3.4		NATURAL GROUND wet light grey / brown silty CLAY with frequent subrounded cobbles. (Some peat overlying natural ground)
				3.5 3.6 3.7		End of Trial Pit at 3.5mBGL. Trial pit collapsing.

Remarks

Soil Sample: TP111A (0.8-2.8m)
TP111B (2.8-3.5m)

Water strike at 2.5 mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP112**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** DMC	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
				0.1		MADE GROUND grey / brown sandy gravelly clay with frequent fragments of concrete, red brick, pipe, rebar, piling and mesh present
	SS	0.0ppm/No Odour	TP112	0.2		
				0.3		
				0.4		
				0.5		
				0.6		
				0.7		
				0.8		
				0.9		
				1.0		
				1.1		
				1.2		
				1.3		
				1.4		
				1.5		
				1.6		
				1.7		
				1.8		
				1.9		
				2.0		
				2.1		
				2.2		
				2.3		
				2.4		
				2.5		
				2.6		
				2.7		
▽				2.8		MADE GROUND grey / brown wet sandy very gravelly clay with frequent fragments of concrete, red brick, pip, rebar, piling and mesh present
				2.9		
				3.0		
				3.1		
				3.2		End of Trial Pit at 3.2mBGL. Trial pit collapsing.
				3.3		
				3.4		

Remarks	
Soil Sample: TP112 (0.1-3.2m) Water strike at 2.8mBGL.	

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP113**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** DMC	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
		0.0ppm No PEC		0.1 0.2 0.3 0.4		MADE GROUND grey / brown gravel fill with large cobbles.
	SS	0.0ppm No PEC	TP113	0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4		MADE GROUND grey / brown gravel fill with large cobbles, frequent large stones, some metal waste and very large limestone cobbles present.
				2.5 2.6 2.7		End of Trial Pit at 2.5mBGL. Trial pit collapsing.

Remarks
Soil Sample: TP113 (0.5-2.5m) Water strike at 2.0mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP114**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** DMC	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
				0.1		MADE GROUND grey sandy silty gravel with frequent limestone cobbles and some fragments of red brick.
	SS	0.0ppm No PEC	TP114	0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4		
				2.5		MADE GROUND comprising grey sandy silty gravel with frequent limestone cobbles red brick plastic wood and hosing present
▽				2.6 2.7 2.8		NATURAL GROUND wet light brown / grey silty CLAY with subrounded cobbles present. (natural layer of peat overlying natural ground)
				2.9		End of Trial Pit at 2.9mBGL. Target depth achieved.
				3.0 3.1 3.2		

Remarks

Soil Sample: TP114 (0.1-2.8m)

Water strike at 2.8mBGL.
PEC- Physical Evidence of Contamination

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Trial Pit No.: TP115**
Site: Pa Healy Road	**Client** Lawlor Burns	**Contractor:** Fergal O'Murchu	**Sheet:** 1 of 1
County: Limerick	**Logged By:** DMC	**Date:** 10/01/2019	**Verde Job Ref:** 52107

SAMPLES AND INSITU TESTING				STRATA RECORD		
Ground Water Depth (m)	Type	Observations	Sample ID	Depth (m)	Key	Description
						Ground Surface
	SS		TP115	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2		MADE GROUND brown sandy gravelly silt with frequent limestone cobbles and red brick, some metal pipes and fragments of concrete.
▽				2.3 2.4 2.5 2.6 2.7 2.8 2.9		NATURAL GROUND wet, soft, loose light brown sandy CLAY with some small clasts present.
				3.0 3.1 3.2		End of Trial Pit at 3.0mBGL. Trial pit collapsing.

Remarks

Soil Sample: TP115 (0.1-2.3m)

Water strike at 2.4mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Borehole Log No.: MW101**
Site: Pa Healy Road	**Logged By:** DH	**Contractor:** Southern Pumps	**Sheet:** 1 of 1
Client: PHM Consulting	**Drilling method:** Rotary	**Date:** 10/01/2019	**Verde Job Ref:** 52107

GROUNDWATER	SAMPLES AND INSITU TESTING					STRATA RECORD	
Well	Depth/ Type (m)	PID (ppm)	Observations	Sample ID	Depth (m)	Key	Description
							Ground surface
					0.0		Rushes/grass surface-dry ground
					0.5		MADE GROUND comprising angular limestone - gravels and cobbles.
					1.0		
					1.5		Large boulder encountered.
					2.0		MADE GROUND comprising light grey, wet, soft silty clay fill with plastic bag fragments.
					2.5		
					3.0		
					3.5		Dark brown, moist, soft, slightly spongy peaty CLAY with plant roots present.
					4.0		
					4.5		
					5.0		
					5.5		Light grey, wet, silty CLAY with plant roots present at 6mBGL.
					6.0		
					6.5		
					7.0		
					7.5		
					8.0		
					8.5		Weathered limestone BEDROCK.
					9.0		
					9.5		
					10.0		
					10.5		End of Borehole, Target Depth

Well installation details:
Pea gravel around screened section (9.3-10.3mBGL). Bentonite seal above (7.5-8.6mBGL). Sand (8.6-8.9m). Native fill above. Well finished with flush cover.

PEC: Physical Evidence of Contamination

Groundwater remarks:
Small groundwater strike at 8.5mBGL.
Large groundwater strike at 10.2mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group

Borehole Log No.: MW102

Site: Pa Healy Road	**Logged By:** DH	**Contractor:** Southern Pumps	**Sheet:** 1 of 1
Client: PHM Consulting	**Drilling method:** Rotary	**Date:** 10/01/2019	**Verde Job Ref:** 52107

GROUNDWATER	SAMPLES AND INSITU TESTING					STRATA RECORD	
Well	Depth/ Type (m)	PID (ppm)	Observations	Sample ID	Depth (m)	Key	Description
							Ground surface
Backfill					0.5		MADE GROUND comprising angular limetone fill - gravels and cobbles with red brick and concrete fragments present.
					3.5		Dark brown, wet, soft spongy peaty CLAY
					4.5		Brown/grey, wet silty CLAY with occasional gravels presents.
Bentonite Seal					8.5		Weathered limestone BEDROCK.
Sand					9.0		
Gravel Pack					10.5		
					11.0		End of Borehole, Target Depth

Well installation details:
Gravel pack around screened section (9.3-10.3mBGL). Sand seal above (9.1-9.3mBGL). Bentonite seal above (8.0-9.1mBGL). Native fill above. Well finished with upright cover.

Groundwater remarks:
Small groundwater strike at 3.5mBGL.
Large groundwater strike at 8.8mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Borehole Log No.: MW103**
Site: Pa Healy Road	**Logged By:** DH	**Contractor:** Southern Pumps	**Sheet:** 1 of 1
Client: PHM Consulting	**Drilling method:** Rotary	**Date:** 10/01/2019	**Verde Job Ref:** 52107

GROUNDWATER	SAMPLES AND INSITU TESTING					STRATA RECORD	
Well	Depth/ Type (m)	PID (ppm)	Observations	Sample ID	Depth (m)	Key	Description
							Ground surface
					0.5		MADE GROUND comprising black limestone chippings, gravelly silt fill.
					1.0		
					1.5		
					2.0		
					2.5		
					3.0		Dark brown, moist, soft, spongy, peaty CLAY with some plkant roots. Becoming wet at 3.5mBGL.
					3.5		
					4.0		
					4.5		Light grey, wet, silty CLAY with some gravels present.
					5.0		
					5.5		
					6.0		
					6.5		
					7.0		
					7.5		Weathered limestone BEDROCK.
					8.0		
					8.5		
							End of Borehole, Target Depth

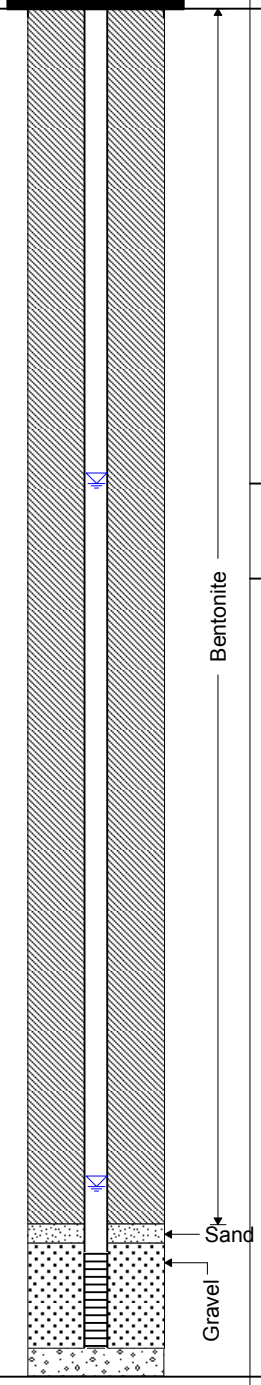
Well installation details:
Gravel pack around screened section (7.7-8.7mBGL). Sand above (7.6-7.7mBGL). Bentonite seal above (6.5-7.6mBGL). Native fill above. Well finished with upright cover.

PEC: Physical Evidence of Contamination

Groundwater remarks:
Small perched groundwater strike at 3.5mBGL.
Moderate groundwater strike at 7.4mBGL.

Verde Environmental Consultants Ltd | part of the Verde Environmental Group			**Borehole Log No.: MW104**
Site: Pa Healy Road	**Logged By:** DH	**Contractor:** Southern Pumps	**Sheet:** 1 of 1
Client: PHM Consulting	**Drilling method:** Rotary	**Date:** 11/01/2019	**Verde Job Ref:** 52107

GROUNDWATER	SAMPLES AND INSITU TESTING					STRATA RECORD	
Well	Depth/ Type (m)	PID (ppm)	Observations	Sample ID	Depth (m)	Key	Description
							Ground surface
					0.5		MADE GROUND comprising black limestone gravels and cobbles with red brick fragments grading into darkbrown silty clay becoming wet at 2.5mBGL.
					1.0		
					1.5		
					2.0		
			Hydrocarbon Odour		2.5		
					3.0		
					3.5		
					4.0		Dark brown soft, peaty CLAY with some plant roots.
					4.5		
					5.0		Grey silty CLAY
					5.5		
					6.0		Weathered limestone BEDROCK with sand.
					6.5		
					7.0		End of Borehole, Target Depth



Well installation details:
Gravel pack around screened section (6.5-7.05mBGL). Sand above (6.4-6.5mBGL). Bentonite seal above (0-6.4mBGL). Well finished with upright cover.

PEC: Physical Evidence of Contamination

Groundwater remarks:
Small perched groundwater strike at 2.5mBGL.
Moderate groundwater strike at 6.2mBGL.

APPENDIX C

Sampling Logs

Groundwater Monitoring Well Sampling Logs			
Well Name	MW101	**Site**	Pa Healy Rd
Static Water Level (meters below reference point)	3.25	**Project Reference**	52107
Water Level Reference Point	top of standpipe	**Coordinates**	-
Well Depth (m)	10.44	**Sampler**	Donncha Mc Carthy
Well Diamter (m)	0.05	**Date**	21st Jan 2019
Screen Interval (m)	9.3 to 10.3	**Sampling Method**	Dedicated bailer
Well Volume (m)	14.1	**Containers Used**	500ml Glass x 1, 40ml Vials x 2, 100ml (H2SO4, ZnAc, HNO3)
Purge Volume (litres)	42	**Preservative Used**	H2SO4, ZnAc, HNO3
Well Head Condition	Upright cover and concrete plinth - good condition	**Weather**	Cool, overcast, breezy

Physical Observations		Field Water Quality Readings	
Colour	Greyish-brown	**pH**	-
Odour	None	**EC (µS/cm)**	-
Well Recovery Rate	Good	**Temperature (°C)**	9.3
Comments	-	**DO (mg/l)**	-
		ORP (mV)	-

Groundwater Monitoring Well Sampling Logs			
Well Name	MW102	**Site**	Pa Healy Rd
Static Water Level (meters below reference point)	3.56	**Project Reference**	52107
Water Level Reference Point	top of standpipe	**Coordinates**	-
Well Depth (m)	10.66	**Sampler**	Donncha Mc Carthy
Well Diamter (m)	0.05	**Date**	21st Jan 2019
Screen Interval (m)	9.3 to 10.3	**Sampling Method**	Dedicated bailer
Well Volume (m)	13.9	**Containers Used**	500ml Glass x 1, 40ml Vials x 2, 100ml (H2SO4, ZnAc, HNO3)
Purge Volume (litres)	42	**Preservative Used**	H2SO4, ZnAc, HNO3
Well Head Condition	Upright cover and concrete plinth - good condition	**Weather**	Cool, overcast, breezy

Physical Observations		Field Water Quality Readings	
Colour	Greyish-brown	**pH**	-
Odour	None	**EC (µS/cm)**	-
Well Recovery Rate	Good	**Temperature (°C)**	9.4
Comments		**DO (mg/l)**	-
		ORP (mV)	-

Groundwater Monitoring Well Sampling Logs			
Well Name	MW103	**Site**	Pa Healy Rd
Static Water Level (meters below reference point)	4.02	**Project Reference**	52107
Water Level Reference Point	top of standpipe	**Coordinates**	-
Well Depth (m)	8.8	**Sampler**	Donncha Mc Carthy
Well Diamter (m)	0.05	**Date**	21st Jan 2019
Screen Interval (m)	7.7 to 8.7	**Sampling Method**	Dedicated bailer
Well Volume (m)	9.4	**Containers Used**	500ml Glass x 1, 40ml Vials x 2, 100ml (H2SO4, ZnAc, HNO3)
Purge Volume (litres)	28	**Preservative Used**	H2SO4, ZnAc, HNO3
Well Head Condition	Upright cover and concrete plinth - good condition	**Weather**	Cool, overcast, breezy

Physical Observations		Field Water Quality Readings	
Colour	Greyish-brown	**pH**	-
Odour	None	**EC (µS/cm)**	-
Well Recovery Rate	Good	**Temperature (°C)**	10
Comments	Well purged dry after 50l	**DO (mg/l)**	-
		ORP (mV)	-

Groundwater Monitoring Well Sampling Logs			
Well Name	MW104	**Site**	Pa Healy Rd
Static Water Level (meters below reference point)	3.68	**Project Reference**	52107
Water Level Reference Point	top of standpipe	**Coordinates**	-
Well Depth (m)	7.38	**Sampler**	Donncha Mc Carthy
Well Diamter (m)	0.05	**Date**	21st Jan 2019
Screen Interval (m)	6.5 to 7.05	**Sampling Method**	Dedicated bailer
Well Volume (m)	7.3	**Containers Used**	500ml Glass x 1, 40ml Vials x 2, 100ml (H2SO4, ZnAc, HNO3)
Purge Volume (litres)	22	**Preservative Used**	H2SO4, ZnAc, HNO3
Well Head Condition	Upright cover and concrete plinth - good condition	**Weather**	Cool, overcast, breezy

Physical Observations		Field Water Quality Readings	
Colour	Greyish-brown	**pH**	-
Odour	None	**EC (µS/cm)**	-
Well Recovery Rate	Good	**Temperature (°C)**	9.1
Comments	Well purged dry after 50l	**DO (mg/l)**	-
		ORP (mV)	-

Groundwater Monitoring Well Sampling Logs				
Well Name	Upstream (US)		**Site**	PA Healy Rd
Static Water Level (meters below reference point)	-		**Project Reference**	52107
Water Level Reference Point	-		**Coordinates**	-
Well Depth (m)	-		**Sampler**	Donncha Mc Carthy
Well Diamter (m)	-		**Date**	21st Jan 2019
Screen Interval (m)	-		**Sampling Method**	telescopic sampling pole with dedicated lab supplied bottles
Well Volume (m)	-		**Containers Used**	500ml Glass x 1, 40ml Vials x 2, 100ml (H2SO4, ZnAc, HNO3)
Channel Width (m)	4		**Preservative Used**	H2SO4, ZnAc, HNO3
Flow description	Slow		**Weather**	Cool, overcast, breezy

Physical Observations			Field Water Quality Readings	
Colour	Yellow tint		**pH**	
Odour	None		**EC (µS/cm)**	
-			**Temperature (°C)**	6.5
Comments	-		**DO (mg/l)**	-
			ORP (mV)	-

Groundwater Monitoring Well Sampling Logs				
Well Name	Downstream (DS)		**Site**	PA Healy Rd
Static Water Level (meters below reference point)	-		**Project Reference**	52107
Water Level Reference Point	-		**Coordinates**	-
Well Depth (m)	-		**Sampler**	Donncha Mc Carthy
Well Diamter (m)	-		**Date**	21st Jan 2019
Screen Interval (m)	-		**Sampling Method**	telescopic sampling pole with dedicated lab supplied bottles
Well Volume (m)	-		**Containers Used**	500ml Glass x 1, 40ml Vials x 2, 100ml (H2SO4, ZnAc, HNO3)
Channel Width (m)	4		**Preservative Used**	H2SO4, ZnAc, HNO3
Flow description	Slow		**Weather**	Cool, overcast, breezy

Physical Observations			Field Water Quality Readings	
Colour	Yellow tint		**pH**	-
Odour	None		**EC (µS/cm)**	-
-			**Temperature (°C)**	6.6
Comments	-		**DO (mg/l)**	-
			ORP (mV)	-

APPENDIX D

Laboratory Certificates

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

Verde Environmental Consultants
Unit 3 Airport E.Business & Technology Park
Farmers Cross
Cork

Attention :	Donal Hogan
Date :	31st January, 2019
Your reference :	52107
Our reference :	Test Report 19/1076 Batch 1
Location :	
Date samples received :	23rd January, 2019
Status :	Final report
Issue :	1

Six samples were received for analysis on 23rd January, 2019 of which six 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.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Donal Hogan
JE Job No.: 19/1076

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

J E Sample No.	1-11	12-22	23-33	34-44	45-55	56-66					LOD/LOR	Units	Method No.
Sample ID	MW101	MW102	MW103	MW104	US	DS							
Depth	10.44	10.66	8.80	7.38									
COC No / misc													
Containers	V H HN N Z P G	V H HN N P G	V H HN N Z P G	V HN H N Z P G	V H HN N P G	V H HN N P G							
Sample Date	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019							
Dissolved Arsenic #	<0.9	<0.9	<0.9	17.3	<0.9	<0.9					<0.9	ug/l	TM30/PM14
Dissolved Barium #	104.0	172.1	142.8	1215.0	84.9	85.2					<1.8	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Boron	56	38	45	55	26	21					<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03					<0.03	ug/l	TM30/PM14
Total Dissolved Chromium #	0.3	<0.2	0.4	1.0	0.3	<0.2					<0.2	ug/l	TM30/PM14
Dissolved Copper #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM30/PM14
Dissolved Lead #	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4					<0.4	ug/l	TM30/PM14
Dissolved Mercury #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Nickel #	2.7	1.9	2.8	2.7	1.7	1.2					<0.2	ug/l	TM30/PM14
Dissolved Selenium #	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2					<1.2	ug/l	TM30/PM14
Dissolved Vanadium #	<0.6	0.9	1.4	1.9	1.1	<0.6					<0.6	ug/l	TM30/PM14
Dissolved Zinc #	14.2	6.5	11.3	7.7	6.4	6.0					<1.5	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013					<0.013	ug/l	TM4/PM30
Acenaphthene #	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013					<0.013	ug/l	TM4/PM30
Fluorene #	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014					<0.014	ug/l	TM4/PM30
Phenanthrene #	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011					<0.011	ug/l	TM4/PM30
Anthracene #	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013					<0.013	ug/l	TM4/PM30
Fluoranthene #	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012					<0.012	ug/l	TM4/PM30
Pyrene #	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013					<0.013	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015					<0.015	ug/l	TM4/PM30
Chrysene #	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011					<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018					<0.018	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016					<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011					<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011					<0.011	ug/l	TM4/PM30
PAH 16 Total #	<0.195	<0.195	<0.195	<0.195	<0.195	<0.195					<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	98	95	83	92	92	93					<0	%	TM4/PM30
VOC TICs	ND	ND	ND	ND	ND	ND						None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	95	107	101	99	96					<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	107	103	104	101	104	102					<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Donal Hogan
JE Job No.: 19/1076

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

J E Sample No.	1-11	12-22	23-33	34-44	45-55	56-66					LOD/LOR	Units	Method No.
Sample ID	MW101	MW102	MW103	MW104	US	DS							
Depth	10.44	10.66	8.80	7.38									
COC No / misc													
Containers	V H HN N Z P G	V H HN N P G	V H HN N Z P G	V HN H N Z P G	V H HN N P G	V H HN N P G							
Sample Date	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019							
SVOC TICs	ND	ND	ND	ND	ND	ND						None	TM16/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphate as SO4 #	59.8	34.7	40.9	3.7	24.3	24.6					<0.5	mg/l	TM38/PM0
Chloride #	19.5	30.6	36.4	47.0	18.8	19.0					<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	6.3	0.7	2.7	<0.2	6.1	5.8					<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	0.05	<0.02	0.07	<0.02	<0.02	<0.02					<0.02	mg/l	TM38/PM0
Ortho Phosphate as P #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03					<0.03	mg/l	TM38/PM0
Free Cyanide #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					<0.01	mg/l	TM89/PM0
Total Cyanide #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as NH3 #	0.23	0.15	0.12	0.25	0.06	0.06					<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<2	<2	<2	<2	<2	<2					<2	ug/l	TM38/PM0
Total Dissolved Chromium III	<2	<2	<2	<2	<2	<2					<2	ug/l	TM0/PM0
Total Alkalinity as CaCO3 #	498	1110	678	532	164	166					<1	mg/l	TM75/PM0
Sulphide	<10	<10	<10	<10	<10	<10					<10	ug/l	TM107/PM0
COD (Settled) #	8	<7	10	18	22	24					<7	mg/l	TM57/PM0
Electrical Conductivity @25C #	808	887	906	819	395	425					<2	uS/cm	TM76/PM0
pH #	7.48	7.33	7.23	7.48	7.64	7.47					<0.01	pH units	TM73/PM0
Total Organic Carbon #	7	6	7	7	9	10					<2	mg/l	TM60/PM0

Please see attached notes for all abbreviations and acronyms

Exova Jones Environmental

Client Name: Verde Environmental Consultants

Report : Liquid

Reference: 52107
Location:
Contact: Donal Hogan
JE Job No.: 19/1076

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

J E Sample No.	1-11	12-22	23-33	34-44	45-55	56-66					LOD/LOR	Units	Method No.
Sample ID	MW101	MW102	MW103	MW104	US	DS							
Depth	10.44	10.66	8.80	7.38									
COC No / misc													
Containers	V H HN N Z P G	V H HN N P G	V H HN N Z P G	V HN H N Z P G	V H HN N P G	V H HN N P G							
Sample Date	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019							
PAH MS ultra low													
Naphthalene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Acenaphthylene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Acenaphthene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Fluorene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Phenanthrene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Anthracene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Fluoranthene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Pyrene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Benzo(a)anthracene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Chrysene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Benzo(bk)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					<0.01	ug/l	
Benzo(a)pyrene	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002					<0.0002	ug/l	
Indeno(123cd)pyrene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Dibenzo(ah)anthracene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
Benzo(ghi)perylene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	ug/l	
PAH 16 Total	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075					<0.075	ug/l	

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Donal Hogan
JE Job No.: 19/1076

SVOC Report : **Liquid**

J E Sample No.	1-11	12-22	23-33	34-44	45-55	56-66							
Sample ID	MW101	MW102	MW103	MW104	US	DS							
Depth	10.44	10.66	8.80	7.38									
COC No / misc													
Containers	V H HN N Z P G	V H HN N P G	V H HN N Z P G	V HN H N Z P G	V H HN N P G	V H HN N P G							
Sample Date	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019							
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<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	ug/l	TM16/PM30
2,4-Dichlorophenol #	<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	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<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	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<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	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<10	<10					<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	<5	<5					<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<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	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
2-Nitroaniline	<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	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<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	ug/l	TM16/PM30
Azobenzene #	<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	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<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	ug/l	TM16/PM30
Dibenzofuran #	<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	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1	<1					<1	ug/l	TM16/PM30
Hexachloroethane #	<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	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<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	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	122	127	120	125	120	107					<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	128	125	128	127	129	128					<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Donal Hogan
JE Job No.: 19/1076

VOC Report : **Liquid**

J E Sample No.	1-11	12-22	23-33	34-44	45-55	56-66					LOD/LOR	Units	Method No.
Sample ID	MW101	MW102	MW103	MW104	US	DS							
Depth	10.44	10.66	8.80	7.38									
COC No / misc													
Containers	V H HN N Z P G	V H HN N P G	V H HN N Z P G	V HN H N Z P G	V H HN N P G	V H HN N P G							
Sample Date	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019	23/01/2019							
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	ug/l	TM15/PM10
Chloromethane #	<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	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1					<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1					<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4					<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2	<2					<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3					<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	95	107	101	99	96					<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	107	103	104	101	104	102					<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Donal Hogan

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/1076						

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/1076

SOILS

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.

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. 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.

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.

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.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

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 UKAS requirement 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.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

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.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental 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

JE Job No: 19/1076

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
TM0	Not available	PM0	No preparation is required.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	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 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270. 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 8270. 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			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				

JE Job No: 19/1076

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
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. 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 can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. 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			
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			

JE Job No: 19/1076

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
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM0	No preparation is required.				

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

Verde Environmental Consultants
Unit 3 Airport E.Business & Technology Park
Farmers Cross
Cork

Attention :	Krzysztof Pniewczuk
Date :	19th February, 2019
Your reference :	52107
Our reference :	Test Report 19/582 Batch 1
Location :	
Date samples received :	15th January, 2019
Status :	Final report
Issue :	2

Twenty one samples were received for analysis on 15th January, 2019 of which twenty one 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.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	LOD/LOR	Units	Method No.
Sample ID	TP - 101A	TP - 101B	TP - 102A	TP - 102B	TP - 103	TP - 104A	TP - 104B	TP - 105	TP - 106	TP - 107			
Depth	0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30	2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019			
Arsenic #	7.5	6.3	-	-	-	-	8.1	7.9	-	-	<0.5	mg/kg	TM30/PM15
Barium #	130	141	-	-	-	-	151	109	-	-	<1	mg/kg	TM30/PM15
Beryllium	0.8	0.7	-	-	-	-	0.9	0.7	-	-	<0.5	mg/kg	TM30/PM15
Cadmium #	0.3	0.2	-	-	-	-	0.1	0.3	-	-	<0.1	mg/kg	TM30/PM15
Chromium #	51.0	41.6	-	-	-	-	54.6	44.6	-	-	<0.5	mg/kg	TM30/PM15
Copper #	35	13	-	-	-	-	13	26	-	-	<1	mg/kg	TM30/PM15
Lead #	92	26	-	-	-	-	39	66	-	-	<5	mg/kg	TM30/PM15
Mercury #	0.3	<0.1	-	-	-	-	<0.1	<0.1	-	-	<0.1	mg/kg	TM30/PM15
Nickel #	30.3	26.8	-	-	-	-	23.9	25.7	-	-	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	-	-	-	-	<1	<1	-	-	<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	857	293	-	-	-	-	381	773	-	-	<50	mg/kg	TM50/PM29
Vanadium	33	27	-	-	-	-	26	27	-	-	<1	mg/kg	TM30/PM15
Water Soluble Boron #	1.5	0.5	-	-	-	-	0.5	1.0	-	-	<0.1	mg/kg	TM74/PM32
Zinc #	118	45	-	-	-	-	41	205	-	-	<5	mg/kg	TM30/PM15
Arsenic	-	-	7.3	6.2	7.0	7.3	-	-	6.5	7.3	<0.5	mg/kg	TM30/PM62
Barium	-	-	136	107	184	169	-	-	126	125	<1	mg/kg	TM30/PM62
Beryllium	-	-	0.7	0.8	0.7	0.6	-	-	0.6	0.6	<0.5	mg/kg	TM30/PM62
Cadmium	-	-	0.4	0.3	0.5	0.3	-	-	0.2	0.4	<0.1	mg/kg	TM30/PM62
Chromium	-	-	23.1	21.6	21.5	20.0	-	-	17.5	24.9	<0.5	mg/kg	TM30/PM62
Copper	-	-	41	24	21	49	-	-	26	41	<1	mg/kg	TM30/PM62
Lead	-	-	77	69	96	178	-	-	64	112	<5	mg/kg	TM30/PM62
Mercury	-	-	<0.1	0.3	<0.1	0.1	-	-	<0.1	<0.1	<0.1	mg/kg	TM30/PM62
Nickel	-	-	32.3	27.1	26.0	22.2	-	-	19.8	30.7	<0.7	mg/kg	TM30/PM62
Selenium	-	-	<1	<1	<1	<1	-	-	<1	<1	<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	-	961	243	1068	958	-	-	885	1186	<50	mg/kg	TM50/PM29
Vanadium	-	-	33	22	25	22	-	-	21	34	<1	mg/kg	TM30/PM62
Water Soluble Boron	-	-	1.1	1.3	0.5	1.0	-	-	1.8	0.9	<0.1	mg/kg	TM74/PM61
Zinc	-	-	169	71	235	139	-	-	100	125	<5	mg/kg	TM30/PM62
VOC TICs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		None	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Toluene #	<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
p/m-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
Surrogate Recovery Toluene D8	84	97	87	98	96	91	92	87	95	89	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	70	93	71	88	83	74	80	77	81	73	<0	%	TM15/PM10
SVOC TICs	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached		None	TM16/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	LOD/LOR	Units	Method No.
Sample ID	TP - 101A	TP - 101B	TP - 102A	TP - 102B	TP - 103	TP - 104A	TP - 104B	TP - 105	TP - 106	TP - 107			
Depth	0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30	2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019			
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	29.9	<0.2	<0.2	<0.2	<0.2	3.7	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	59	<4	<4	<4	<4	18	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	115	<7	<7	<7	<7	32	14	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	121	52	294	<7	<7	95	<7	237	105	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	121	52	498	<19	<19	95	<19	291	119	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	3.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2 SV	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	29	<4	<4	<4	<4	11	<4	<4 SV	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	81	<7	<7	24	<7	33	14	<7 SV	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	207	157	284	<7	<7	239	<7	224	146	63 SV	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	207	157	397	<19	<19	263	<19	268	160	63 SV	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	328	209	895	<38	<38	358	<38	559	279	63 SV	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
Natural Moisture Content	26.1	15.7	17.3	28.5	24.2	15.7	25.5	11.4	18.5	24.1	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.1087	0.0167	-	-	-	-	0.0415	0.1151	-	-	<0.0015	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext)	-	-	0.0650	0.0450	0.0189	0.0731	-	-	0.0720	0.0759	<0.0015	g/l	TM38/PM60
Chromium III	51.0	41.6	-	-	-	-	54.6	44.6	-	-	<0.5	mg/kg	NONE/NONE
Chromium III	-	-	23.1	21.6	21.5	20.0	-	-	17.5	24.9	<0.5	mg/kg	NONE/NONE
Free Cyanide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
Organic Matter	5.5	0.9	NDP	NDP	NDP	NDP	1.3	1.4	NDP	NDP	<0.2	%	TM21/PM24
pH #	7.59	7.88	8.33	7.86	8.54	8.28	7.88	8.34	7.96	7.95	<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	45-48	49-52	53-56	57-60	61-64	65-68	69-72	73-76	77-80	81-84	LOD/LOR	Units	Method No.
Sample ID	TP - 108A	TP - 108B	TP - 109	TP - 110	TP - 111A	TP - 111B	TP - 112	TP - 113	TP - 114	TP - 115			
Depth	1.40-3.10	3.10-3.40	0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019			
Arsenic #	8.8	-	-	-	6.9	-	-	-	6.3	-	<0.5	mg/kg	TM30/PM15
Barium #	82	-	-	-	142	-	-	-	102	-	<1	mg/kg	TM30/PM15
Beryllium	0.8	-	-	-	0.7	-	-	-	0.7	-	<0.5	mg/kg	TM30/PM15
Cadmium #	0.2	-	-	-	0.2	-	-	-	0.2	-	<0.1	mg/kg	TM30/PM15
Chromium #	56.8	-	-	-	57.4	-	-	-	53.6	-	<0.5	mg/kg	TM30/PM15
Copper #	19	-	-	-	31	-	-	-	23	-	<1	mg/kg	TM30/PM15
Lead #	42	-	-	-	52	-	-	-	27	-	<5	mg/kg	TM30/PM15
Mercury #	0.2	-	-	-	<0.1	-	-	-	<0.1	-	<0.1	mg/kg	TM30/PM15
Nickel #	39.0	-	-	-	35.7	-	-	-	33.1	-	<0.7	mg/kg	TM30/PM15
Selenium #	<1	-	-	-	1	-	-	-	1	-	<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	612	-	-	-	527	-	-	-	527	-	<50	mg/kg	TM50/PM29
Vanadium	26	-	-	-	39	-	-	-	36	-	<1	mg/kg	TM30/PM15
Water Soluble Boron #	0.7	-	-	-	1.1	-	-	-	0.7	-	<0.1	mg/kg	TM74/PM32
Zinc #	67	-	-	-	98	-	-	-	94	-	<5	mg/kg	TM30/PM15
Arsenic	-	12.9	8.6	9.0	-	6.0	8.3	6.5	-	4.9	<0.5	mg/kg	TM30/PM62
Barium	-	150	171	175	-	69	151	117	-	108	<1	mg/kg	TM30/PM62
Beryllium	-	1.8	0.7	0.6	-	<0.5	0.7	0.8	-	<0.5	<0.5	mg/kg	TM30/PM62
Cadmium	-	0.6	0.9	0.5	-	0.2	0.3	0.2	-	0.2	<0.1	mg/kg	TM30/PM62
Chromium	-	33.2	25.7	21.1	-	17.3	22.7	37.0	-	17.9	<0.5	mg/kg	TM30/PM62
Copper	-	33	36	75	-	19	25	41	-	24	<1	mg/kg	TM30/PM62
Lead	-	47	153	6371_{AA}	-	46	158	49	-	66	<5	mg/kg	TM30/PM62
Mercury	-	<0.1	0.1	0.1	-	<0.1	0.1	<0.1	-	<0.1	<0.1	mg/kg	TM30/PM62
Nickel	-	42.8	35.1	28.6	-	20.5	23.5	42.4	-	20.1	<0.7	mg/kg	TM30/PM62
Selenium	-	1	<1	<1	-	<1	<1	1	-	<1	<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	332	1095	935	-	545	712	469	-	730	<50	mg/kg	TM50/PM29
Vanadium	-	33	36	19	-	18	23	49	-	23	<1	mg/kg	TM30/PM62
Water Soluble Boron	-	1.0	1.2	4.5	-	0.8	1.3	0.7	-	0.6	<0.1	mg/kg	TM74/PM61
Zinc	-	81	292	644	-	51	180	108	-	102	<5	mg/kg	TM30/PM62
VOC TICs	See Attached	ND	ND	ND	ND	ND	ND	ND	ND	ND		None	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	<3	<3	<3	<3	<3	7	<3	<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
p/m-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
Surrogate Recovery Toluene D8	92	100	98	95	96	98	100	100	92	84	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	78	97	81	83	84	84	83	88	77	73	<0	%	TM15/PM10
SVOC TICs	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached		None	TM16/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	45-48	49-52	53-56	57-60	61-64	65-68	69-72	73-76	77-80	81-84	LOD/LOR	Units	Method No.
Sample ID	TP - 108A	TP - 108B	TP - 109	TP - 110	TP - 111A	TP - 111B	TP - 112	TP - 113	TP - 114	TP - 115			
Depth	1.40-3.10	3.10-3.40	0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019			
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	305.7	11.5	<0.2	<0.2	<0.2	5.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	773	37	8	<4	<4	20	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	875	38	13	<7	<7	31	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	301	<7	54	70	<7	51	28	32	<7	72	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	2256	87	75	70	<19	107	28	32	<19	72	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	134.8	7.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	493	21	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	642	33	19	10	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	237	10	105	110	35	<7	<7	<7	41	132	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	1507	71	124	120	35	<19	<19	<19	41	132	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	3763	158	199	190	<38	107	<38	<38	41	204	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
Natural Moisture Content	14.7	26.3	16.5	20.6	15.5	19.1	15.4	14.9	14.3	14.6	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0518	-	-	-	0.0368	-	-	-	0.0988	-	<0.0015	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext)	-	0.0121	0.0400	<0.0015	-	0.0057	0.0790	0.0645	-	0.0385	<0.0015	g/l	TM38/PM60
Chromium III	56.8	-	-	-	57.4	-	-	-	53.6	-	<0.5	mg/kg	NONE/NONE
Chromium III	-	33.2	25.7	21.1	-	17.3	22.7	37.0	-	17.9	<0.5	mg/kg	NONE/NONE
Free Cyanide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
Organic Matter	1.4	NDP	NDP	NDP	1.5	NDP	NDP	NDP	1.4	NDP	<0.2	%	TM21/PM24
pH #	8.55	7.99	9.21	9.54	8.01	8.27	8.46	8.14	7.97	8.63	<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

J E Sample No.	41-44												
Sample ID	TP - 107												
Depth	2.50												
COC No / misc													
Containers	V G												
Sample Date	10/01/2019												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	15/01/2019												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	<10										<10	ug/l	TM36/PM12
>C6-C8 #	<10										<10	ug/l	TM36/PM12
>C8-C10 #	<10										<10	ug/l	TM36/PM12
>C10-C12 #	<5										<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10										<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10										<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10										<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10										<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10										<10	ug/l	TM36/PM12
>EC7-EC8 #	<10										<10	ug/l	TM36/PM12
>EC8-EC10 #	<10										<10	ug/l	TM36/PM12
>EC10-EC12 #	<5										<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10										<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10										<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10										<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10										<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10										<10	ug/l	TM5/TM36/PM12/PM16/PM30
MTBE #	<5										<5	ug/l	TM31/PM12
Benzene #	<5										<5	ug/l	TM31/PM12
Toluene #	<5										<5	ug/l	TM31/PM12
Ethylbenzene #	<5										<5	ug/l	TM31/PM12
m/p-Xylene #	<5										<5	ug/l	TM31/PM12
o-Xylene #	<5										<5	ug/l	TM31/PM12

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

SVOC Report : **Solid**

J E Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	LOD/LOR	Units	Method No.
Sample ID	TP - 101A	TP - 101B	TP - 102A	TP - 102B	TP - 103	TP - 104A	TP - 104B	TP - 105	TP - 106	TP - 107			
Depth	0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30	2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019			
SVOC MS													
Phenols													
2-Chlorophenol #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4-Dichlorophenol #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Phenol #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Methylnaphthalene #	25	<10	80	<10	<10	25	<10	56	26	22	<10	ug/kg	TM16/PM8
Naphthalene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Acenaphthylene	44	<10	59	<10	22	60	<10	91	65	66	<10	ug/kg	TM16/PM8
Acenaphthene	<10	<10	<10	<10	<10	<10	<10	144	<10	40	<10	ug/kg	TM16/PM8
Fluorene	33	<10	57	<10	<10	44	<10	101	28	38	<10	ug/kg	TM16/PM8
Phenanthrene #	330	<10	503	69	96	309	<10	309	224	204	<10	ug/kg	TM16/PM8
Anthracene	52	<10	164	32	26	103	<10	144	85	83	<10	ug/kg	TM16/PM8
Fluoranthene #	631	20	957	132	222	767	93	1048	681	427	<10	ug/kg	TM16/PM8
Pyrene #	465	16	766	116	194	659	77	1055	600	352	<10	ug/kg	TM16/PM8
Benzo(a)anthracene	282	<10	472	<10	154	458	98	424	465	282	<10	ug/kg	TM16/PM8
Chrysene	314	<10	460	82	147	436	59	460	391	251	<10	ug/kg	TM16/PM8
Benzo(bk)fluoranthene	512	<10	802	127	253	886	89	1018	780	571	<10	ug/kg	TM16/PM8
Benzo(a)pyrene	296	<10	470	84	139	518	49	616	474	347	<10	ug/kg	TM16/PM8
Indeno(123cd)pyrene	148	<10	251	27	76	292	<10	336	254	205	<10	ug/kg	TM16/PM8
Dibenzo(ah)anthracene	66	<10	91	<10	14	106	<10	110	91	71	<10	ug/kg	TM16/PM8
Benzo(ghi)perylene	175	<10	304	28	94	331	13	436	307	231	<10	ug/kg	TM16/PM8
Benzo(b)fluoranthene	369	<10	577	91	182	638	64	733	562	411	<10	ug/kg	TM16/PM8
Benzo(k)fluoranthene	143	<10	225	36	71	248	25	285	218	160	<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Diethyl phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Dimethyl phthalate #	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

SVOC Report : **Solid**

J E Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	LOD/LOR	Units	Method No.
Sample ID	TP - 101A	TP - 101B	TP - 102A	TP - 102B	TP - 103	TP - 104A	TP - 104B	TP - 105	TP - 106	TP - 107			
Depth	0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30	2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019			
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Nitroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
3-Nitroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Bromophenylphenylether #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Chloroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Nitroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Azobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Carbazole	24	<10	50	<10	17	45	<10	51	27	34	<10	ug/kg	TM16/PM8
Dibenzofuran #	19	<10	43	<10	<10	24	<10	56	18	20	<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Hexachlorobutadiene #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Hexachloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Isophorone #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Nitrobenzene #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	117	114	118	118	119	117	115	120	121	121	<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	124	120	125	117	124	124	123	126	124	124	<0	%	TM16/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

SVOC Report : **Solid**

J E Sample No.	45-48	49-52	53-56	57-60	61-64	65-68	69-72	73-76	77-80	81-84			
Sample ID	TP - 108A	TP - 108B	TP - 109	TP - 110	TP - 111A	TP - 111B	TP - 112	TP - 113	TP - 114	TP - 115			
Depth	1.40-3.10	3.10-3.40	0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4-Dichlorophenol #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Phenol #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Methylnaphthalene #	<10	<10	69	34	<10	13	18	22	<10	<10	<10	ug/kg	TM16/PM8
Naphthalene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Acenaphthylene	<10	<10	118	77	17	15	17	24	<10	63	<10	ug/kg	TM16/PM8
Acenaphthene	535	<10	146	57	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Fluorene	1350	39	133	63	<10	<10	<10	<10	26	91	<10	ug/kg	TM16/PM8
Phenanthrene #	2080	71	727	344	70	60	77	116	131	584	<10	ug/kg	TM16/PM8
Anthracene	<10	<10	332	121	30	20	29	33	66	253	<10	ug/kg	TM16/PM8
Fluoranthene #	600	30	2043	788	199	214	180	230	406	1059	<10	ug/kg	TM16/PM8
Pyrene #	524	28	1623	672	172	183	155	221	385	935	<10	ug/kg	TM16/PM8
Benzo(a)anthracene	252	<10	1002	429	142	138	129	208	304	772	<10	ug/kg	TM16/PM8
Chrysene	252	<10	973	405	120	116	111	191	285	1108	<10	ug/kg	TM16/PM8
Benzo(bk)fluoranthene	333	<10	1647	806	238	187	197	353	642	4929	<10	ug/kg	TM16/PM8
Benzo(a)pyrene	193	<10	954	484	124	96	108	205	422	4330	<10	ug/kg	TM16/PM8
Indeno(123cd)pyrene	95	<10	495	273	65	54	58	106	240	2810	<10	ug/kg	TM16/PM8
Dibenzo(ah)anthracene	21	<10	169	80	14	<10	<10	25	65	768	<10	ug/kg	TM16/PM8
Benzo(ghi)perylene	115	<10	599	345	77	66	70	122	309	3718	<10	ug/kg	TM16/PM8
Benzo(b)fluoranthene	240	<10	1186	580	171	135	142	254	462	3549	<10	ug/kg	TM16/PM8
Benzo(k)fluoranthene	93	<10	461	226	67	52	55	99	180	1380	<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Diethyl phthalate	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8
Dimethyl phthalate #	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	ug/kg	TM16/PM8

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

SVOC Report : **Solid**

J E Sample No.	45-48	49-52	53-56	57-60	61-64	65-68	69-72	73-76	77-80	81-84			
Sample ID	TP - 108A	TP - 108B	TP - 109	TP - 110	TP - 111A	TP - 111B	TP - 112	TP - 113	TP - 114	TP - 115			
Depth	1.40-3.10	3.10-3.40	0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	LOD/LOR	Units	Method No.
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Nitroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
3-Nitroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Bromophenylphenylether #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Chloroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Nitroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Azobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Carbazole	<10	<10	100	40	<10	<10	<10	<10	<10	110	<10	ug/kg	TM16/PM8
Dibenzofuran #	282	<10	83	25	<10	<10	<10	<10	<10	99	<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Hexachlorobutadiene #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Hexachloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Isophorone #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Nitrobenzene #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	125	120	118	119	115	113	114	117	116	112	<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	128	124	123	124	122	113	119	122	120	116	<0	%	TM16/PM8

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

VOC Report : **Solid**

J E Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	LOD/LOR	Units	Method No.
Sample ID	TP - 101A	TP - 101B	TP - 102A	TP - 102B	TP - 103	TP - 104A	TP - 104B	TP - 105	TP - 106	TP - 107			
Depth	0.15-0.85	0.85-3.00	0.25-2.00	2.00-3.20	0.20-1.40	0.05-2.30	2.50-3.10	0.05-2.50	0.30-3.10	0.20-2.80			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019			
VOC MS													
Dichlorodifluoromethane	<2	<2	<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	<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) #	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	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	26	<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	<3	<3	<3	<3	ug/kg	TM15/PM10
p/m-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	25	<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	84	97	87	98	96	91	92	87	95	89	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	70	93	71	88	83	74	80	77	81	73	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Verde Environmental Consultants **VOC Report :** **Solid**
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk
JE Job No.: 19/582

J E Sample No.	45-48	49-52	53-56	57-60	61-64	65-68	69-72	73-76	77-80	81-84			
Sample ID	TP - 108A	TP - 108B	TP - 109	TP - 110	TP - 111A	TP - 111B	TP - 112	TP - 113	TP - 114	TP - 115			
Depth	1.40-3.10	3.10-3.40	0.20-2.80	2.40-2.80	0.80-2.80	2.80-3.50	0.00-3.20	0.50-2.50	0.10-2.80	0.10-2.40	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	10/01/2019	10/01/2019	10/01/2019	10/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019	11/01/2019			
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	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	15/01/2019	LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2	<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	<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) #	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	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	7	<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	<3	<3	<3	<3	ug/kg	TM15/PM10
p/m-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 #	31	<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 #	56	5	<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 #	5	<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 #	71	9	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
sec-Butylbenzene #	116	8	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	18	<4	<4	45	<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 #	148	15	<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	67	<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	92	100	98	95	96	98	100	100	92	84	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	78	97	81	83	84	84	83	88	77	73	<0	%	TM15/PM10

Job number: 19/582
Sample number: 45
Sample identity: TP - 108A
Sample depth: 1.40-3.10
Sample Type: Soil
Units: ug/kg

Method: **VOC**
Matrix: **Solid**

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
493-02-7	Naphthalene, decahydro-, trans-	7.247	93	138
93-53-8	Benzeneacetaldehyde, .alpha.-methyl-	7.313	81	178
99-87-6	p-Cymene	7.364	91	214
1758-88-9	Benzene, 2-ethyl-1,4-dimethyl-	7.407	95	189
1587-04-8	Benzene, 1-methyl-2-(2-propenyl)-	7.480	83	155
1000152-47-3	trans-Decalin, 2-methyl-	7.576	90	255
2958-76-1	Naphthalene, decahydro-2-methyl-	7.683	95	145
53172-84-2	Benzene, (1-methyl-1-butenyl)-	8.033 - 8.114	89,90	275

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 3
Sample identity: TP - 101A
Sample depth: 0.15-0.85
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.816	95	1107
18435-45-5	1-Nonadecene	12.137	99	484
2381-21-7	Pyrene, 1-methyl-	12.241	95	136
112-95-8	Eicosane	13.071	83	291
112-84-5	13-Docosenamide, (Z)-	14.609	96	4323
98496-82-3	Antra-9,10-quinone, 1-(3-hydrohy-3-phenyl-1-triazenyl)-	15.604	86	849

Job number: 19/582
Sample number: 7
Sample identity: TP - 101B
Sample depth: 0.85-3.00
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
295-48-7	Cyclopentadecane	12.136	95	423

Job number: 19/582
Sample number: 11
Sample identity: TP - 102A
Sample depth: 0.25-2.00
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.826	97	929
629-50-5	Tridecane	9.486	80	382
1921-70-6	Pentadecane, 2,6,10,14-tetramethyl-	10.035	92	386
593-45-3	Octadecane	10.459	90	235
62016-76-6	Nonadecane, 1-chloro-	10.906	91	491
10544-50-0	Cyclic octaatomic sulfur	11.463	91	911
297-03-0	Cyclotetracosane	12.136	98	805
646-31-1	Tetracosane	12.173	90	348
1599-67-3	1-Docosene	13.034	83	413
112-95-8	Eicosane	13.070	91	565
629-94-7	Heneicosane	13.544	90	507
301-02-0	9-Octadecenamide, (Z)-	14.608	91	4649

Job number: 19/582
Sample number: 15
Sample identity: TP - 102B
Sample depth: 2.00-3.20
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
74685-30-6	5-Eicosene, (E)-	12.136	97	641
301-02-0	9-Octadecenamide, (Z)-	14.608	92	4589

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 19
Sample identity: TP - 103
Sample depth: 0.20-1.40
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
301-02-0	9-Octadecenamide, (Z)-	14.607	91	4217

Job number: 19/582
Sample number: 23
Sample identity: TP - 104A
Sample depth: 0.05-2.30
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.826	97	1005
629-50-5	Tridecane	9.486	84	274
544-76-3	Hexadecane	9.985	93	207
638-36-8	Hexadecane, 2,6,10,14-tetramethyl-	10.035	89	170
629-92-5	Nonadecane	10.905	89	386
10544-50-0	Cyclic octaatomic sulfur	11.462	94	590
295-65-8	Cyclohexadecane	12.135	96	443
2381-21-7	Pyrene, 1-methyl-	12.239	92	244
112-95-8	Eicosane	12.613	95	309
646-31-1	Tetracosane	13.543	95	522
301-02-0	9-Octadecenamide, (Z)-	14.607	84	3137
126848-01-9	3,5,6-Trimethyl-p-quinone, 2-(2,5-dioxotetrahydrofuran-3-yl)thio-	15.029	91	568

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 27
Sample identity: TP - 104B
Sample depth: 2.50-3.10
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
18435-45-5	1-Nonadecene	12.143	97	326
112-84-5	13-Docosenamide, (Z)-	14.607	83	3471

Job number: 19/582
Sample number: 31
Sample identity: TP - 105
Sample depth: 0.05-2.50
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.826	90	862
112-40-3	Dodecane	8.952	95	762
544-76-3	Hexadecane	9.486	95	1028
55045-07-3	Dodecane, 2-methyl-8-propyl-	9.752	86	500
629-59-4	Tetradecane	9.985	95	799
638-36-8	Hexadecane, 2,6,10,14-tetramethyl-	10.035	93	1032
70928-52-8	4-n-Hexylthiane, S,S-dioxide	10.414	80	208
629-92-5	Nonadecane	10.905	95	1203
112-95-8	Eicosane	11.336	96	871
10544-50-0	Cyclic octaatomic sulfur	11.462	87	496
62016-76-6	Nonadecane, 1-chloro-	11.750	92	652
297-03-0	Cyclotetracosane	12.143	98	976
4443-61-2	Eicosane, 9-cyclohexyl-	12.365	89	469
288246-53-7	Pyridine-3-carboxamide, oxime, N-(2-trifluoromethylphenyl)-	12.729	90	339
139123-69-6	1-Bromo-11-iodoundecane	12.791	95	319
646-31-1	Tetracosane	14.430	93	975

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 35
Sample identity: TP - 106
Sample depth: 0.30-3.10
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.827	97	1434
629-78-7	Heptadecane	9.986	93	267
593-45-3	Octadecane	10.459	96	333
629-92-5	Nonadecane	10.905	96	538
10544-50-0	Cyclic octaatomic sulfur	11.463	94	365
116196-83-9	4,4'-Bis(tetrahydrothiopyran)	11.603	97	596
62016-79-9	Heptacosane, 1-chloro-	11.751	96	513
112-88-9	1-Octadecene	12.136	96	450
62016-76-6	Nonadecane, 1-chloro-	12.173	96	387
630-02-4	Octacosane	12.614	95	453
544-76-3	Hexadecane	13.070	95	559
112-95-8	Eicosane	13.544	96	566
646-31-1	Tetracosane	14.431	95	750

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 39
Sample identity: TP - 107
Sample depth: 0.20-2.80
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
18435-45-5	1-Nonadecene	12.137	97	474
51314-72-8	2-Bromo-4,5-dimethoxycinnamic acid	12.174	90	150
7371-99-5	11-Methylnonacosane	13.070	83	552
112-84-5	13-Docosenamide, (Z)-	14.608	83	3961

Job number: 19/582
Sample number: 47
Sample identity: TP - 108A
Sample depth: 1.40-3.10
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
5911-04-6	Nonane, 3-methyl-	4.528	87	1090
611-14-3	Benzene, 1-ethyl-2-methyl-	4.895	93	838
934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	5.344	91	1148
2847-72-5	Decane, 4-methyl-	5.486	90	5199
1678-93-9	Cyclohexane, butyl-	5.564	90	3045
1074-43-7	Benzene, 1-methyl-3-propyl-	5.643	89	3901
934-74-7	Benzene, 1-ethyl-3,5-dimethyl-	5.713	87	1671
1074-17-5	Benzene, 1-methyl-2-propyl-	5.799	91	1574
527-84-4	o-Cymene	5.906	94	4474
4126-78-7	Cycloheptane, methyl-	6.079	81	1429
95-93-2	Benzene, 1,2,4,5-tetramethyl-	6.287	94	2793
1632-70-8	Undecane, 5-methyl-	6.371	87	2320
488-23-3	Benzene, 1,2,3,4-tetramethyl-	6.560	94	4301
1595-16-0	Benzene, 1-methyl-4-(1-methylpropyl)-	6.636	92	2518
16608-68-7	2-Butene, 3-chloro-1-phenyl-, (Z)-	6.855	91	2125
1680-51-9	Naphthalene, 1,2,3,4-tetrahydro-6-methyl-	7.428	92	4534
1454-85-9	n-Heptadecanol-1	7.679	83	1651
1129-29-9	Benzene, 1-(1-methylethenyl)-3-(1-methylethyl)-	7.822	84	8491
17302-32-8	Nonane, 3,7-dimethyl-	8.251	81	15962
575-43-9	Naphthalene, 1,6-dimethyl-	8.345	95	6873
581-40-8	Naphthalene, 2,3-dimethyl-	8.429	97	13909
581-42-0	Naphthalene, 2,6-dimethyl-	8.450	98	12006
582-16-1	Naphthalene, 2,7-dimethyl-	8.555	97	5390
638-36-8	Hexadecane, 2,6,10,14-tetramethyl-	8.756	86	37899
1120-21-4	Undecane	8.952	83	14194
6158-45-8	Naphthalene, 1-(1-methylethyl)-	9.036	90	8739
2245-38-7	Naphthalene, 1,6,7-trimethyl-	9.088	98	7203
2131-42-2	Naphthalene, 1,4,6-trimethyl-	9.266	93	12573
629-50-5	Tridecane	9.486	90	8464
3218-36-8	[1,1'-Biphenyl]-4-carboxaldehyde	9.566	80	2786

Job number: 19/582
Sample number: 47
Sample identity: TP - 108A
Sample depth: 1.40-3.10
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
3892-00-0	Pentadecane, 2,6,10-trimethyl-	9.752	95	18750
629-59-4	Tetradecane	9.985	91	7098
51282-56-5	Ethyl 5-chloro-2-nitrobenzoate	10.215	90	5542
630-01-3	Hexacosane	10.530	91	26704
67388-11-8	4-Methylnaphtho[1,2-b]thiophene	10.699	95	2404
832-69-9	Phenanthrene, 1-methyl-	10.994	89	3586
832-64-4	Phenanthrene, 4-methyl-	11.012	90	2174
89816-75-1	2,6-Dimethyldibenzothiophene	11.244	95	1498
629-62-9	Pentadecane	11.343	91	4972
2789-88-0	di-p-Tolylacetylene	11.491	93	3867
62016-76-6	Nonadecane, 1-chloro-	11.676	90	2736
544-76-3	Hexadecane	11.913	95	2846
112-95-8	Eicosane	12.357	95	3073

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 51
Sample identity: TP - 108B
Sample depth: 3.10-3.40
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
2131-42-2	Naphthalene, 1,4,6-trimethyl-	9.172	96	249
13287-24-6	Nonadecane, 9-methyl-	9.753	95	384
31295-56-4	Dodecane, 2,6,11-trimethyl-	10.036	95	854
638-36-8	Hexadecane, 2,6,10,14-tetramethyl-	10.530	96	629
112-95-8	Eicosane	10.905	95	366
3386-33-2	Octadecane, 1-chloro-	11.336	81	158
5416-98-8	3-(N-Methylamino)-9-methylcarbazole	11.499	90	346
18435-45-5	1-Nonadecene	12.136	97	794
62016-76-6	Nonadecane, 1-chloro-	12.173	89	232
123-95-5	Octadecanoic acid, butyl ester	12.935	89	370
301-02-0	9-Octadecenamide, (Z)-	14.607	80	3409

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 55
Sample identity: TP - 109
Sample depth: 0.20-2.80
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
629-50-5	Tridecane	9.487	86	515
638-36-8	Hexadecane, 2,6,10,14-tetramethyl-	10.034	93	594
610-48-0	Anthracene, 1-methyl-	11.012	95	204
10544-50-0	Cyclic octaatomic sulfur	11.462	93	298
3674-66-6	Phenanthrene, 2,5-dimethyl-	11.491	92	217
85385-68-8	[14]Annulene, 1,6:8,13-bis(methano)-, syn	11.514	86	453
18435-45-5	1-Nonadecene	12.135	95	715
629-97-0	Docosane	12.172	86	419
2381-21-7	Pyrene, 1-methyl-	12.239	96	676
42217-03-8	Behenyl chloride	12.613	95	312
112-95-8	Eicosane	13.069	89	644
3351-28-8	Chrysene, 1-methyl-	13.927	94	363
126848-01-9	3,5,6-Trimethyl-p-quinone, 2-(2,5-dioxotetrahydrofuran-3-yl)thio-	15.020	93	1117

Job number: 19/582
Sample number: 59
Sample identity: TP - 110
Sample depth: 2.40-2.80
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.826	97	1372
10544-50-0	Cyclic octaatomic sulfur	11.462	95	206
6566-19-4	10,18-Bisnorabieta-5,7,9(10),11,13-pentaene	11.758	89	321
295-48-7	Cyclopentadecane	12.135	96	502
2381-21-7	Pyrene, 1-methyl-	12.239	91	251
42217-03-8	Behenyl chloride	12.613	95	274
62016-79-9	Heptacosane, 1-chloro-	13.069	96	620
112-95-8	Eicosane	13.990	90	388

Job number: 19/582
Sample number: 63
Sample identity: TP - 111A
Sample depth: 0.80-2.80
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.826	94	501
18435-45-5	1-Nonadecene	12.135	96	584
629-94-7	Heneicosane	13.069	95	400
112-84-5	13-Docosenamide, (Z)-	14.607	89	4099

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 67
Sample identity: TP - 111B
Sample depth: 2.80-3.50
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
18435-45-5	1-Nonadecene	12.135	97	555

Job number: 19/582
Sample number: 71
Sample identity: TP - 112
Sample depth: 0.00-3.20
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
10544-50-0	Cyclic octaatomic sulfur	11.463	93	190
7206-21-5	5-Octadecene, (E)-	12.136	99	475
646-31-1	Tetracosane	13.070	95	336
629-78-7	Heptadecane	13.544	93	441
112-84-5	13-Docosenamide, (Z)-	14.608	91	3048

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 75
Sample identity: TP - 113
Sample depth: 0.50-2.50
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
74685-30-6	5-Eicosene, (E)-	12.136	92	455
112-84-5	13-Docosenamide, (Z)-	14.607	83	3102

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 19/582
Sample number: 79
Sample identity: TP - 114
Sample depth: 0.10-2.80
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.827	95	823
10544-50-0	Cyclic octaatomic sulfur	11.462	87	157
18435-45-5	1-Nonadecene	12.136	97	677
243-17-4	11H-Benzo[b]fluorene	12.239	95	190
629-94-7	Heneicosane	13.069	90	466
646-31-1	Tetracosane	13.543	95	453

Job number: 19/582
Sample number: 83
Sample identity: TP - 115
Sample depth: 0.10-2.40
Sample Type: Soil
Units: ug/kg

Method: **SVOC**
Matrix: **Solid**

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
13798-23-7	Hexathiane	8.816	94	1620
2381-21-7	Pyrene, 1-methyl-	12.247	96	410
192-97-2	Benzo[e]pyrene	15.021	98	3303

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Verde Environmental Consultants **Matrix : Solid**
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
19/582	1	TP - 101A	0.15-0.85	1-4	Lubricating oil & tarmac/bitumen
19/582	1	TP - 101B	0.85-3.00	5-8	Lubricating oil & tarmac/bitumen
19/582	1	TP - 102A	0.25-2.00	9-12	Degraded diesel, Lubricating oil, Possible PAH's & tarmac/bitumen
19/582	1	TP - 102B	2.00-3.20	13-16	No interpretation possible
19/582	1	TP - 103	0.20-1.40	17-20	No interpretation possible
19/582	1	TP - 104A	0.05-2.30	21-24	Possible Trace Degraded diesel, Trace Lubricating oil, Possible PAH's & tarmac/bitumen
19/582	1	TP - 104B	2.50-3.10	25-28	No interpretation possible
19/582	1	TP - 105	0.05-2.50	29-32	Degraded diesel, possible Lubricating oil, Possible PAH's & tarmac/bitumen
19/582	1	TP - 106	0.30-3.10	33-36	Trace Degraded diesel, possible Lubricating oil, Possible PAH's
19/582	1	TP - 107	0.20-2.80	37-40	Possible PAH's & tarmac/bitumen
19/582	1	TP - 108A	1.40-3.10	45-48	Degraded diesel
19/582	1	TP - 108B	3.10-3.40	49-52	Possible Degraded diesel
19/582	1	TP - 109	0.20-2.80	53-56	Trace Degraded diesel, possible Lubricating oil & PAH's
19/582	1	TP - 110	2.40-2.80	57-60	Possible PAH's & tarmac/bitumen
19/582	1	TP - 111A	0.80-2.80	61-64	No interpretation possible
19/582	1	TP - 111B	2.80-3.50	65-68	Possible Trace Degraded diesel & possible Lubricating oil
19/582	1	TP - 112	0.00-3.20	69-72	No interpretation possible
19/582	1	TP - 113	0.50-2.50	73-76	No interpretation possible
19/582	1	TP - 114	0.10-2.80	77-80	Possible PAH's & Naturally occurring compounds
19/582	1	TP - 115	0.10-2.40	81-84	Possible Trace Lubricating oil, PAH's & tarmac/bitumen

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/582	1	TP - 101A	0.15-0.85	4	16/01/2019	**General Description (Bulk Analysis)**	soil/stones
					16/01/2019	**Asbestos Fibres**	NAD
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	NAD
					16/01/2019	**Asbestos Level Screen**	NAD
19/582	1	TP - 101B	0.85-3.00	8	16/01/2019	**General Description (Bulk Analysis)**	soil/stones
					16/01/2019	**Asbestos Fibres**	NAD
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	NAD
					16/01/2019	**Asbestos Level Screen**	NAD
19/582	1	TP - 102A	0.25-2.00	12	16/01/2019	**General Description (Bulk Analysis)**	soil/stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 102B	2.00-3.20	16	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 103	0.20-1.40	20	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 104A	0.05-2.30	24	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 104B	2.50-3.10	28	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	NAD
					16/01/2019	**Asbestos ACM**	NAD

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/582	1	TP - 104B	2.50-3.10	28	16/01/2019	**Asbestos Type**	NAD
					16/01/2019	**Asbestos Level Screen**	NAD
19/582	1	TP - 105	0.05-2.50	32	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	NAD
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	NAD
					16/01/2019	**Asbestos Level Screen**	NAD
19/582	1	TP - 106	0.30-3.10	36	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 107	0.20-2.80	40	16/01/2019	**General Description (Bulk Analysis)**	soil.stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 108A	1.40-3.10	48	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	NAD
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	NAD
					16/01/2019	**Asbestos Level Screen**	NAD
19/582	1	TP - 108B	3.10-3.40	52	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 109	0.20-2.80	56	16/01/2019	**General Description (Bulk Analysis)**	soil/stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 110	2.40-2.80	60	16/01/2019	**General Description (Bulk Analysis)**	soil/stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos Fibres (2)**	Free Fibres
					16/01/2019	**Asbestos ACM**	ACM Debris
					16/01/2019	**Asbestos ACM (2)**	NAD
					16/01/2019	**Asbestos Type**	Crocidolite
					16/01/2019	**Asbestos Type (2)**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	Asbestos level cannot be determined from Screen. Quantification required.
19/582	1	TP - 111A	0.80-2.80	64	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	NAD
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	NAD
					16/01/2019	**Asbestos Level Screen**	NAD

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/582	1	TP - 111B	2.80-3.50	68	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 112	0.00-3.20	72	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	Asbestos Cement Debris
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	Asbestos level cannot be determined from Screen. Quantification required.
19/582	1	TP - 113	0.50-2.50	76	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%
19/582	1	TP - 114	0.10-2.80	80	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	NAD
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	NAD
					16/01/2019	**Asbestos Level Screen**	NAD
19/582	1	TP - 115	0.10-2.40	84	16/01/2019	**General Description (Bulk Analysis)**	soil-stones
					16/01/2019	**Asbestos Fibres**	Fibre Bundles
					16/01/2019	**Asbestos ACM**	NAD
					16/01/2019	**Asbestos Type**	Chrysotile
					16/01/2019	**Asbestos Level Screen**	less than 0.1%

Client Name: Verde Environmental Consultants **Matrix : Solid**
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Method No.	NDP Reason
19/582	1	TP - 102A	0.25-2.00	9-12	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 102B	2.00-3.20	13-16	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 103	0.20-1.40	17-20	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 104A	0.05-2.30	21-24	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 106	0.30-3.10	33-36	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 107	0.20-2.80	37-40	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 108B	3.10-3.40	49-52	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 109	0.20-2.80	53-56	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 110	2.40-2.80	57-60	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 111B	2.80-3.50	65-68	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 112	0.00-3.20	69-72	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 113	0.50-2.50	73-76	TM21/PM24	Asbestos detected in sample
19/582	1	TP - 115	0.10-2.40	81-84	TM21/PM24	Asbestos detected in sample

Client Name: Verde Environmental Consultants
Reference: 52107
Location:
Contact: Krzysztof Pniewczuk

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/582						

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/582

SOILS

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.

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. 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.

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.

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.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

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 UKAS requirement 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.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

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.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental 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

JE Job No: 19/582

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 and BS1377.	PM0	No preparation is required.			AR	
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	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	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	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			
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes

JE Job No: 19/582

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
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B. 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 can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B. 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 can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. 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 can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes

JE Job No: 19/582

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
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM60	As received solid samples are extracted with deionised water in a 2:1 ratio of water to solid.			AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes		AD	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM61	As received solid samples are extracted with hot water in a 20:1 ratio of water to soil ready for analysis by ICP.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes

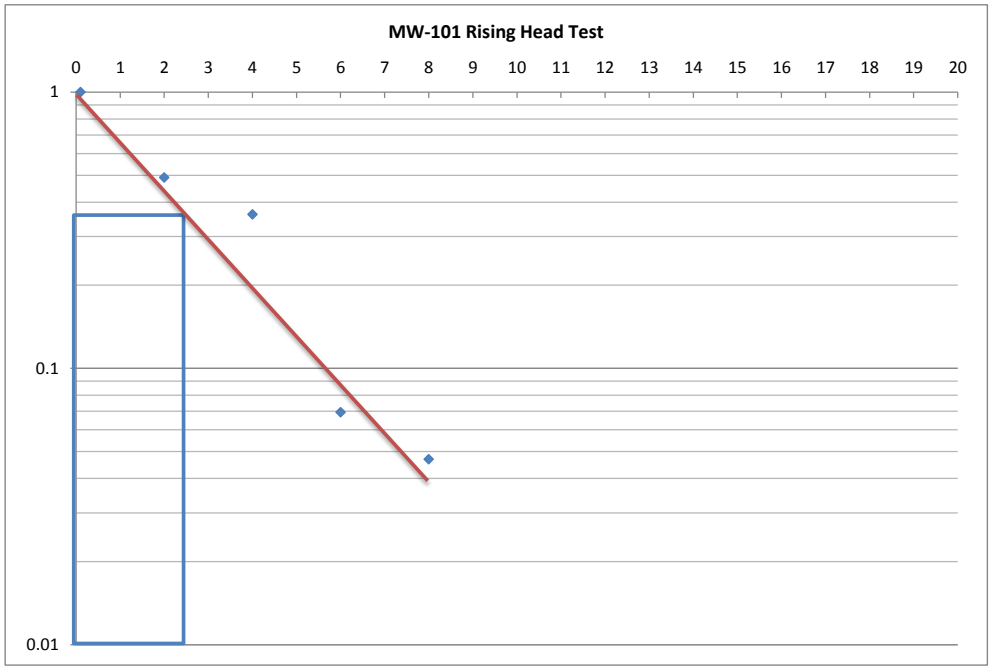
JE Job No: 19/582

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_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

APPENDIX E

Permeability Tests

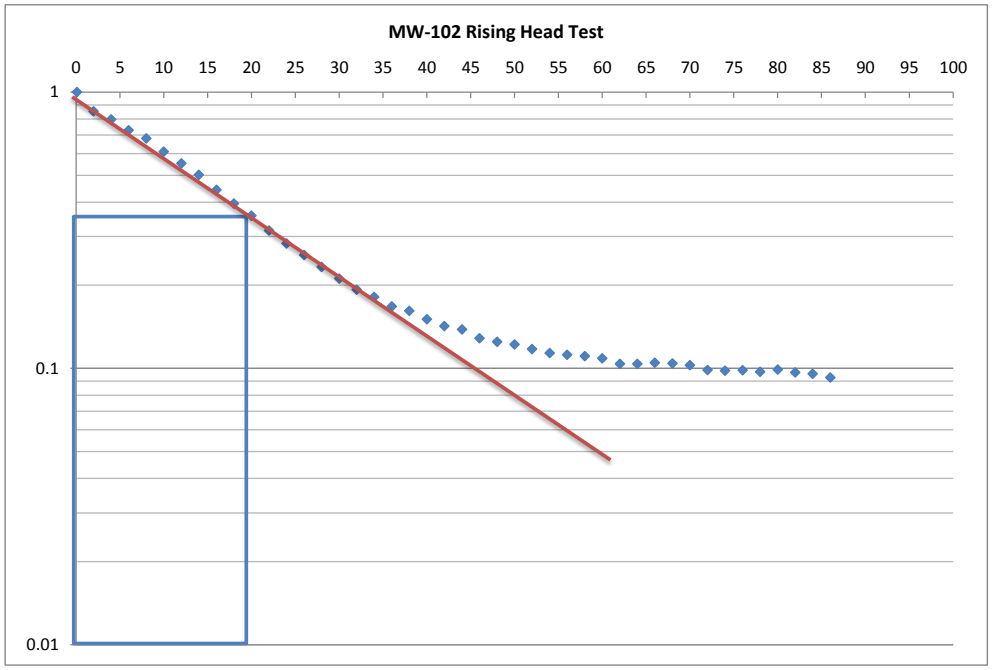
	Time Seconds	DTW toc	Excess Head (m)	H/Ho
		3.25		
MW101	0.1	3.724	0.474	1
	2	3.483	0.233	0.491139
	4	3.421	0.171	0.360759
	6	3.283	0.033	0.069409
	8	3.272	0.022	0.046835



63mm od	
51.4	mm id
25.7	
0.0257	

to=	2.6	s
r=	0.0257	m
R=	0.075	m
L=	1	m
K=	**0.00032901**	**m/s**
	28.426	**m/d**

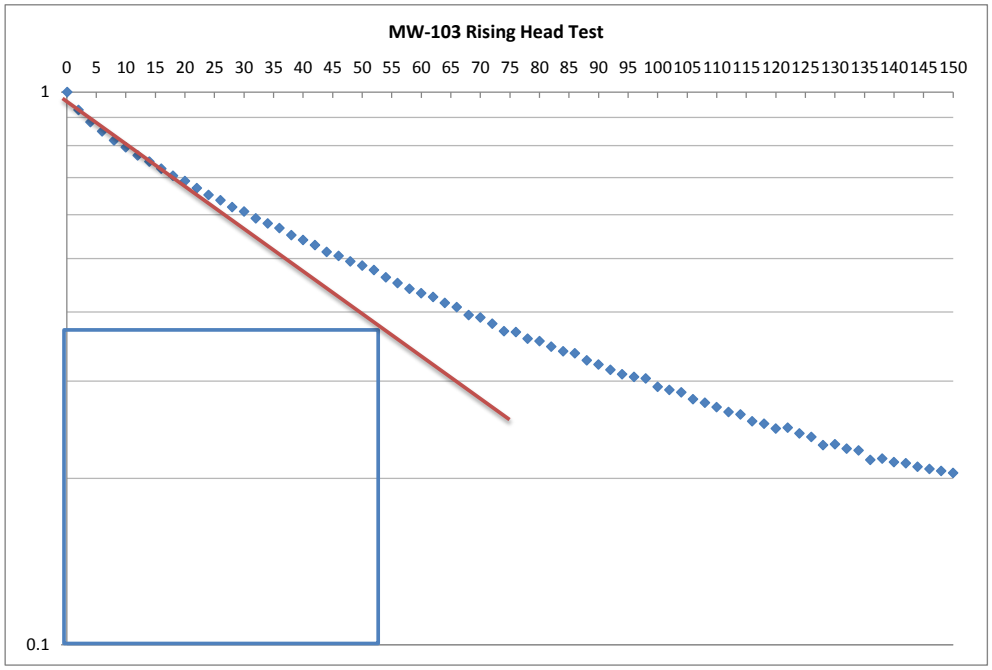
	Time Seconds	DTW toc	Excess Head (m)	H/Ho
		3.56		
MW102	0.1	4.685	1.125	1
	2	4.520	0.960	0.852763
	4	4.456	0.896	0.795806
	6	4.378	0.818	0.727119
	8	4.324	0.764	0.679136
	10	4.245	0.685	0.608584
	12	4.182	0.622	0.552515
	14	4.124	0.564	0.501333
	16	4.0582	0.498	0.442687
	18	4.0047	0.445	0.395148
	20	3.9613	0.401	0.356584
	22	3.9152	0.355	0.315621
	24	3.8785	0.319	0.28301
	26	3.8493	0.289	0.257064
	28	3.8222	0.262	0.232984
	30	3.7978	0.238	0.211303
	32	3.7768	0.217	0.192643
	34	3.7641	0.204	0.181358
	36	3.7486	0.189	0.167585
	38	3.7416	0.182	0.161365
	40	3.7293	0.169	0.150435
	42	3.7199	0.160	0.142083
	44	3.7158	0.156	0.13844
	46	3.7047	0.145	0.128577
	48	3.7005	0.141	0.124844



63mm od
51.4 mm id
25.7
0.0257

to=	20	s
r=	0.0257	m
R=	0.075	m
L=	1	m
K=	**4.2771E-05**	**m/s**
	3.695	**m/d**

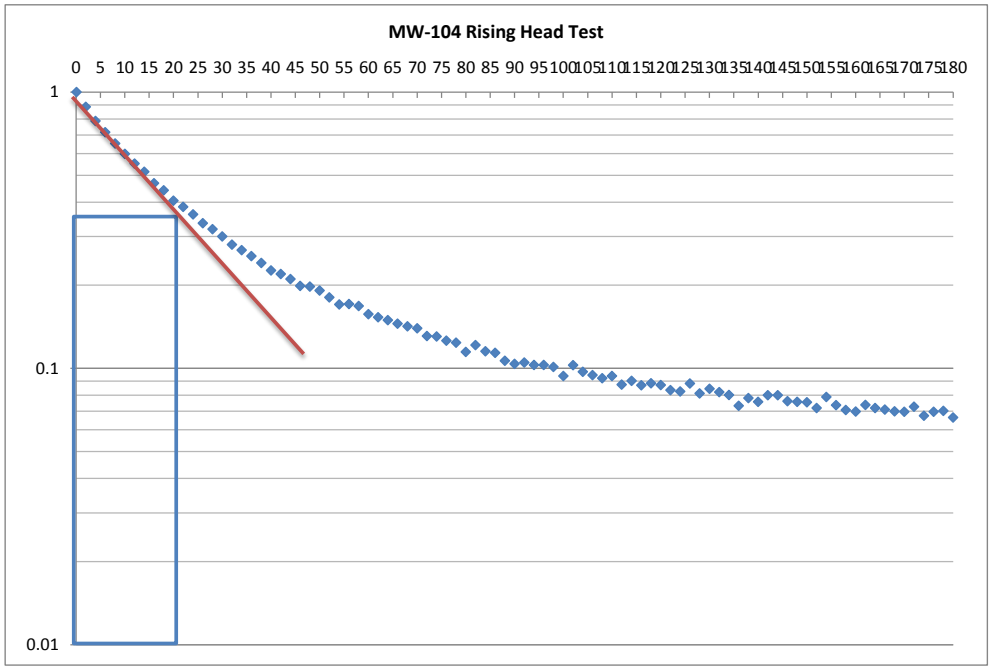
	Time Seconds	DTW toc	Excess Head (m)	H/Ho
		4.02		
MW103	0.1	4.922	0.902	1
	2	4.857	0.837	0.928373
	4	4.816	0.796	0.88247
	6	4.786	0.766	0.848875
	8	4.758	0.738	0.81794
	10	4.736	0.716	0.794323
	12	4.713	0.693	0.768156
	14	4.695	0.675	0.748753
	16	4.6755	0.656	0.726799
	18	4.6567	0.637	0.705954
	20	4.6423	0.622	0.689988
	22	4.6247	0.605	0.670473
	24	4.6076	0.588	0.651513
	26	4.5947	0.575	0.63721
	28	4.5786	0.559	0.619359
	30	4.5681	0.548	0.607717
	32	4.5528	0.533	0.590753
	34	4.5415	0.522	0.578224
	36	4.5316	0.512	0.567247
	38	4.5167	0.497	0.550726
	40	4.5068	0.487	0.539749
	42	4.4966	0.477	0.52844
	44	4.4834	0.463	0.513804
	46	4.4756	0.456	0.505156
	48	4.4655	0.446	0.493957



63mm od
51.4 mm id
25.7
0.0257

to=	53	s
r=	0.0257	m
R=	0.075	m
L=	1	m
K=	**1.614E-05**	**m/s**
	1.395	**m/d**

	Time Seconds	DTW toc	Excess Head (m)	H/Ho
		3.68		
MW104	0.1	4.209	0.529	1
	2	4.147	0.467	0.883554
	4	4.096	0.416	0.785633
	6	4.059	0.378	0.715501
	8	4.025	0.345	0.651985
	10	3.996	0.316	0.597164
	12	3.972	0.292	0.551418
	14	3.952	0.272	0.514367
	16	3.9275	0.247	0.467864
	18	3.9132	0.233	0.440832
	20	3.894	0.214	0.404537
	22	3.8833	0.203	0.38431
	24	3.8708	0.191	0.360681
	26	3.8575	0.177	0.335539
	28	3.8488	0.169	0.319093
	30	3.8389	0.159	0.300378
	32	3.8284	0.148	0.280529
	34	3.8218	0.142	0.268053
	36	3.8149	0.135	0.255009
	38	3.8074	0.127	0.240832
	40	3.7997	0.120	0.226276
	42	3.7961	0.116	0.219471
	44	3.7913	0.111	0.210397
	46	3.7851	0.105	0.198677
	48	3.7845	0.104	0.197543



63mm od	
51.4	mm id
25.7	
0.0257	

to=	21	s
r=	0.0257	m
R=	0.075	m
L=	0.5	m
K=	**5.9668E-05**	**m/s**
	5.155	**m/d**