The Secretary
An Coimisiún Pleanála
64 Marlborough Street
Dublin 1
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Ballynoe
Mungret
Co. Limerick

January 6th , 2026

RE: An Coimisiún Pleanála - Case reference: VA91.323893 – Objection - the construction of a new 110/38kV/MV electrical substation and will include the following elements: 1. Removal of four existing 110 kV Overhead Line timber pole sets (c. 15 m in height) and c. 800m of Overhead Line conductor; 2. Relocation of existing Interface Transformer; 3. Construction of: i. A new substation compound (c. 5,950 sq. m.) with a 2.6 m high palisade fencing; ii. A new 110 kV GIS building with eight 110 kV bays (c. 700 sq.m.; c. 12 m in height); ili. A new 38 / 20 kV GIS building with fourteen 38 kV bays and eighteen MV (20 kV) bays (c. 235 sq.m.; c. 7 m in height); iv. Two bunded 110 / 38 kV power transformers (c. 5 m in height) with associated electrical equipment; v. Two bunded 38 / 20 kV power transformers (c. 5 m in height) with associated electrical equipment; vi. Three bunded Arc Suppression Coils (c. 4 m in height) with associated electrical equipment; vii. Two new 110 kV double circuit overhead (OHL) line / cable interface end masts (c. 17m in height); vili. One new 110 kV double circuit overhead line (OHL) angle mast (c. 17m in height); ix. One temporary 110 kV Overhead Line timber pole set (c. 16 m in height); x. Temporary diversion of the existing 110 kV overhead line to the temporary timber pole set (c. 320 m of OHL conductor); xi. Diversion of the existing 110 kV overhead line to the new end masts (c. 510m of OHL conductor); xii. 110 kV underground cabling between the 110 kV GIS building and the new line / cable interface end masts; xili. Associated and ancillary outdoor electrical equipment and other apparatus, including installation of underground cables and ducts; 4. Site development works including provision of access roads, car parking area, lighting, telecommunications, fencing, landscaping, site services including drainage and all other ancillary works

My name is Tom Ryan, Ballynoe, Mungret, Co Limerick. I am a farmer and a portion of the Loughmore canal is situated on my lands. The Loughmore Canal is part of the Loughmore Turlough which is hydrologically connected to the Barnakyle stream which flows through my land where it enters the Barnakyle river also on my lands. This application is proposed to be carried out in the Raheen Industrial Estate and Loughmore, both of which are hydrologically connected to the Loughmore Canal by the stormwater network but also hydrologically connected by the underground aquifers and rivers present in the Karst features of the estate and Loughmore.

I wish to formally object to this Planning application:

My objection is based on the following grounds:

1. I have been raising concerns in relation to the discharges to the Loughmore Canal, Barnakyle stream and Barnakyle river for almost two decades. There are correspondences on file with Shannon Development, the IDA and Limerick City and

County Council since 2007. I have always believed that the storm waters entering my lands from the Canal and from the Barnakyle river were polluted and that the flooding caused to my grazing platforms was due to the volume of development being allowed where the outfall was the Loughmore Canal or the Barnakyle river. My livestock developed sores and tumours consistent with poisoning from trade effluent. The state agencies tasked with pollution control have failed to protect water quality, my lands and my rights as a citizen. There is an investigation running now in its sixth year into the pollution of the Loughmore Canal and Turlough. All the State Agencies including the High Court accept there is pollution. I have always been concerned regarding the type of testing carried out by Limerick City and County Council and the EPA because I believe they are not looking for the hazardous and dangerous chemicals. In 2024 I commissioned Tetra Tech an International Environmental Consultancy to prepare a report on the Loughmore Canal and Turlough. The report was issued in July 2024 .This is the conclusions of the Tetra Tech Report:

"Samples analysed from Loughmore Common and upstream at Barnakyle Stream had generally lower concentrations for metals, PAH, VOC`s and hydrocarbons in comparison to those taken at the outflow of the drain at Raheen Business Park and the nearby banks of Loughmore Canal (previously discussed in Section 5.1).

There are currently no threshold values published to determine safe levels for these substances in freshwater sediments however, EPA ranges for trace elements for non-polluted agricultural soils were used as a proxy with all Hazardous substances below or within the EPA ranges. Chromium a non-hazardous pollutant under the JAGDAG marginally exceeded the EPA range for non-polluted agricultural soils at SL3 and SL4. It is noted the elevated contaminant concentrations detected within this assessment closely correlate to the DoE industry profile list of anticipated contaminants when compared to onsite activities within the Raheen business park.

PAHs classed as Hazardous Substances, as previously discussed (Section 5.1) were reported to be present in soil samples taken from the bank of Loughmore Canal. Notably concentrations of 2-Methylnaphthalene were detected in SL1 and SL3 which is potentially linked to pesticides or plastic production. VOC's were reported in both the sediment and soils samples however, only soil samples on the canal bank at SL3 & SL4 contained VOCs classified as 'Hazardous substances'.

The impacted soils detected on the canal bank and Loughmore Common pose a potential risk to grazing animals, farmers or people working on the canal. The results indicate that the nature of the contamination is largely anthropogenic in origin and classified as organic contaminations which would typically result from trade effluent or industrial activity.

The sediments along the base of the canal act like a reservoir for contaminants to bioaccumulate over time. A number of contaminants including VOCs, metals (lead, chromium, copper), phenols, phthalates and hydrocarbons. The canal has been dredged in the past, and this is likely why the soils sampled from the banks of the canal have these anthropogenic compounds present as it is reported that the dredged material was deposited on the banks of the canal.

The water in Loughmore Canal is in continuity with groundwater (see section 2.6.8), via swallow hole and diffuse flow over the length of the canal. As such there is potential for Hazardous substances and non-hazardous substances present in the waters or sediments to enter groundwater via these hydrogeological connections. The aim of the WFD is prevent the entry of hazardous substances into groundwater and reduce or limit the entry of non-hazardous substances."

What the report found is extremely concerning. The Loughmore Canal which is part of the Loughmore Turlough is high polluted with forever chemicals and hazardous substances. The Turlough is connected to drinking water supplies and the subterranean network of water courses in the karst in the Loughmore Common and Raheen Industrial Estate. The state agencies tasked with protecting water quality have failed to protect this unique habitat and in turn my farming enterprise. I am attaching a copy of the Tetra Tech report for the authority to consider. It should be noted that all state agencies received a copy of the Tetra Tech report in July 2024. To date no state agencies have acknowledged the report.

2. In a landmark ruling on November 20, 2025, the European Court of Justice (ECJ) found Ireland in breach of multiple obligations under the EU Water Framework Directive (WFD). The judgment (Case C-204/24) specifically condemned the Irish state for failing to put in place a robust regulatory framework to prevent physical damage to its waterways, which includes unique groundwater-dependent bodies like turloughs.
   Key findings from the 2025 ruling and related legislative context include:
   Failure to Prevent Physical Deterioration:
   The court highlighted Ireland's lack of adequate regulations to control activities causing physical (hydromorphological) damage such as dredging or draining which is identified as a primary cause of poor health in Irish waters. I refused permission to Limerick City and County Council to dredge my section of the Canal. The Tetra Tech report found that the dredged material scattered on the canal bank had hazardous chemicals which are dangerous to humans and grazing animals.
   Inadequate Groundwater Protection:
   Ireland was found to have failed in transposing basic measures for groundwater protection, including rules for assessing chemical status and preventing deterioration.
   Weak Abstraction Controls: The ECJ ruled that Ireland's existing 25 m^3/day threshold for water abstraction was too high and failed to meet the directive's requirements for meaningful monitoring and control of water extraction.

   The Court of Justice of the European Union (CJEU) found that Ireland failed to correctly transpose technical and binding requirements for preventing and monitoring water pollution. Specifically, the judgment addresses the following pollution control measures:

Prevention of Groundwater Deterioration: The Court ruled that Ireland's existing general prohibitions on pollution were insufficient to meet the specific obligation under Article 7(3) to prevent the deterioration of groundwater intended for drinking water abstraction.

- Accidental Pollution Warning Systems: Ireland was found in breach for failing to transpose Article 11(3)(l), which requires measures to prevent significant leaks of

pollutants and to establish alert systems for accidental pollution that could affect aquatic ecosystems.

- Pollution Source Identification: The judgment noted that Irish law failed to incorporate mandatory criteria from Annex II for identifying "anthropogenic pressures," including specific sources of pollution and their impacts on water status. (Noted in the Tetra Tech report).
- Technical Monitoring Standards: The Court rejected the argument that administrative practice by the Environmental Protection Agency (EPA) was sufficient, ruling that national law must clearly impose the technical criteria of Annex V for monitoring chemical and ecological water status.
- Hydromorphological Controls: The Court found a lack of binding general rules for a control system over interventions (like impoundments or abstractions) that affect the status of surface waters.

The ruling emphasizes that Member States cannot rely on general duties or administrative discretion but must clearly frame specific pollution prevention obligations within their national legal frameworks.

Case C-204/24 (Commission v Ireland, 20 Nov 2025) is crucial for Irish planning, as the European Court of Justice (ECJ) condemned Ireland for failing to properly transpose the Water Framework Directive, impacting groundwater/surface water protection, meaning planning authorities must now rigorously apply EU water rules, avoid conflicts of interest (per other cases like C-204/24's spirit), and ensure robust environmental assessments (like EIA/AA), making future permissions vulnerable without strict compliance.
Key Impacts on Planning Decisions:

- Water Quality is Paramount: Planning bodies must now ensure projects comply with the Water Framework Directive for groundwater/surface waters, a failure Ireland was condemned for in C-204/24.
- Conflict of Interest: Similar to related ECJ rulings (e.g., Article 9a of EIA Directive), authorities must be objective, avoiding situations where they assess projects they are also developing, ensuring unbiased environmental impact assessments (EIA).
- EIA/AA Rigor: The ruling reinforces the need for thorough Environmental Impact Assessments (EIA) and Appropriate Assessments (AA) under the Habitats Directive, requiring objective evidence for decisions and possibly halting processes if conservation objectives aren't met.

Case C-204/24 (*Commission v Ireland*), decided on November 20, 2025, addresses Turloughs indirectly through its focus on broader water protection and hydromorphological controls under the EU Water Framework Directive (WFD).
While the judgment primarily concerns Ireland's failure to fully transpose and implement the WFD, its implications for Turloughs which are unique seasonal lakes and Priority Habitats in Ireland are significant.

The ruling from the European Court of Justice is the culmination of an interaction that started in 2007 by the EU against Ireland. I was raising these concerns in 2007, and I have been raising them since. It is clear that Limerick City and County Council and the EPA have been grossly negligent in the protection of the waterbodies under their control and have ignored multiple warnings in relation to the Loughmore Turlough and ignored it as

insignificant in planning decisions. Limerick City and County Council must now adhere to the Water Framework directive and consider the scientific reports on the pollution in the Loughmore Turlough.

I have been high critical of the EPA and their light touch regulation.
Case C-204/24 (*Commission v Ireland*), the Court of Justice of the European Union (CJEU) directly addresses and critiques the role of the Environmental Protection Agency (EPA) in Ireland's implementation of the Water Framework Directive (WFD).
The Court's comments regarding the EPA focused on its administrative practices and discretionary powers:

- Insufficient Discretionary Mandate: Ireland argued that the EPA had the technical discretion to determine the scope of environmental pressures to be analyzed. The Court rejected this, ruling that national law must clearly define a mandate and impose mandatory obligations rather than leaving them to the agency's unguided discretion.
- Rejection of Administrative Practice: Ireland contended that the EPA already applied necessary monitoring criteria in practice. The Court held that mere administrative practice by the EPA does not substitute for the full and correct transposition of EU law into national legislation.
- Mandatory Monitoring Criteria: The judgment noted that while the 2003 Irish Regulations required the EPA to establish water monitoring programs, they failed to transpose the specific mandatory technical criteria required by the Directive, rendering the EPA's legal framework deficient.

While ESB will argue they are not intending to discharge to Loughmore Canal (which I will deal with in point 3) they are trenching over a large site and adjacent to the Loughmore Common.

3. The proposed development involves extensive civil engineering works, trenching, and drainage over Karst features. The AA screen report fails to assess the ecosystem associated with the Karst environment. Karst environments are characterized by distinctive landforms related to dissolution and a dominant subsurface drainage. The direct connection between the surface and the underlying high permeability aquifers makes karst aquifers extremely vulnerable to pollution. Moreover, karst terrains, frequently underlain by cavernous carbonate and/or evaporite rocks, may be affected by severe ground instability problems. Impacts and hazards associated with karst are rapidly increasing as development expands upon these areas without proper planning taking into account the peculiarities of these environments. This has led to an escalation of karst-related environmental and engineering problems such as sinkholes, floods involving highly transmissive aquifers, and landslides developed on rocks weakened by karstification. The environmental fragility of karst settings, together with their endemic hazardous processes, have received an increasing attention from the scientific community in the last decades. There are known aquifers within the site boundary of this development which goes almost to the edge of the Loughmore Common Turlough. The application is devoid of assessment for potential impacts. The ESB have a very poor record regarding the protection of groundwater when allowing fluid leakages from their cable infrastructure to damage groundwater.

While ESB will argue that they will not be using fluid filled cables their groundwater management history is a cause for major concern. Previous civil engineering works carried out in the Raheen Industrial Estate resulted in multiple pollution events to the Loughmore Canal due to the aged infrastructure and the condition of foul and storm networks which were shown to have poor integrity due to damage and fractures as evident in the CCTV surveys. The ESB project is high risk in a highly vulnerable ecosystem, and the applicant has shown a complete lack of awareness regarding the assessments required.

The infrastructure in the Raheen Industrial Estate contains misconnections and does not have the capacity to support the current level of development. Limerick City and County Council have allowed and continue to allow unauthorised development. The habitats and water framework directives are ignored. The local development plan is ignored. A facile investigation is underway for six years. Hazardous substances are being discharged directly to water, which is in turn connected to potable water supplies. This application will cause serious damage to a vulnerable aquifer and unique eco system. I once again object in the strongest terms to planning for these works within the Raheen Industrial Estate which will have a direct impact on the water quality that will outfall to my farm.

Yours faithfully

Tom Ryan

632-B064924

Loughmore Canal, Limerick

Environmental Report

July 2024

Version 2

TETRA TECH

Environmental Report

632-B064924
July, 2024

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1.0 INTRODUCTION

1.1 BACKGROUND

Mr Tom Ryan (Client) is a dairy farmer who lives at Ballynoe, Mungret, County Limerick. Mr Ryan has observed a) reduced quality waters discharging from the Loughmore canal and b) flooding affecting his lands, herein referred to as the study area, in the vicinity of the confluence of the Barnakyle stream with the Barnakyle river over a period of a number of years.

The surface water drain named the Loughmore Canal was constructed in 1970's as part of the Raheen Business Park Development by the Shannon Free Airport Development Company (SFADCO), the precursor to the Industrial Development Agency (IDA). The approximate study area and key features of the IDA site is shown on Figure 1-1.

Surface water drainage from the IDA business park is piped (diameter approx. 1500mm) to Loughmore Canal, which flows into Barnakyle Stream as shown on Figure 1-1. The route of the pipe was shown in the LCCC Interim Report (2022) and its approximate route is shown on Figure 1-1. This drainage pipe from the Raheen Business Park site also receives water from other businesses on the R526 road. There are five EPA licenced facilities within the business park, which discharge into the drainage system of the Raheen Business Park.

Barnakyle stream is shown as an arterial drainage channel on the Office of Public Works (OPW) Arterial Drainage Scheme Channels GIS database[1], the route of which is shown on Figure 1-1. The Barnakyle stream discharges into Barnakyle River.

The land in the ownership of Mr Tom Ryan adjoins the Loughmore Common, the Barnakyle stream passes through My Ryans land and subsequently joins the Barnakyle River in the southern area of his farm.

1.2 OBJECTIVES

The objective of the environmental monitoring is to evaluate the potential impact upon the property of Mr Tom Ryan, via discharge from the Loughmore Canal. A program of monitoring to include the surface water from the Loughmore Canal, the sediments of the Loughmore Canal and the soils in the land adjoining the canal.

The scope of environmental testing is based on the desk study review completed within the earlier sections of this report and specifically Section 6.0 which identifies potential sources / hazards, including nearby current industrial land uses largely within the Raheen Business Park. Based on these potential sources of contamination a list of potential contaminants of concern was developed, which have been presented in Appendix C.

1.3 SCOPE OF WORKS

Liberi Management Consultancy Ltd., on behalf of Tom Ryan have tasked Tetra Tech Consulting Ireland Limited with assessing the condition of the water, sediment and soil within and in the immediate vicinity of the Barnkyle stream against baseline conditions to determine what impact, if any, has occurred.

This desk study seeks to summarise the timeline of events from the LCCC & IDA investigations to date as well as provide a desktop assessment of the environmental conditions at the site. The study comprises Loughmore Canal and the study area immediately adjoining the Canal.

[1] OPW - Arterial Drainage Scheme Channels (https://data.gov.ie/dataset/arterial-drainage-scheme-channels) Accessed (09/06/2024)

Figure 1.1: Study Area and Key Features

Based on the outline conceptual model (detailed in section 6.0) and possible pollutant linkages identified, the following monitoring scope is recommended:

- Soil sampling and laboratory testing of samples obtained from agricultural fields located adjacent to the Loughmore Canal.
- Surface water sampling and laboratory testing of samples obtained from the Canal; and,
- Sediment sampling and laboratory testing of samples obtained from the Canal.

Monitoring rationale for selection of specific locations is further detailed and explained in table 1 below.

Table 1 – Monitoring Rationale

Sampling/ Monitoring Location	Monitoring Rationale
US 1-2 (2 water + 2 sediment samples)	Collection of surface water (2No) and sediment (2No) from Loughmore Canal at an upstream location for contamination testing.
SWD 1-2 (discharge point) (2 water + 2 sediment samples)	Collection of surface water (2No) and sediment (2No) samples from Loughmore Canal at a midstream location at the discharge point for contamination testing.
BLS1-2 (2 samples)	Collection of 2No. soil samples (2No) from land in the adjoining fields next to the canal as representative baseline soil conditions.
SL1- SL4 (4 samples)	Collection of 4No. soil samples from land immediately adjacent to the canal for contamination testing. Collection of an additional 6no. soil samples from nearby agricultural fields for background values.

1.4 LIMITATIONS

The recommendations and opinions expressed in this report are based upon information obtained as part of the desktop study or information that has been provided by others. Information provided from other sources has been taken in good faith and Tetra Tech cannot guarantee its accuracy.

2.0 SITE INFORMATION

2.1 SITE SETTING

The following sections provide details of the solid and drift geology, and the hydrogeological environment at the site and in the surrounding area and previous historical site uses. As part of this assessment, the following resources have been consulted:

- Irish Townland and Historical Map Viewer (osi.maps.arcgis.com)
- Geological Survey Ireland (GSI) Spatial Resources website (http://dcenr.maps.arcgis.com)
- Office of Public Works (OPW) National Catchment-based Flood Risk Assessment & Management (CFRAM) mapping (http://www.cfram.ie/pfra/interactive-mapping/)
- Environmental Protection Agency (EPA) maps (http://gis.epa.ie/Home)
- OPW historical flood mapping (http://www.floodinfo.ie/map/floodmaps/)
- EPA Radon Mapping (http://www.epa.ie/radiation/radonmap).

2.2 STUDY AREA

Loughmore Common is located south of Limerick City as shown on Figure 2-1 (overleaf). The Loughmore Common is bound to the north by residential housing estates and Ballycummin Road, to the west and south by agricultural land, and to the east by the M20 motorway and residential housing.

2.2.1 Loughmore Common

It is surrounded by privately owned land. The aerial image used as a basemap on Figure 1-1, show some tracks through the field used by farm machinery and bridge where the farm machinery crosses the canal.

Plate 1 - Loughmore Common

2.2.2 Loughmore Canal

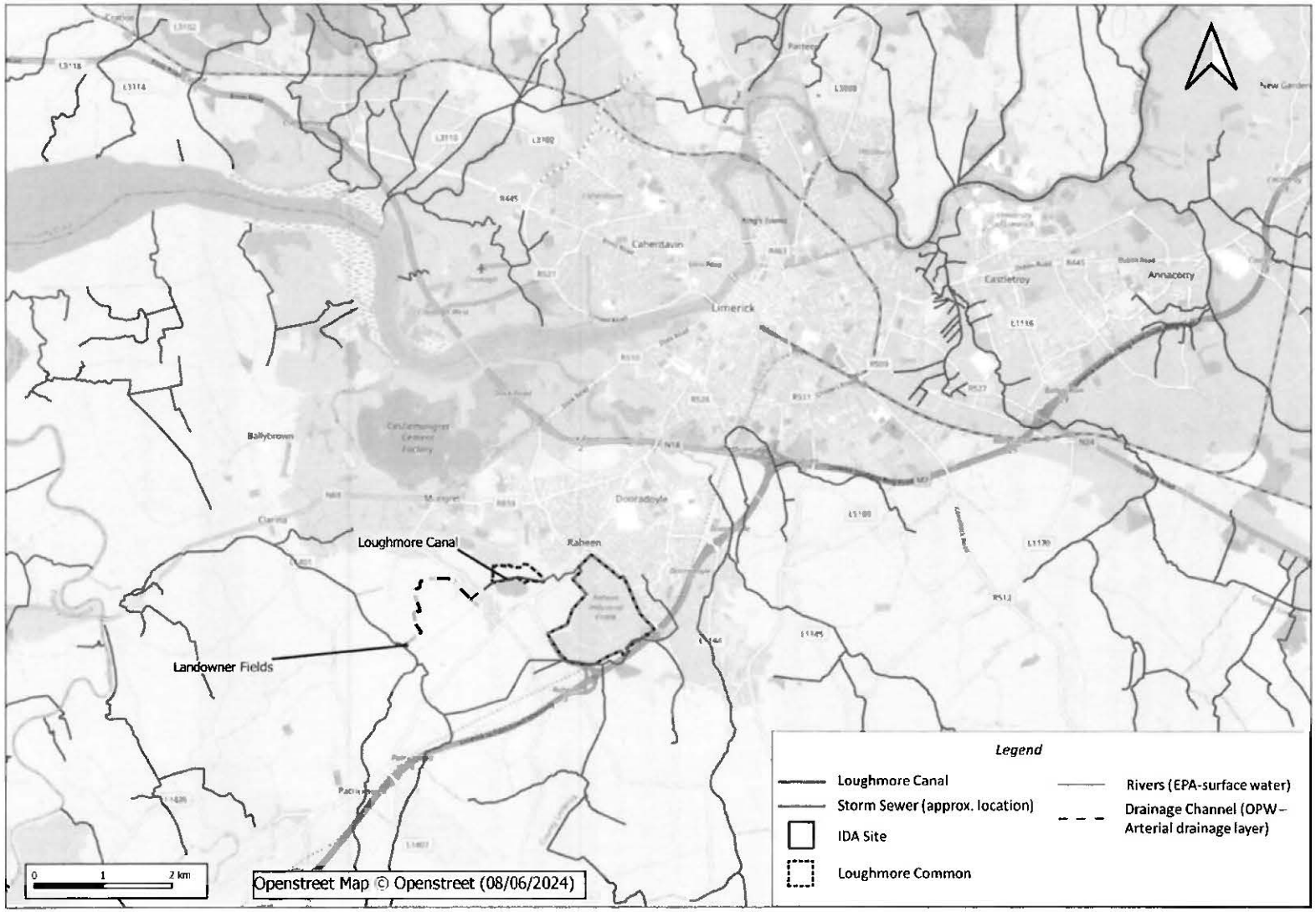
The primary focus of the assessment is Loughmore Canal, a photo of which is shown on Plate2A. The canal starts in east of Loughmore Common and flows east to west for approximately 735 m along the southern boundary of the Common. The discharge point of the pipe from IDA Business Park into Loughmore Canal is shown on Plate 2B.

After passing through the western boundary of the common, Loughmore Canal turns to the southwest and passes through agricultural fields for approximately 145 m, after which the canal is culverted to pass under a garden and the Caher road. After the culverted section Loughmore Canal, the canal flows through agricultural fields for approximately 150 where it joins Barnakyle stream.

Plate 2A Loughmore Canal and Plate 2B the discharge point of pipe from IDA Business Park.

(A)  (B) 

Figure 2-1: Study Area Location

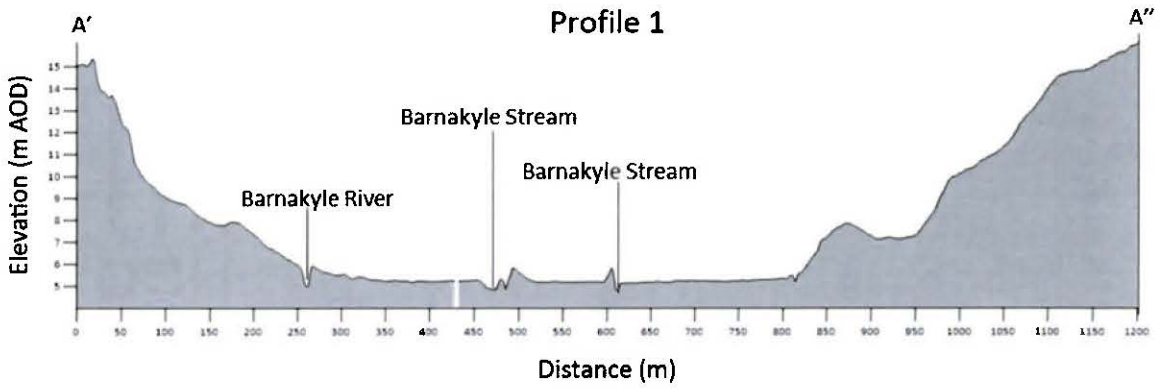


2.3 TOPOGRAPHY

The topographic map presented on Figure 2-4 (overleaf) was generated using publicly available lidar data from the Open Topographic Data Viewer[2], the data was contoured using modelling software Surfer published by Golden software.

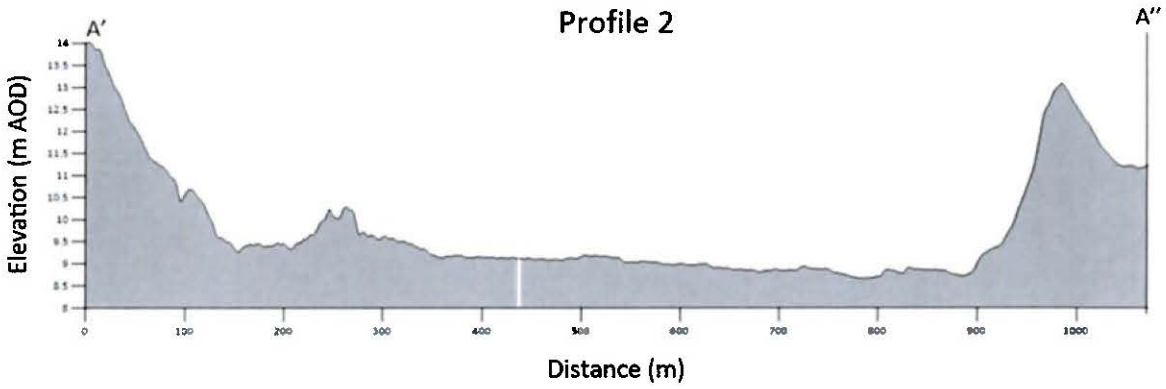
The land nearest the Barnakyle River with the drainage ditches and also indicated by the label (landowners fields) is shown on the western side of the topographic map (Figure 2-4), occupy a topographically low area. A Topographic Profile 1 generated using surfer is presented on Figure 2-2, the section of the topographic profile is shown on Figure 2-4. Topographic Profile 1 (Figure 2-2) also shows that if Barnakyle River overtops its bank it will flood the low-lying land to north of the river, which is between is between 5 and 6 m AOD.

Figure 2-2: Topographic Profile 1 – land nearest Barnakyle River.



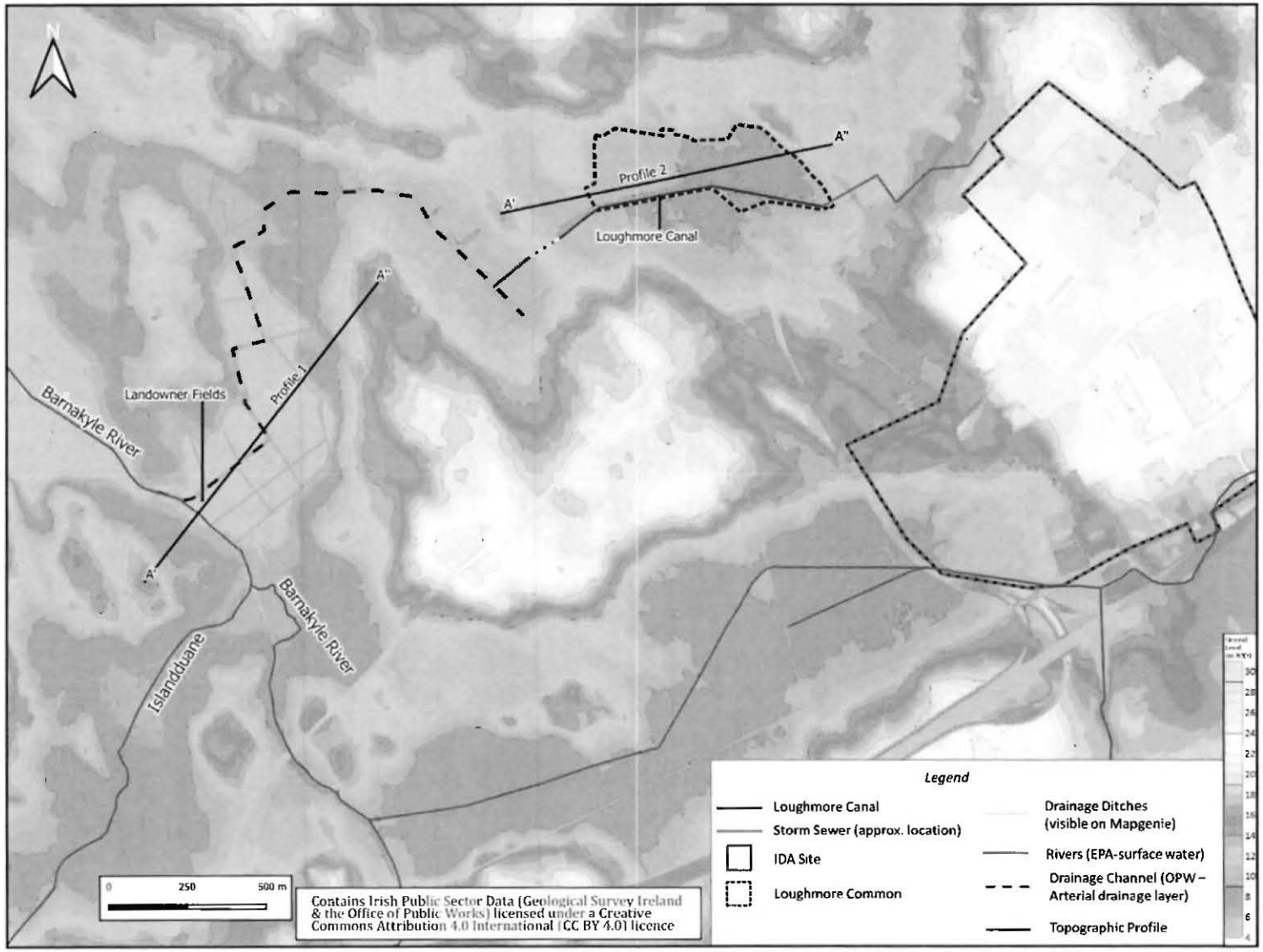
Overlain on the topographic map (Figure 2-4), is the outline of Loughmore Common. The common is very flat and sees frequent flooding, particularly to the area north of the canal, where a turlough has been mapped. The other factor in the flooding of the Loughmore Common is shown by the topographic map (Figure 2-4), which shows that Loughmore Common predominantly sits in a topographic bowel / basin with no natural outflows. The low point of the common is approximately at 8.3 m AOD towards the northwestern side of the common. The section of the topographic profile is shown on topographic Profile 2 (Figure 2-2).

Figure 2-3: Topographic Profile 2 – through Loughmore Common.



[2] GSI - Open Topographic Data Viewer, https://www.gsi.ie/en-ie/events-and-news/news/Pages/Open-Topographic-Data-Viewer.aspx (accessed on 08/06/2024) copyright OPW

Figure 2-4: Topographic Map



2.4 SITE DATA REVIEW

In June 2021 Limerick City and County Council (LCCC) received a complaint regarding the discharge from a stormwater pipe which feeds into the Loughmore Canal. The following reports and correspondence have been reviewed and are summarised below. Note this overview summarises relevant and available correspondence and may not include all correspondence relating to the ongoing investigation:

2.4.1 Overview of Key Correspondence

This section provides brief summary of key points from the correspondence available to Tetra Tech the time of writing this report between stakeholders.

Note: LCC = Limerick County & City Council – Relevant Local Authority, IDA – Owner of Raheen Business Park. CWSL = Capital Water Systems Ltd

2.4.1.1 IDA Letter to LCCC (21st July 2022)

A letter from Department Manager Sarah O'Connell of the IDA to the CEO of LCCC Pat Daly. This letter refers to a draft report detailing the analysis of the water sampling undertaken by Capital Water Systems Ltd and the interpretive reports have been produced by Garland Consulting on behalf of the IDA. Water samples were collected from the storm water drainage system on the IDA site as well as at the storm water entrance into the Loughmore Canal. There was a total of 80 samples collected and analysed, detailed in the Garland Report from July to September 2022.

Report states that most tested elements returned expected readings compared with limits set out in 2009 Surface Water Act, with the highest elevated concentrations of zinc recorded, 0.56mg/L on 09/08/22 at SP06 and highest phosphorous concentrations being detected at SP04 ranging from <0.5mg/L to 4.6mg/L across the whole sampling period. Elevated zinc & phosphorous concentrations were recorded in ten of the fifteen sample locations in manholes onsite and at the entrance to the Loughmore Canal.

2.4.1.2 An Taisce to LCCC (27th June 2023)

The draft report was produced by Garland consultancy and noted that most samples collected in 2022 were taken in dry periods of low water flow, which may lead to higher concentrations being detected.

Recommendation of this report include:

- Further sampling with an increased number of sampling locations to assist in identifying the source of elevated elements.
- The proposed water sampling and analysis campaign was scheduled to comment on the 16/06/22 and comprised continuation of flow monitoring at 2No. outfalls from the Raheen Business Park and water sampling at 15No locations once per week for 6 weeks.
- In conjunction with LCCC, communication with tenants of Raheen Business Park regarding the findings of the draft report
- IDA to continue to assist LCCC with any further sampling and testing, as required to help identify the sources of the elevated levels detected.

It is understood from the report that the IDA instructed further water sampling and committed to assist LCCC with the identification of the source of the elevated levels of zinc and phosphorous.

The IDA request that LCCC advise as to whether investigations into sites outside Raheen Business Park are being caried out and once available, such information is provided to the IDA to facilitate a complete evaluation of all potential sources.

Further, the IDA request that all additional sampling undertaken by LCCC on non-Raheen discharge points be completed concurrently with IDA's sampling and analysis and should replicate the assessment techniques used by the IDA.

The IDA request that discharges from the Loughmore Canal into the Barnakyle Stream, together with samples from the Barnakyle Stream (above and below its confluence with Loughmore Canal) should be analysed to determine the extent of any influence that such discharges from the Loughmore Canal may have on water quality in the Barnakyle Stream.

The IDA then requested further information from LCCC in relation to the sampling points and results or sampling analysis, flow monitoring devices and results, details of any investigative studies and highlighted a number of external sites which may be discharge sources and requested any updates on groundwater flood and draining event modelling completed on behalf of LCCC. Finally, the IDA asked LCCC for clarification on the ownership of Loughmore Canal.

2.4.1.3 IDA Letter to LCCC (21st July 2021)

In this letter the IDA state that they would welcome a discussion with LCCC in respect of ascertaining the ownership profile of the Loughmore Canal to clarify those individuals/entities that have an ongoing responsibility for maintaining same given the volume of discharge points into the Loughmore canal, including those external to the Raheen Business Park. While IDA were pleased to note that the majority of the investigations returned expected readings for many elements, elevated concentrations of some substances (mainly Zinc & Phosphorus) were found in a number of manholes and at the entrance to the Loughmore Canal.

However, the source of all the elevated elements has not yet been established, the IDA continues to engage with LCCC to assist in determining the potential sources and commits to completing the set of recommendations noted, where possible.

- IDA request all data regarding all sampling, surveys, flows in the canal, assessments of the outflow.
- IDA points out that there are other connections to the storm sewer and that there may be other discharge points into Loughmore canal and Barnakyle stream

2.4.1.4 LCCC to IDA Letter to (22nd August 2021)

A detailed investigation has been undertaken into properties in the area that may be discharging to the Loughmore Canal via the surface water sewer.

The following commercial premises on the R526 including discharges from Folio LK16870; Caseys Furniture, McDonnell paints, right price tiles, Top oil service station, Co-op store and Brian Geary Toyota dealership, were all identified as connecting surface water through the business park network which is under the responsibility of the IDA.

2.4.1.5 Garland Consultants to Nadine Boyland (IDA) cc Eoin Cronin (IDA) (16/11/2022)

The subject of this email is Raheen 2018 Loughmore Canal Sediment analyses. Discuss high levels of zinc (2000 mg/kg) in sediment samples.

2.4.1.6 An Taisce to LCCC (27th June 2023)

An Taisce requested an update on if the Council is aware of this issue and what actions are being taken.

2.4.1.7 Internal Comms LCCC (26th September 2023)

Email sent by Arlene Mellett to Aidan Finn and wider LCCC team. A summary of key points of the email updating the LCCC Team on the following

- LCC held meetings with the EPA in relation to the investigation of Loughmore Canal;
- EPA agreed to work with LCCC and the EPA licensed facilities within the Raheen Business park;
- The investigation of the non-licenced facilities is ongoing;

- LCCC monthly sampling programme is ongoing at the discharge point to the canal and downstream of the discharge point.
- In the process of procuring consultants to undertake an Ecological assessment of the Loughmore canal;
- Plan to install multi parameter water quality sondes measuring devices with telemetry system and capacity for 15 min intervals multi parameter measurement.

2.4.2 Available Reports

The information from the public information requests to E. Brady and B. Moore, was reviewed. The information requests contained a number of Technical Reports, which have been listed on Table 2 below:

Table 2 – Available Technical Reports

Report	Author	Client	Date Issued
JRE (2022) Technical Memo. Sampling Results for Industrial Drains in the Raheen Area and Loughmore Canal	JRE Ltd.	LCCC	10th May 2022
Tynan Environmental (2021) - Groundwater Flood Drainage Event Modelling	Tynan Environmental	LCCC	22nd February 2021
JRE (2021) report for surface water sampling at Loughmore canal & Barnkyle river, Mungret, Limerick, co. Limerick."	JRE Ltd.	LCCC	11th November 2021
JRE (2022) Technical Memo. Sampling Results for Industrial Drains in the Raheen Area and Loughmore Canal	JRE Ltd.	LCCC	3rd March 2022
LCCC (2022) Loughmore Canal Alleged Pollution Investigation – Case 445798	LCCC	LCCC	16th September 2022
CD Environmental (2023) Process Line Dye Testing Report - LM/SR/19012023	CD Environmental	Stryker Limerick	19th January 2023
CWSL (2022) Raheen Business Park Flow & Sampling Survey	CWSL	IDA	07th June 2022
Garland (2022) Analysis of the 2021/ 2022 surface water discharges to the Loughmore Canal from the Raheen Industrial & Business Park (draft)	Garland	IDA	07th July 2022
Garland (2023) Analysis of the 2022 surface water discharges to the Loughmore Canal from the Raheen Industrial & Business Park (draft)	Garland	IDA	05th January 2023
Garland (2023) Analysis of the 2022 surface water discharges to the Loughmore Canal from the Raheen Industrial & Business Park (Final)	Garland	IDA	15th February 2023
LCCC (2023) Loughmore Canal - Investigation Progress Report	LCCC	Internal	23rd December 2023
ARUP (2023) Limerick City & County Council Mungret Residential Development Report for Screening for Appropriate Assessment	ARUP	LCCC	December 2023

Report	Author	Client	Date Issued
ARUP (2023) Baseline Ecology Report Mungret Residential Development	ARUP	LCCC	December 2023
ARUP (2023) Environmental Impact Assessment (EIA) Screening Report	ARUP	LCCC	December 2023

2.4.2.1 Tynan Environmental (2021) Groundwater Flood Drainage Event Modelling

Tynan Environmental (2021) Groundwater Flood Drainage Event Modelling Technical Summary, Mungret Co. Limerick Phase 2.

The report outlines the flood modelling work and modelling results regarding the assessment of flooding Loughmore Common and the Output of Loughmore Canal under extreme weather events prior to the proposed development and post completion of the proposed development.

The report provides a synopsis of field work conducted to collect flow and level data from Loughmore Canal and levels from one monitoring borehole in Loughmore Common and two monitoring boreholes outside Loughmore Common. Note that none of the level or flow data is presented in Tynan Environmental (2021). The flow and level data presented in Tynan Environmental (2018), was unavailable at the time of writing this report.

Tynan Environmental (2021) did present a conceptualisation interaction between groundwater and surface water in the canal. Karst features were identified at the site during a site walkover carried out by Tynan Environmental and a swallow hole was identified in Loughmore Canal. The swallow hole's role in groundwater and surface water interactions was outlined and is summarised below:

- During periods of low groundwater levels, water will flow from Loughmore Canal through the swallow hole into the aquifer.
- During periods of higher groundwater levels, water will discharge from the aquifer via the swallow hole into the Loughmore Canal.

Surface water flow in the canal is dominated by storm drainage from Raheen, evident in the study monitoring water level monitoring data. During summer of 2018, it was observed that all of the storm water discharging into the canal was entering the swallow hole, demonstrating a direct hydrogeological connection with the underlying groundwater body.

2.4.2.2 JRE Report, May 2022

JRE Environmental Consulting, Kilkenny sampling results submitted to Tara Flanagan of LCCC (10/04/2022). Storm water samples were taken during seven sampling events from two manholes and the input drainage pipe to Loughmore Canal, between February and April 2022. The key analytical results are summarised as follows. Note however it is difficult to pinpoint the geographical locations due to redacted location references in this report:

- **Metals:**
  - One of the seven samples in the manhole had elevated zinc concentrations above the 2009 Surface water regulations Limit of 100ug/L.
  - Six of the seven samples collected from the drain manhole contained elevated zinc concentrations above the 2009 Surface water regulations Limit of 100ug/L.
  - Two (01/02/22 and 15/03/22) of the seven samples collected in the canal discharge pipe contained elevated zinc concentrations above the 2009 Surface water regulations Limit of 100ug/L.

- **Nutrients:**
  - Three (01/01/22, 08/02/22 and 22/003/22) of the seven samples collected in the manhole contained elevated phosphorus concentrations greater than the 2009 Surface Water Regulation Limit of 75 µg/l. The sampling events that indicated phosphorus concentrations
  - All seven samples collected in the drain manhole contained elevated phosphorus concentrations greater than the 2009 Surface Water Regulation Limit of 75 µg/l.
  - Six of the seven samples collected in the canal discharge pipe contained phosphorus concentrations greater than the 2009 Surface Water Regulation Limit of 75 µg/l.
  - One sample collected from the manhole had an elevated ammonia concentration. This sample was collected on March 22nd (0.16 mg/l) and was only marginally higher than the 0.14 mg/l Surface Water regulatory limit.
  - The first two samples collected from the drain manhole on February 1st (0.51 mg/l) and 8th (0.69mg/l) contained ammonia concentrations greater than the Surface Water regulatory limit of 0.14 mg/l. The five subsequent surface water samples collected at the manhole contained ammonia concentrations equal to or less than the Surface Water regulatory limit.
  - Four (01/02/22, 15/03/22, 28/03/22, 04/04/22) of the seven samples collected at the canal discharge pipe contained ammonia concentrations greater than the 2009 Surface Water Regulation Limit of 0.14 µg/l.
  - All samples collected from all three sample locations over the sampling period contained nitrate concentrations less than 25 mg/l and would not be considered high.
- **BOD:**
  - One sample collected on 01/02/22 from the manhole reported a BOD concentration greater than the 2009 Surface Water Regulation Limit of 2.6 mg/l.
  - Four (01/02/22, 01/03/22, 15/03/22 and 04/04/22) of the seven samples collected from the canal discharge pipe contained BOD concentrations greater than the 2009 Surface Water Regulation Limit of 2.6 mg/l.
- **COD:**
  - One sample collected on 01/02/22 from the canal reported a COD concentration greater than the 2009 Surface Water Regulation Limit of 40 mg/l.
- **Fats, Oils & Greases:**
  - One (04/04/22) of the seven samples collected from the canal discharge pipe contained FOG concentrations greater than the detection limit of 4 mg/l.
- **Suspended Solids:**
  - One (28/03/22) of the seven samples collected from the canal discharge pipe contained significant suspended solids concentrations.

This report suggests elevated levels of zinc may be sourced from metal manufacturing, rubber tyres, washing chemicals or fertilizer. The author then suggests the phosphorous is likely sourced from fertilizer, commercial cleaning processes, Wastewater Treatment Plant (WWTP) or from other agricultural sources.

2.4.2.3 LCCC Interim Report (2022) (Case 440371) Environmental Inspection of alleged pollution from Storm sewer at the Loughmore Canal

This report acts as a status update to case 445798-Pollution at Loughmore Canal and sets out the investigation methodology, progress to date and the LCCC planned program or works.

The stated scope is to examine all businesses discharging into the IDA storm sewer system, including external businesses and connections on the R526 road. The report states that other matters of concern identified or raised over the course of the investigation in relation to the Loughmore Canal, Loughmore Common and Barnakyle river will not be included as part of this investigation as they are considered separate issues and unrelated to the complaint.

The methodology proposed included a programme of works, a desktop study, sampling and monitoring, CCTV survey and various meetings, summarised as follows:

- **Program of Works:** LCCC & IDA agreed commitment to a programme of works which included responsibilities, critical paths & timelines. It is noted that stakeholders were informed that these works would be a lengthy process given the complex nature of the investigation, as such, an exact timeline is not included.

- **Desktop study:** The investigation began with a study to determine ownership of lands surrounding the Loughmore canal, location of the storm network & its route outside the IDA business park to examine any potential pollutant sources. A number (exact unknown) of commercial premises located outside the remit of the business park on the R526 road were found to connect directly to the storm sewer network. The exact location and names of these businesses are redacted from the report, but they conclude all businesses identified in the desktop study connected to the storm sewer.

- **Sampling and Monitoring:** LCCC & IDA developed a sampling programme which was carried out by John Rea Environmental & Garland Consultants in Nov 2021 and found Phosphorous levels higher than Surface Water Regulation Limits. No other exceedances were noted. Further sampling locations were added, to target the pollution source with locations selected to represent all possible stormwater discharge inputs from the business park, local businesses & roads.

In February 2022 the work programme was updated to include a 7-week sampling survey. The aim of this was to narrow down pollutant sources to a particular premises, including both external and internal sites to the business park. The stakeholders also agreed to implement a flow monitoring plan as the complaint highlighted intervals of large volumes of discharge into Loughmore canal.

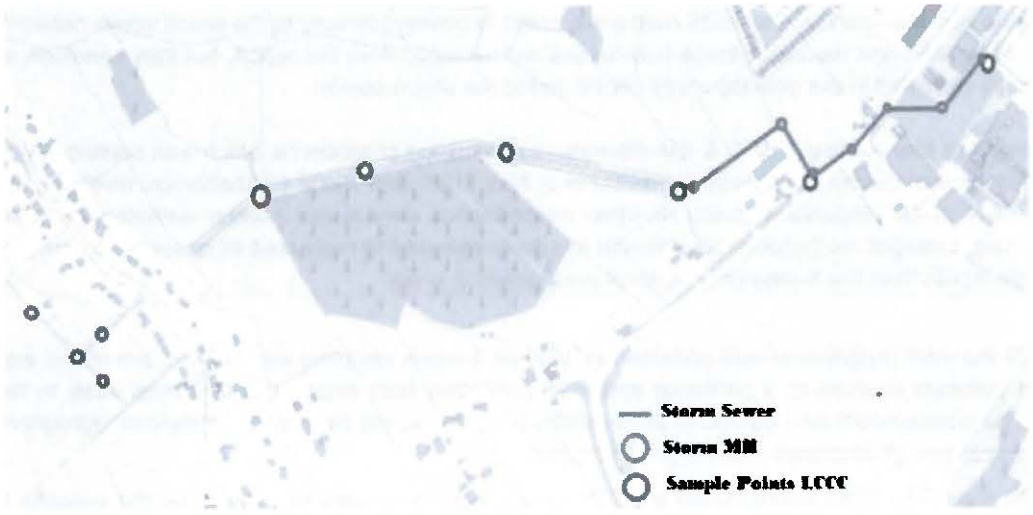
- **CCTV Survey:** The IDA commissioned a CCTV survey in 2019 to gain information on the integrity of the drainage network and the possibility of infiltration or cross connections from other parties. The survey found no issues with the infrastructure or sections of the sewer network along the R526. However, the CCTV survey shows the poor condition of the network, with open joints in pipes , cracks, roots, grey sludge in some pipes, clear water in others notes and a mixture of plastic, concrete and asbestos pipes recorded indicating that the infrastructure on the IDA site is aged and in poor condition with misconnections between storm and foul evident. It is noted the report states the IDA are currently (2019) carrying out improvement works to the storm drainage network.
- **Meetings:** The report states that throughout the investigation meetings have been scheduled with the IDA to ensure prompt action and coordination of the works programme. Meetings have also been held with the EPA who have been provided with up-to-date sampling results and progress reports. There were also communications with Inland Fisheries Ireland & National Parks and Wildlife Services. Lastly there is confirmation of written and verbal communications with stakeholders including landowners who have a single point of contact for all communications. The name of this contact is redacted from the interim report.
- **Interim findings:**
    - Phosphorous: concentrations exceeded the limit set out in the 2009 Surface Water Regulations at seven sampling locations. Exceedances recorded from sampling location MH SL09 which is nearest to Loughmore canal indicate the source of pollution is likely located in the business park.

    - Zinc: concentrations were higher than expected with two exceedances recorded by LCCC & one by the IDA. The exceedance observed by the IDA was also at sampling location MH SL09.

    - Hydrocarbons: The results indicate that there is no impact from oil or fuel on the quality of water throughout the storm water drainage system. It is noted that LCCC commit to carrying out further sampling at locations where hydrocarbons may have potential impact.

- Flow Monitoring: Over a two-month period there were no large storm water flows recorded on the sampling days. A periodic pulse flow was observed at regular 50-minute intervals which lasted 10-15mins each in duration. The report notes this regular inflow of fluid requires further investigation.
- Note that Garland Consulting emailed the IDA on the 16/11/2022 in relation to high levels of zinc 2,000mg/kg in a sediment sample collected on behalf of the IDA. There is no reference to sediment samples in this report.

Fig 2-5: IDA Sampling locations taken from LCCC interim report



Conclusion: The reports carried out for LCCC & IDA by JRE Environmental and Garland Consultants respectively in 2022 found no exceedances in many of the elements tested. The primary exceedances of the 2009 Surface Water Regulations were observed in Phosphorous and Zinc limits. The reports identify the likely source of phosphorus to be cleaning products, fertilizers, livestock, septic tanks & wastewater treatment product discharges. The source of zinc is stated as potentially washing powders, detergents, degradation of tyres as well as pharmaceutical production or fertilizer.

Investigation Actions:

- Targeted sampling: The report states the IDA has conducted a more targeted sampling plan in the areas where exceedances have been recorded. Results of this are not included in the interim report.
- Business Engagement: LCCC carried out a screening exercise to better determine which businesses in the surrounding area & business park contain phosphorous and/or zinc as part of their production or daily processes. A meeting is proposed with shortlisted businesses to discuss their operations to gain insight into possible discharges from their respective premises. The IDA also issued a communication to businesses located in the area to highlight the issues found.
- Further actions: The report notes there are a number of actions which have not been completed, the work programme has been updated to include this. These actions include the IDA targeted sampling, communication plan, a briefing for stakeholders & councillors as well as further consultation with the EPA. It is also noted in this section that LCCC intend to conduct sampling of businesses producing hydrocarbons and completion of dredging works in Loughmore canal.

2.4.2.4 LCCC Investigation Progress Report 2023

Interim Report relating to Case 445798 Alleged Pollution at the Loughmore Canal. Investigation progress report filed by Arlene Mellett of Limerick City & County Council (LCCC) on the 23rd of December 2023. LCCC received

a complaint in June 2021 of a suspected pollution event which occurred from a storm sewer outfall into the Loughmore Canal. A member of the public reported that a grey coloured discharge was sighted, which prompted the LCCC to investigate. This report also confirms, the IDA site, and its businesses are included in the drainage system which connects to the Canal as well as road gullies and other businesses located along R526 road.

Work progressed in 2023 included: Limerick City and County Council procured a laboratory, BHP, to undertake a sampling programme at two locations in the canal, the outfall (A) and downstream (B), monthly as shown below in Figure 1. This programme commenced in March 2023.

Fig 2-6: LCCC Samples Locations 2023 taken from Loughmore Canal - Investigation Progress Report 2023

Sampling was undertaken on the following dates 07/03/2023, 09/05/2023, 13/06/2023, 04/07/2023, 08/08/2023, 07/09/2023, 17/10/2023 and the 8/11/2023. December sampling date not provided at the time of writing.

Samples were tested and compared with the Surface water standards that are presently in place in Ireland at the European Union and are contain in the 'European Communities Environmental Objectives (Surface Water) Regulations 2009 – S.I. No. 272 of 2009, as amended'. For parameters where there were no emissions limit values in the 2009 Surface Water Regulations, samples were compared to the limerick set in the EPA document: 'Parameters of Water Quality – Interpretation and Standards, Environmental Protection Agency, 2001 (EPA Surface Water Guideline limit).

Phosphate and Orthophosphate exceedances were recorded across the sampling dates when compared with 2009 Surface Water Regulations. In total there were four exceedances recorded at the outfall sampling location A and one downstream at sampling location B.

BOD exceedances were recorded on four sampling dates at the outfall sampling location A where concentrations were greater than 2009 surface Water Regulation of 2.6mg/l. Results from one sample correlated with an exceedance recorded from the downstream sample location B on 17/10/23.

Zinc concentrations were found to exceed the 0.1mg/l limit on two sampling dates 13/06/23 and 17/10/23. These were both recorded at the outfall sampling location, no were exceedances observed downstream. The report states there appear to be no consistent pattern of zinc exceedance.

LCCC note they are currently engaging with suppliers with a possible option to install composite samplers at sampling locations A and B. It is unknown whether these have been implemented at the time of writing.

According to the report an ecological assessment of the canal was carried out by the EPA in early December 2023 to determine the current state of the canal's health. The results of this assessment have not been received at the time of writing.

Following on from the initial communications with local businesses in 2022, a meeting took place in 2023 which reduced the scope of the investigation. A number of businesses were eliminated from the investigation due to their specific processes, while others required further analysis. In 2023 LCCC carried out 37 inspections of businesses related to the investigation. These inspections found a small number of premises discharging grey water into the storm sewer and a notice was served under the Water Pollution Acts 1977 to 2007. Most of these instances involved vehicle washing, LCCC state they are working with the owners to implement appropriate solutions. LCCC also commit to developing an awareness notification to inform local businesses of proper procedures in use of storm water networks & correct discharge for grey water.

Frequent meetings have been held with stakeholders, EPA, and IDA to update and agree actions which would be taken in 2023 & beyond.

The report finishes with a programme of works for 2024 which includes the list of actions below,

1. Progress option of installing composite samplers.
2. Continue monthly sampling programme.
3. Review requirement for further ecological assessment.
4. Follow up on notices issued to local businesses.
5. Continue to monitor both external and internal business operations.
6. Issue the awareness notice to all businesses discharging into Loughmore canal.

As of the time of writing it is unknown if these actions have been implemented or their current status.

2.4.3 Historical Data

Tetra Tech have compiled all analytical data from previous assessments/reports which have been provided. A summary of the historic data which has been collated in tabular at Appendix B. This includes surface water sampling results from:

- Garland 2021
- Garland 2023
- JRE Environmental Consulting May 2022 Results: Surface Water Sampling
- LCCC Surface Water Sampling Results

2.4.3.1 Garland 2022 & Garland 2023

Capital water systems completed surface water sampling on 8th June 2021 from five sample points (SP10 to SP14 inclusive).

Analysis has been undertaken for a suite of inorganic contaminants. The following presents a review of elevated concentrations detected.

Inorganic compounds

All five samples were analysed for Suspended Solids, pH. Total phosphorus, Nitrate, Ammonia, Zinc, copper, Lead and E coli. None of the samples presented exceedances for pH, Nitrate, Zinc, copper and Lead.

No assessment criteria are available for Suspended Solids however it is noted SP11 concentration (2808mg/L) is significantly higher than the remaining samples which range from 4mg/L at SP10 to 25mg/l at SP13.

No assessment criteria are available for Total Phosphorus however it is noted SP11 concentration (18mg/L) is marginally higher than the remaining samples which range from 0.3mg/L at SP12 to 1.235mg/l at SP13.

No assessment criteria are available for Ammonia however it is noted SP11 concentration (20.2mg/L) is marginally higher than the remaining samples which range from 0.009mg/L at SP13 to 0.087mg/l at SP12.

No assessment criteria are available for E.coli however it is noted SP10 (2030mg/L), SP11 (500mg/L) and SP12 (400mg/L) are significantly higher than the remaining samples which range from 4mg/L at SP14 to 8mg/l at SP13.

2.4.3.2 LCCC Sampling Canal Discharge 2022 results

LCCC present two sets of analysis for 1) a canal discharge point and 2) IDA SL09 manhole sample point. The canal discharge point was sampled on eight occasions between 1st February 2022 and 6th June 2022. The IDA MH SL09 sample point was sampled on two occasions on 22nd April 2022 and 25th April 2022. Analysis has been undertaken for a selection of inorganic contaminants. The following presents a review of elevated concentrations detected.

Inorganic Compounds - Canal Discharge point

All eight samples were analysed for Total Phosphorus and Zinc.

Two of the eight samples analysed exceeded the limit for both the Groundwater Threshold Value and the EPA Interim Groundwater Value standards of 75ug/l and 100ug/l respectively for zinc ranging from 164ug/L on 15th March 2022 to 331ug/L on 1st February 2022.

No assessment criteria are available for Total Phosphorus, measured concentrations ranged from 0.045mg/L on 16th February 2022 to 3.806mg/L on 28th March 2022.

Inorganic Compounds – IDA MH SL09 sampling point

Two samples were analysed for Total Phosphorus and Zinc.

One sample exceeded the limit for both the Groundwater Threshold Value and the EPA Interim Groundwater Value standards of 75ug/l and 100ug/l respectively for zinc with a concentration of 170ug/L on 25th April 2022.

No assessment criteria are available for Total Phosphorus, measured concentrations ranged from 0.1mg/L on 22nd April 2022 to 0.16mg/L on 25th April 2022.

2.4.3.3 LCCC outfall analysis 2022 to 2023 results

LCCC present analysis results for the outfall sample point located down gradient of the industrial complex re Figure 1 section 2.4.2.4. The outfall point was sampled on nine occasions between 30th November 2022 and 8th November 2023. Analysis has been undertaken for a selection of inorganic contaminants. The following presents a review of elevated concentrations detected.

Inorganic compounds

All nine samples were analysed for Suspended Solids, BOD, COD, pH, Total phosphorus, Nitrate, Ammonia, and Zinc. None of the samples presented exceedances for pH or Nitrate N03.

Two of nine samples exceeded the limit for both the Groundwater Threshold Value and the EPA Interim Groundwater Value standards of 75ug/l and 100ug/l respectively for zinc with a concentration of 150ug/L on 13th June 2023 and 17th October 2023.

No assessment criteria are available for Suspended Solids however where concentrations were detected above the laboratory limit of detection, they ranged from 5.6mg/L on 7th March 2023 to 50mg/L on 9th May 2023.

No assessment criteria are available for BOD however where concentrations were detected above the laboratory limit of detection, they ranged from 0.8mg/L on 7th September 2023 to 13mg/L on 4th July 2023.

No assessment criteria are available for COD however concentrations were typically less than the laboratory limit of detection (<50mg/L). One sample collected on 13th June measured 57mg/L.

No assessment criteria are available for Total Phosphorus, one sample measured a concentration of 0.89mg/L on 7th March 2023. The remaining samples were less than laboratory detection limits.

No assessment criteria are available for Ammonia, concentrations ranged from <0.122mg/l on 30th November 2022 to 0.61mg/L on 7th September 2023.

2.4.3.4 LCCC Downstream analysis 2023 results

LCCC present analysis results for the downstream sample point located c 895m down gradient of the outfall point re Figure 1 section 2.4.2.4. The downstream point was sampled on six occasions between 13th June 2023 and 8th November 2023. Analysis has been undertaken for a selection of inorganic contaminants. The following presents a review of elevated concentrations detected.

Inorganic compounds

All six samples were analysed for Suspended Solids, BOD, COD, pH, Total phosphorus, Nitrate, Ammonia, and Zinc. None of the samples presented exceedances for pH, Nitrate, and Zinc.

No assessment criteria are available for Suspended Solids however concentrations were detected less than the laboratory limit of detection.

No assessment criteria are available for BOD however where concentrations were detected above the laboratory limit of detection, they ranged from 5.4mg/L on 17th October 2023 to 13mg/L on 4th July 2023.

No assessment criteria are available for COD however concentrations were typically less than the laboratory limit of detection (<50mg/L). One sample collected on 13th June 2023 measured 54mg/L.

No assessment criteria are available for Total Phosphorus however all samples were less than limits of detection 0.5mg/l.

No assessment criteria are available for Ammonia. Four samples were less than laboratory detection limits. Where concentrations were detected in two samples these were ranging from 0.39mg/L on 17th October 2023 to 0.59mg/L on 7th September 2023.

2.4.3.5 Complete Laboratory Solutions 2024 results

Brendan Moore (on behalf of Tom Ryan) provided analysis results for the TRLC sample points. Three water samples and two leachable sediment samples were collected on 8th February 2024. It is noted TRLC001 and TRLC001A are at the same location (the outfall of the storm pipe into the Loughmore Canal) with sample TRLC001A collected approximately 15 minutes after TRLC001 during a discharge event when a change of colour was noticed coming from the pipe. TRLC004 was collected as a water sample at the outfall from the southern end of the Raheen Industrial Estate.

Leachable sediment samples were TRLC002 and TRLC005. TRLC002 sediment sample was collected at the same location as TRLC001 while TRLC005 was collected at the same location as TRLC004. Analysis has been undertaken for a selection of organic and inorganic contaminants including sVOC and VOC compounds. The following presents a review of elevated concentrations detected.

Water Sample Results

Organic compounds

All three samples were analysed for Total Polyaromatic Hydrocarbon (PAH), two samples were analysed for PCB and Phenols. Both Phenol samples reported concentrations less than the laboratory detection limit. Both PCB samples reported concentrations less than the laboratory detection limits.

An assessment criterion is not available for Total PAH. Concentrations ranged from 9ng/l at TRLC004 to 604ng/l at TRLC 001A. It is noted the TRLC001 sample reported a significantly lower concentration of 35ng/l than that of TRLC001A.

Inorganic compounds

All three samples were analysed for Total Phosphorus, Ammonia, Arsenic, Zinc, Chromium, Copper, Nickel, Lead, Antimony, Cadmium, Cobalt, Selenium, Tellurium, Thallium, Vanadium, Molybdenum, Tin, Beryllium and total heavy metals. None of the samples presented exceedances for, Arsenic, Chromium, Copper, Nickel, and Cadmium.

One of three samples exceeded the limit for the Groundwater Threshold Value standards of 75ug/l for zinc with a concentration of 99ug/L at TRLC001.

One of three samples exceeded the limit for both the Groundwater Threshold Value and the EPA Interim Groundwater Value standards of 7.5ug/l and 10ug/l respectively for lead with a concentration of 17ug/L at TRLC001A.

No assessment criteria are available for Total Phosphorus, Ammonia, Antimony, Cobalt, Selenium, Tellurium, Thallium, Vanadium, Molybdenum, Tin, Beryllium and total heavy metals. Concentrations were typically less than the laboratory limit of detection or were detected marginally in excess of the detection limit.

sVOC Compounds.

Two samples (TRLC001 and TRLC004) were analysed for sVOC compounds. All parameters for both samples were less than laboratory limit of detection.

Tentatively Identified Compounds O-Xylene and 2,4,7,9-Tetramethyl-5-decyn-4,7-diol were measured with elevated concentrations of 328.3ug/l and 33.59ug/l reported respectively in sample TLRC001.

Tentatively Identified Compounds Benzyl 2-chloroethyl sulfone and 2,4,7,9-Tetramethyl-5-decyn-4,7-diol were measured with elevated concentrations of 2.089ug/l and 4.08ug/l respectively in sample TLRC004.

VOC Compounds.

Two samples (TRLC001 and TRLC004) were analysed for VOC compounds. All parameters for both samples, except for Chloroform (TRLC 004, 1.75ug/L), were less than laboratory limit of detection, all samples reported concentrations less than the applicable assessment criteria.

Sediment Sample Results

It is understood that sediment samples were leached in the lab and the resultant leachate was analysed for both organic and inorganic compounds, as outlined below. In addition, the sediment itself was analysed for VOC compounds, the results for this analysis are also reported below.

Both samples were analysed for VOC concentrations. Results were generally less than laboratory detection limits. Where concentrations were detected, these were marginally above the Limits of detection and not considered significantly elevated.

Organic compounds

Both samples were analysed for PCB and TRLC002 analysed for Phenols. Phenol concentrations were reported less than the laboratory detection limit. Both PCB samples reported concentrations less than the laboratory detection limits.

Inorganic compounds

Both samples were analysed for Arsenic, Zinc, Chromium, Nickel, Lead, Antimony, Cadmium, Cobalt, Selenium, Tellurium, Thallium, Vanadium, Molybdenum, Tin, Beryllium and total heavy metals. None of the samples presented exceedances for Arsenic, Chromium, Nickel, and Cadmium.

No assessment criteria are available for Antimony, Cobalt, Selenium, Tellurium, Thallium, Vanadium, Molybdenum, Tin, Beryllium and total heavy metals. It is noted the leachate concentrations were generally slightly more elevated than that measured within the water samples.

Both samples exceeded the limit for both the Groundwater Threshold Value and the EPA Interim Groundwater Value standards of 75ug/l and 100ug/l respectively for zinc with a concentration of 266ug/L at TRLC002 and 359mg/l at TRLC005.

Both samples exceeded the limit for both the Groundwater Threshold Value and the EPA Interim Groundwater Value standards of 7.5ug/l and 10ug/l respectively for Lead with a concentration of 14.79ug/L at TRLC002 and 13.91mg/l at TRLC005.

No assessment criteria are available for Antimony, Cobalt, Selenium, Tellurium, Thallium, Vanadium, Molybdenum, Tin, Beryllium and total heavy metals. It is noted the leachate concentrations were generally slightly more elevated than that measured within the water samples.

VOC Compounds

Both samples were analysed for VOC concentrations. Results were generally less than laboratory detection limits. Where concentrations were detected, these were marginally above the Limits of detection and not considered significantly elevated.

2.4.4 Historical Information Review - Discussion & Findings

Extensive water sampling programs have been conducted by LCCC and IDA however the reports reviewed by Tetra Tech and undertaken by or on behalf of LCCC or the IDA have not reported on the soil and sediment samples results. An email dated 16/11/2022 from Garland Consultants to Nadine Boyland (IDA) cc Eoin Cronin (IDA) discusses the results of an elevated zinc concentration reported for a sediment sample. It is further noted that recent dredging of the canal was undertaken by the IDA. It is unclear if contaminated sediments were spread onto Loughmore Common during the course of these works.

The flow monitoring of the drains from the IDA site was undertaken by CWSL and CWSL in 2022 presented plots of the data which did not include rainfall data. It would be useful to understand the flow data in the context of the rainfall to determine if the plot is from a high or low rainfall period. No conclusion was found in relation to the periodic pulse flow noted during investigations. CWSL have undertaken the sampling and Garland Consultants have been producing the interpretive reports, however there are no sampling methodology used, QA/QC, laboratory reports, Chain of Custody or field sheets detailing site conditions at the time of sampling.

None of the IDA reports have referenced sediment or soil samples having been taken to date or future plans to include soils or sediment sampling of the Loughmore canal and adjoining banks. However, Garland Consulting emailed the IDA on the 16/11/2022 in relation to high levels of zinc 2,000mg/kg in sediment samples collected on behalf of the IDA.

None of reports reviewed have identified the swallow hole identified in Tynan Environmental 2021 and the significance of the hydrogeological connectivity between groundwater and surface water in the canal.

There has been no Conceptual Site Model presented to demonstrate an understanding of the complex source – pathway -receptor (SPR) linkages identified as part of the investigations works completed to date in any of the reports produced for IDA or LCCC.

2.5 GROUND CONDITIONS

The Geological Survey Ireland (GSI) Spatial Resources[3] was accessed in March 2024 to provide information relating to the geology of the study area. Tetra Tech also completed a review of geological information contained within previous reports (list of reports summarised in Section 2.0) which were pertinent to the site.

2.5.1 Bedrock Geology

The mapped Bedrock geology of the study area is presented on Figure 2.7 is predominantly underlain by Visean Limestones (undifferentiated). Parts of the Raheen Business Park underlain by volcaniclastic rocks an Basalt. GSI Linework (100K) layer (Figure 2-) for geological faults, shows no mapped faults under or in the vicinity of the study area. The GSI bedrock outcrops layers shows no outcrops within the boundary of Loughmore common. The GSI databases shows that there were no records of boreholes drilled within Loughmore Common and geotechnical boreholes predominately drilled in footprint of the IDA business park and M20 motorway.

2.5.2 Superficial Deposits

The mapped superficial deposits in the study are presented on Figure 2- has shown the site is underlain by Glacial Till derived from limestones. The depth or thickness of the deposit is not currently known; however, it is noted that the Loughmore Canal is situated in a cut over raised peat area, as indicated on Figure 2.8. There are also pockets of alluvium along the Barnakyle Stream.

Made ground is not anticipated in areas of undeveloped greenfield, however it is more likely made ground or fill is present where development has occurred including beneath Raheen Business Park to the east of site.

2.5.3 Geo-hazards

A review of the GSI online mapping was undertaken for geohazards within the vicinity of the site and a summary of available data is provided in Table 33 below.

Table 3 - Summary of Geohazards

Geohazards	Details
Landslides	No landslide events identified to have occurred on site or in the nearby vicinity. The Landslide Susceptibility Map has shown the site to be in an area where the likelihood of a landslide is considered low.
Karst Features	There are two karst features detailed as turloughs, one of which is associated with Loughmore Canal and the second located 800m south of this alongside the R510 roadway. There are no further karst landforms identified within the site or c.1km of the site.
Quarries	No active quarrying or mining activities were identified within the site or immediate vicinity of the site. A small former quarry was identified in the historical OS maps c.60m southwest of the site.

[3] Geological Survey Ireland Spatial Resources. (Accessed 09/06/2024) https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228

Figure 2-7: GSI Bedrock Geology (100K)

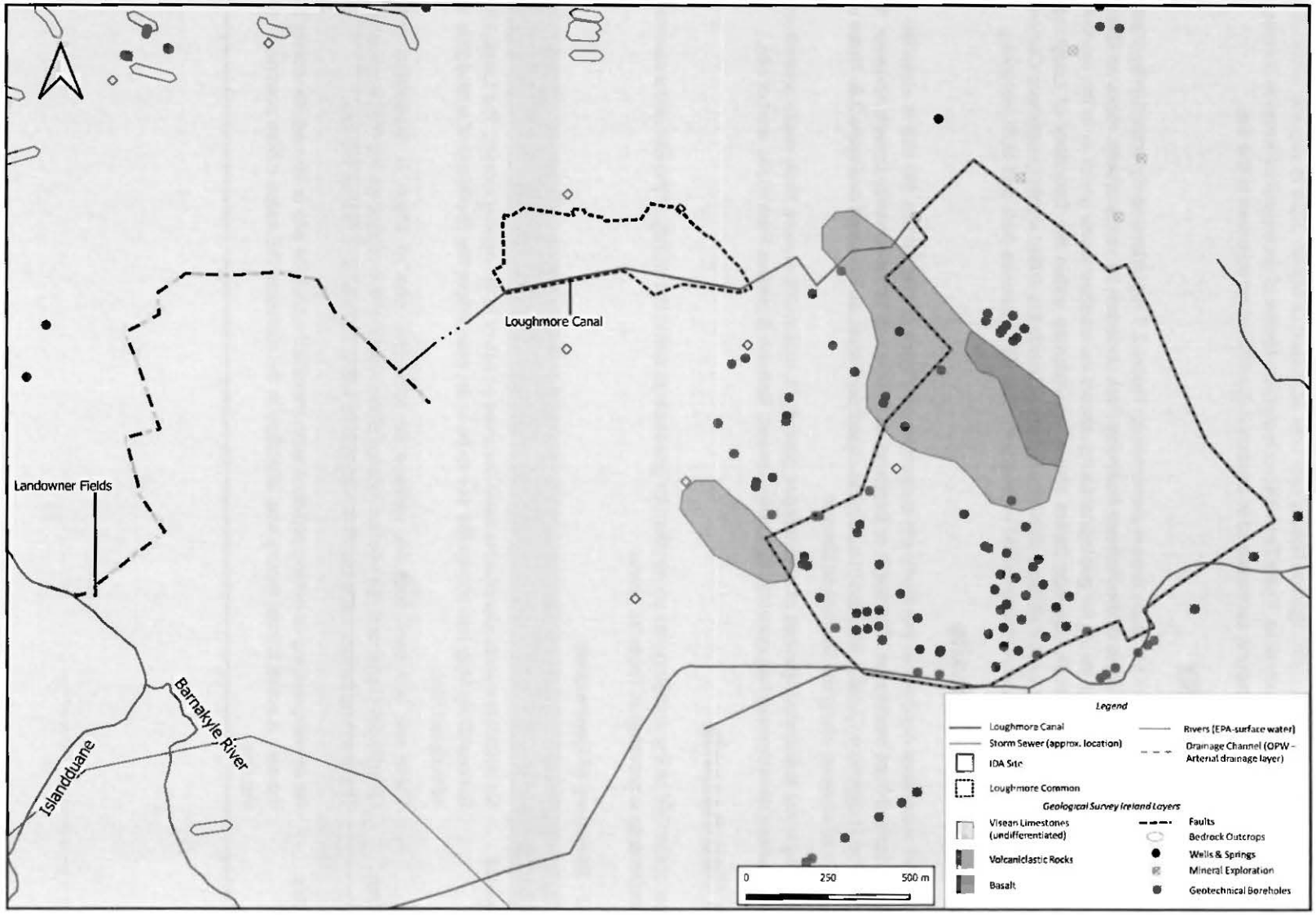
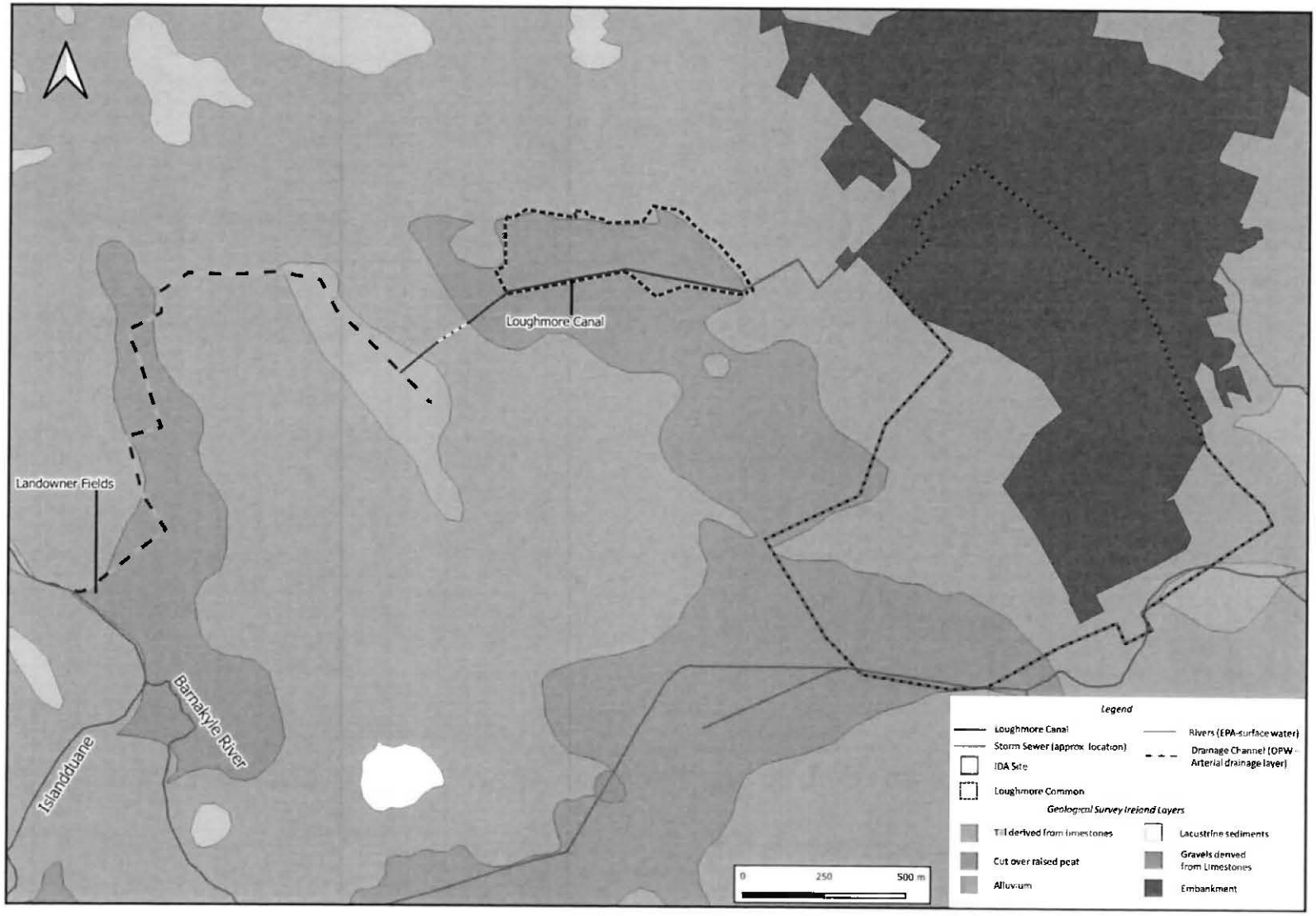


Figure 2-8: GSI Quaternary Sediments (50K)



2.6 HYDROGEOLOGY

2.6.1 WFD Groundwater Body Status

2.6.1.1 WFD Groundwater Body

The site is located within the Limerick City Southwest Groundwater Body (GWB). The EU Code for the Limerick City Southwest GWB is IE_SH_G_141. The boundary of the Limerick City Southwest GWB is shown on Figure 2- and the GWB covers an area of 83 km^2. The GSI (2004) published a Summary of Initial Characterisation for Limerick City Southwest GWB[4], which identifies Rivers: Shannon, Maigue, Barnakyle, Ballynaclough, Ahanload. Creeks: Ballincurra and Ballindrayas as associated surface waters. GSI 2004 also identifies associated terrestrial ecosystems Inner Shannon Estuary (000435) and Loughmore Common Turlough (000438).

2.6.1.2 WFD Groundwater Body Status

Groundwater quality and resource availability in Ireland is monitored and assessed under the Water Framework Directive (WFD). The WFD is implemented through River Basin Management Plans (RBMPs). The status of WFD groundwater bodies in Ireland is reported through Catchments.ie, the website is a collaboration between the Department of Housing, Local Government and Heritage, the Environmental Protection Agency, and the Local Authority Waters Programme. For the 2016 to 2021 WFD cycle Limerick City Southwest WFD GWB had the following WFD Classification:

- **Overall Status** - Good
- **Quantitative Status** - Good
- **Chemical Status** - Good

2.6.1.3 Pressures on WFD Status

EPA Maps database lists pressures on WFD status for Groundwater Bodies, a search of the EPA database of pressures on Limerick City Southwest GWB is summarised on Table 44

Table 4 - Pressure on Groundwater Body WFD Status

EPA Maps – Groundwater Pressures	Pressures Identified
Significant Pressures - IEL Facilities	
Significant Pressures - Certs of Authorisations	
Significant Pressures - IPC Facilities	
Water Treatment Pressures	-
Waste Pressures	-
Urban Waste Water Pressures	-
Urban Run Off Pressures	-
Other Anthropogenic Pressures	-
Invasive Specie Pressures	-
Industry Pressures	-
Hydromorphology Pressures	-

[4] GSI (2004) Limerick City South West GWB: Summary of Initial Characterisation

EPA Maps – Groundwater Pressures	Pressures Identified
Historically Polluted Site Pressures	-
Forestry Pressures	-
Extractive Industry Pressures	-
Domestic Waste Water Pressures	-
Atmospheric Pressures	-
Aquaculture Pressures	-
Anthropogenic Pressures	-
Agriculture Pressures	-
Abstractions Pressures	-

There were currently no pressures on the WFD status or objectives.

2.6.2 Aquifer Designations

The superficial deposits underlying the Loughmore Common are shown to be Glacial Till derived from limestones as shown on Figure 2-, which are a low permeability deposit and cannot be classed as an aquifer. The GSI gravel aquifers layer was included on Figure 2-, there are no mapped gravel aquifers in the area. The GSI Bedrock aquifer map plotted on Figure 2-, shows that the GSI has classed the Visean Limestones (undifferentiated), which underlies Loughmore Common as a Locally Important Aquifer which is generally Moderately Productive (Lm). Figure 2- also shows that the volcanic deposits underlying the IDA business park are classed by the GSI as Locally Important Aquifer - which is Moderately Productive only in Local Zones

2.6.3 Groundwater Vulnerability

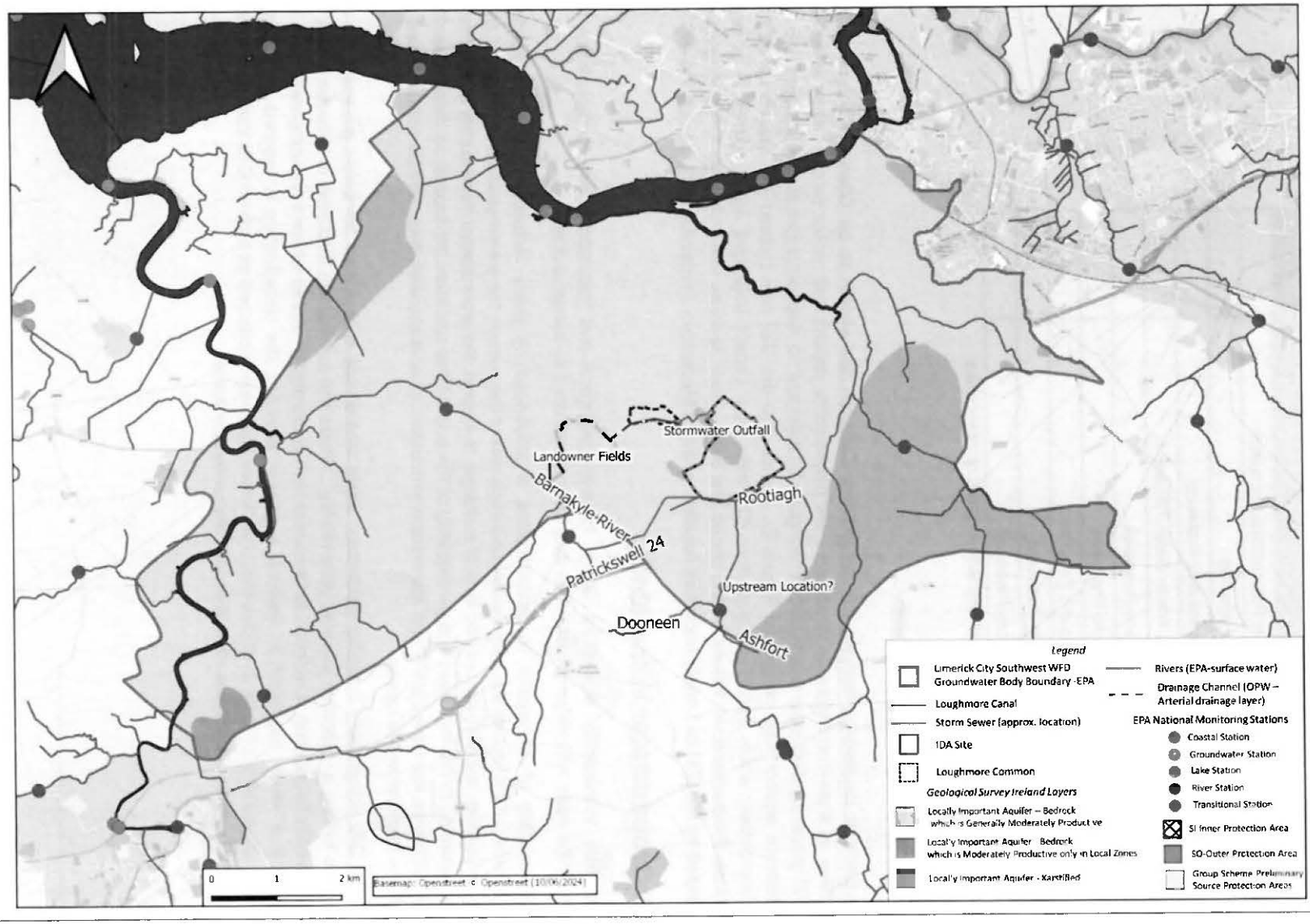
Groundwater Vulnerability is defined as the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities[5].

The vulnerability of an aquifer to contamination is influenced by many factors including the leaching characteristics of the topsoil, the permeability and thickness of the subsoil, the presence of an unsaturated zone, the type of aquifer, and the amount and form of recharge. In Ireland, the groundwater vulnerability is determined mainly according to the thickness and permeability of the subsoil that underlies the topsoil, as these properties strongly influence the travel times and attenuation processes of contaminants that may be released into the subsurface from below the topsoil.

Under the GSI vulnerability mapping guidelines, areas where rock is less than 3m below ground level, are mapped as having a "probable extreme vulnerability". Where the overburden thickness is between 3 and 5m the vulnerability to pollution is reduced to "probable high vulnerability". Areas where the overburden has a low permeability or where the depth to bedrock is greater than 5m, the classification is reduced to "probable moderate vulnerability". Figure 2- shows that Loughmore Common is classed as high on GSI Vulnerability map and that the Loughmore canal is rock at or near the surface or karst.

[5] Daly, D. and Warren, W., 1998. Mapping Groundwater Vulnerability: the Irish perspective. In: Robins, N.S., (ed) Groundwater Pollution, Aquifer Recharge, and Vulnerability, Geological Society, London, Spec. Publication. 130 pp 179-190.

Figure 2-9: WFD Groundwater Body Boundary and EPA National Monitoring Stations



The GSI Groundwater Vulnerability layer has been plotted on Figure 2- at the Loughmore Common is classed as High. Loughmore Canal itself is classified as rock near the surface, this likely due the excavation and removal of the soils for the canal construction. Figure 2- shows that for the region GSI Groundwater Vulnerability is predominantly classed as high. On the western side of the map on Figure 2-, there is a zone of moderate vulnerability, which a portion of the Barnakyle stream passes over zone of moderate vulnerability.

2.6.4 Groundwater Flow Mechanisms

Visean Limestones (undifferentiated) and volcaniclastic rocks are devoid of meaningful intergranular permeability (primary porosity); as such groundwater flow occurs in secondary porosity through fractures, bedding planes, karst conduits or zones of weathered bedrock referred to as epikarstic. Groundwater flow through an epikarstic, which is the upper weathered zone of the limestone which will have enhanced porosity generally at the soil/bedrock contact. Fracture zones in the upper part of the aquifer tend to be more dense and open. The groundwater flow regimes in the epikarst and fractured zones will be hydraulically connected. The amount of fracturing of bedrock will be dependent on the faulting and joints associated with the structural deformation. Groundwater flux is thought to be concentrated in the top 30 m or so of the aquifer.

2.6.5 Karstic Features

Figure 2- shows GSI Karstic Features layer, there is one Turlough mapped in the boundary of Loughmore Common.

Tynan Environmental (2021) identified karst features Dolines (x3) and swallow holes (x3) in Loughmore Common, the indicative locations are shown on

Figure **2-5**. These represent zones of higher groundwater vulnerability and shortcuts for potential contamination to enter groundwater. Outside the common boundaries there were two springs identified.

2.6.6 Groundwater Levels & Flow

There was one groundwater monitoring borehole installed at Loughmore Common, Tyan Environmental (2021). No groundwater level data presented in Tyan Environmental (2021). Arup 2023 baseline ecology report presented the groundwater level data captured by Tynan Environmental on Table 8.

Table 5 – Groundwater Levels

Date	BH205	BH211	BH202
15/09/2018	5.2	11.03	5.90
10/11/2018	10.98	16.5*	8.58
04/02/2019	8.40	15.38	7.92

Note *value noted by Tynan Environmental as having a maximum error of 0.47m. BH202 located in Loughmore Common.

A check of EPA hydronet showed that there are no groundwater level monitoring wells in the Visean Limestones bedrock at the Loughmore Common or in the Limerick City Southwest GWB.

Groundwater flow will be driven by topography and with structural controls such as faults, bedding plains and fractures. There are no mapped faults or structural features in the study area, groundwater flow will likely be from the topographic high shown on the west of topographic map (Figure 2-4) to discharge into Shannon Estuary to the north and north east and the local rivers.

2.6.7 Groundwater Quality

A check of the EPAs National Monitoring Station Network plotted on (Figure 2.9) showed that there are no groundwater quality monitoring stations of national network installed in the Visean Limestones bedrock at Loughmore Common or in the Limerick City Southwest GWB.

There is a groundwater monitoring well in Loughmore Common, the indicative location of which is shown on Figure 2.12.

Figure 2-10: GSI Bedrock Aquifer Classification & Gravel Aquifers

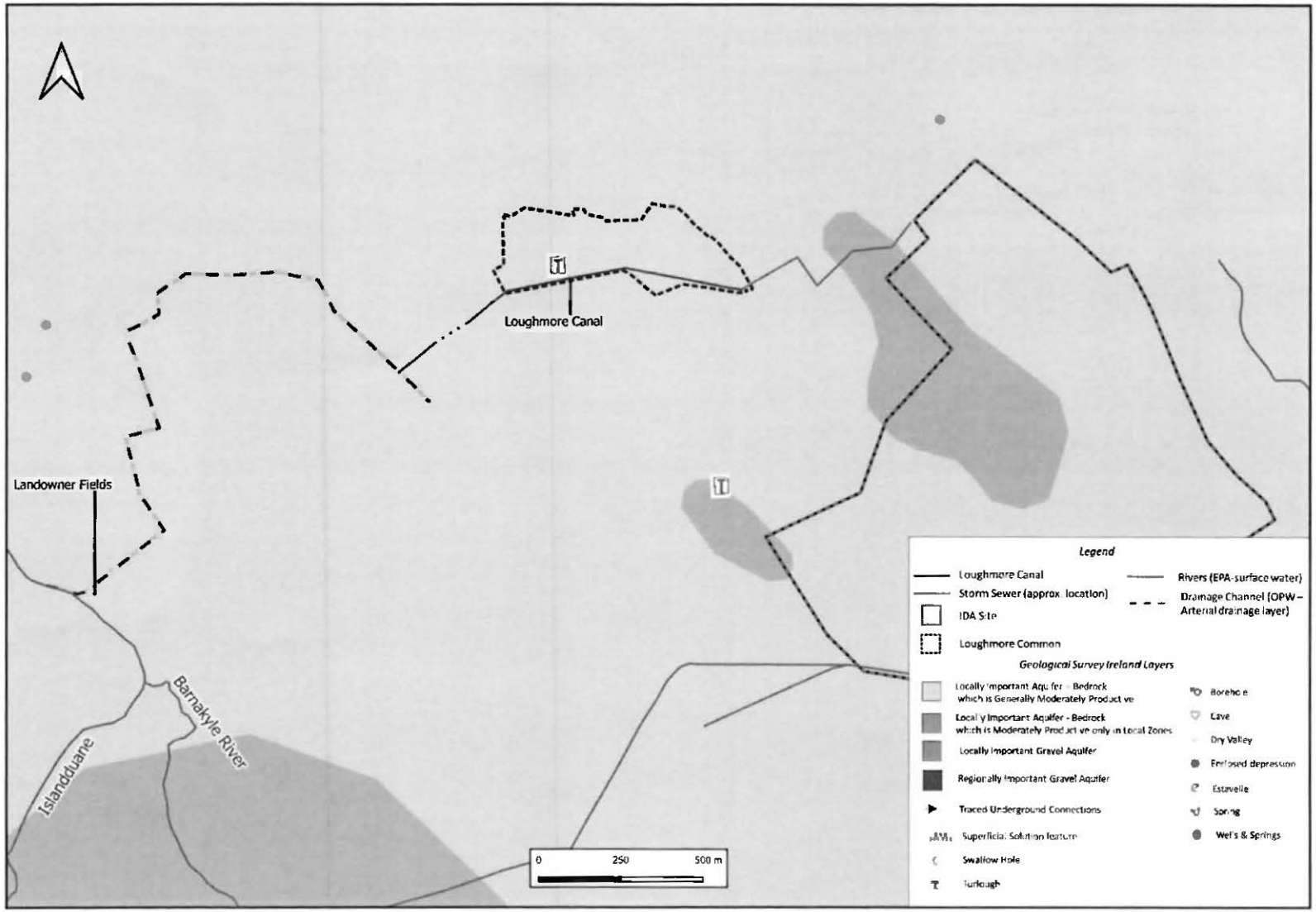


Figure 2-11: Groundwater Vulnerability

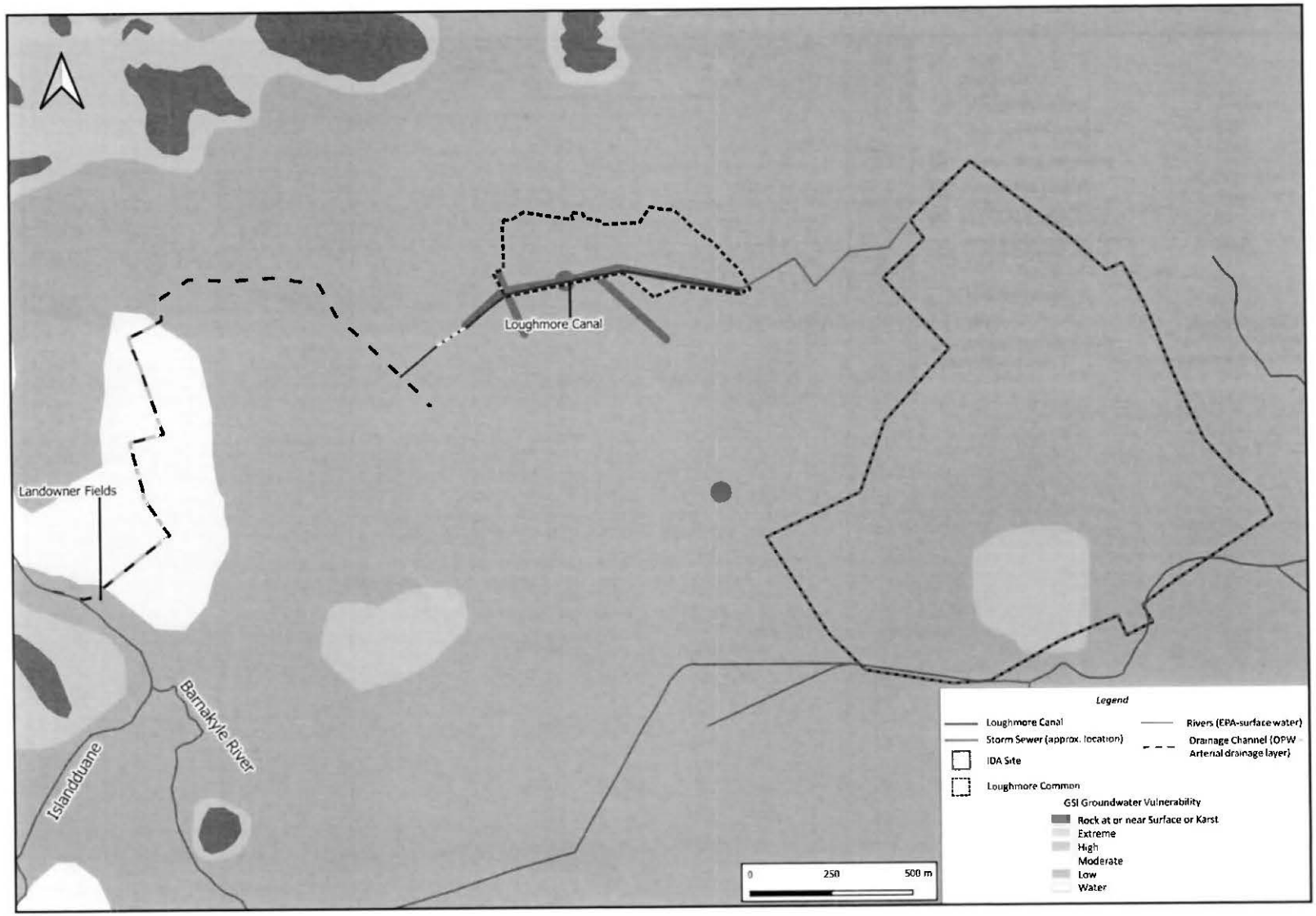
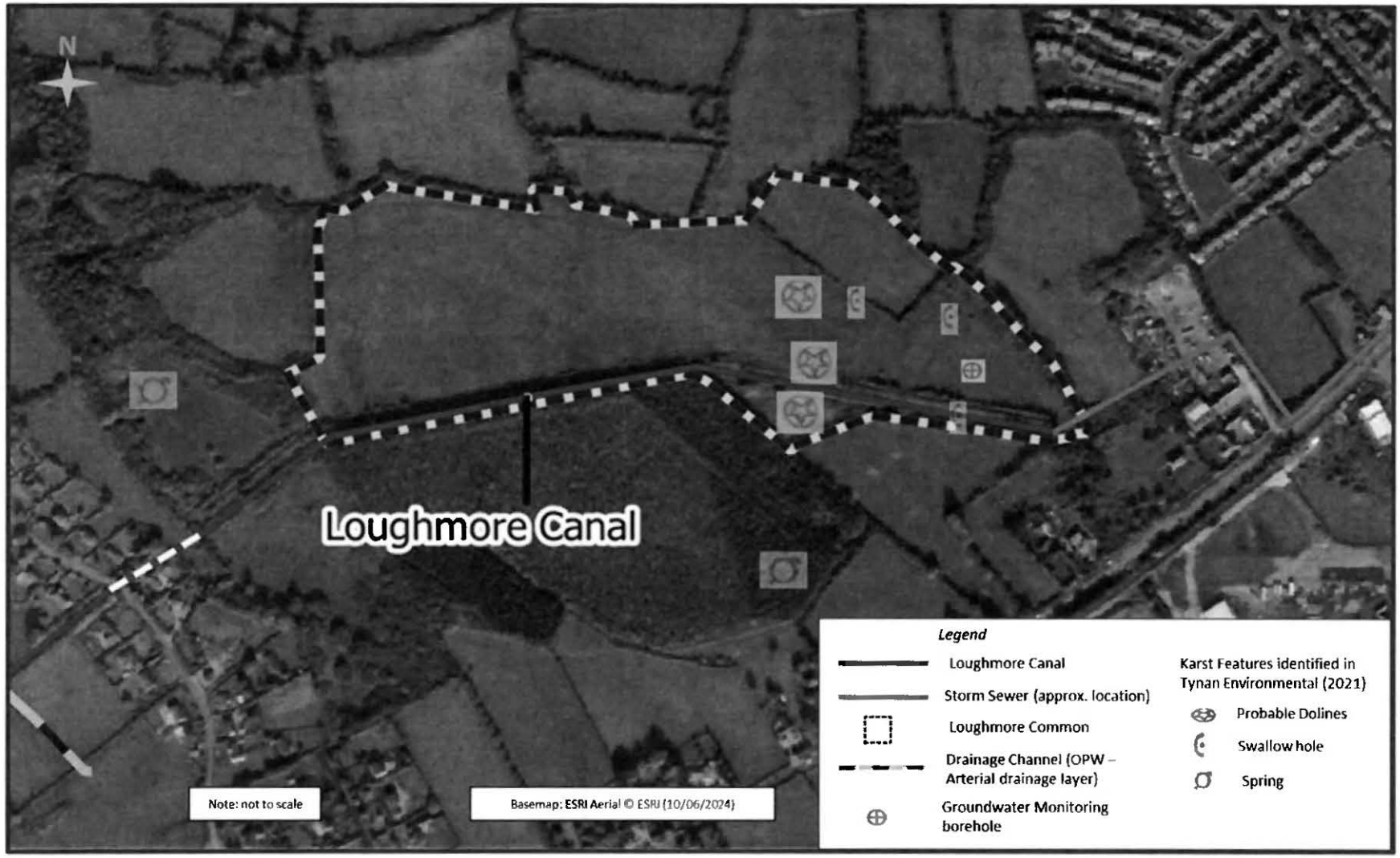


Figure 2-5: Karst Features Identified by Previous Study

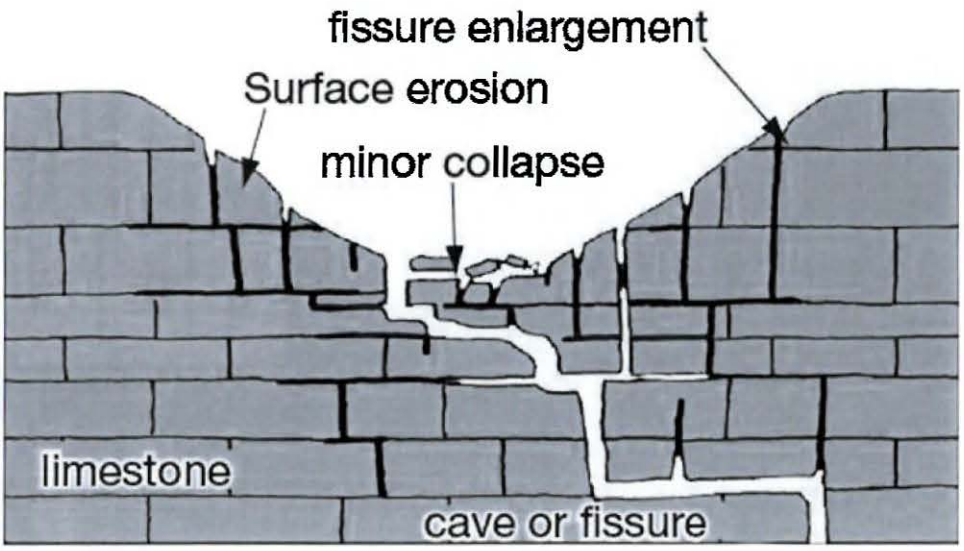


Note: Indicative locations for Karst Features as per Diagram 1, Page 9 of Tynan Environmental (2021)

2.6.8 Groundwater & Surface Water Interaction

Tynan Environmental (2021) characterised the interaction of groundwater and surface water at the site. During the excavation of the channel for Loughmore Canal at least one karst swallow hole was intercepted. The swallow hole was identified by Tynan Environmental (2021). Solution swallows are formed by local chemical weathering (dissolution) of rock where water accumulates around a fissure or joint in the bedrock rock as shown on figure 2-11 below. This represents a shortcut for rainfall (recharge) to enter the groundwater.

Figure 2-6- Swallow hole



Source- BGS6

The link between groundwater and surface water:

- When groundwater levels are low, water will flow from Loughmore Canal via the swallow hole into groundwater;
- When groundwater levels are sufficiently high, groundwater will discharge from the swallow hole into the canal; and
- Diffuse flow occurs between groundwater and surface water across the length of canal.

Loughmore Common sits in a basin/topographic low, as discussed in Section 2.3 and shown by topographic map on Figure 2-4. There is a turlough mapped on Figure 2- and the area is prone to groundwater flooding which will be discussed in more detail in the Conceptual Site Model presented in Section 5.0. This demonstrated that there is a direct hydrogeological connection between the discharge pipe in the IDA Business Park and surface water/groundwater,

2.6.9 Groundwater Source Protection Zones

Groundwater Source Protection Zones (SPZs) have been delineated for the protection of public water supply and fulfil a requirement WFD places on regulatory bodies. SPZs have three subdivisions and bespoke SPZs are defined for all major abstraction sources intended for human consumption or food use, e.g., boreholes and springs. These sub-divisions are defined as follows:

- SPZ1 – Inner protection zone - defined as the 50-day travel time from any point below the water table to the abstraction source. This zone has a minimum radius of 50 metres.

[6] BGS, 2024- Understanding sinkholes and karst - British Geological Survey (bgs.ac.uk) (accessed 19/07/2024)

- SPZ2 – Outer protection zone - defined by a 400-day travel time from a point below the water table. This zone has a minimum radius of 250 or 500 metres around the abstraction source, depending on the size of the abstraction.
- SPZ3 – Source catchment protection zone - defined as the area around an abstraction source within which all groundwater recharge is presumed to be discharged at the abstraction source.

The GSI layers for Public Supply Source Protection Areas (SPA) or Group Scheme Preliminary Source Protection Areas are included on Figure 2-., there are no SPAs within 5km of the site or within the Limerick City Southwest Groundwater Body (GWB) discussed in Section 4.10.

The nearest identified SPA is associated with was Coshma Group Water Scheme and is located approximately 5.5km southwest of the site.

2.6.10 Licensed Groundwater Abstractions

A review of the GSI viewer identified the closest Groundwater Scheme Abstraction Point to be approximately 9.5km southeast of the site associated with Fedamore Public Water Supply (PWS).

A review of the EPA Water Abstraction Register (Published August 2023) has identified 4no. water abstractions of 25m^3 or more per day from the Limerick City Southwest Waterbody. Two of the licenced abstractions belong to Analog Devices International Unlimited Company, located in Ballycummin townland, and is used for industrial purposes. One licensed abstraction belongs to Irish Cement Limited, located in Conigar (Ballycummin) townland and is used for quarrying purposes. The fourth licenced abstraction is a private abstractor located in Ballycasey townland and is used for agriculture (drinking consumption, parlour and herd washing) purposes.

2.6.11 Private Groundwater Abstractions

Limerick City and County Council were contacted in regard to private water supplies at the site or within the surrounding area. At the time of writing a response has not been received.

The GSI viewer shows no groundwater wells or springs within the site. The closest groundwater well is GSI Name - 1415SWW072 located approximately 100m north of the site and is reported to yield 27.3m^3 per day, which is deemed to be Poor.

On the map viewer by landdirect*[7], there are number of open wells beside a lined or unlined hole in the ground that accesses the shallowest groundwater available in the local area.

2.7 HYDROLOGY

2.7.1 WFD Surface Water Bodies

2.7.1.1 WFD River Sub Basins and Catchments

Loughmore Canal is approximately 1km in length. The canal passes through the Loughmore Common and is culverted under the Caher road (R526) to another section of canal before joining to Barnakyle Stream. Barnakyle Stream flows into Barnakyle river, which flows into Maigue Estuary. Maigue Estuary opens into the Shannon Estuary.

Figure 2-74 shows that the IDA site split between WFD river sub basins. The northern portion of the IDA site is within the BallyNaclogh_010 and southern section of the IDA site is within the Barnakyle_020. Loughmore Common is within the BallyNaclogh_010 WFD river sub basin. Loughmore canal crosses the boundary of the

[7] https://www.landdirect.ie/pramap/

canal BallyNaclogh_010 WFD river sub basin into Barnakyle_020 WFD river sub basin discharges water in Barnakyle stream. As such water us being transferred between WFD river sub basins.

BallyNaclogh_010 and the Barnakyle_020 WFD river sub basins fall within the Ballynaclogh_SC_010 sub catchment, which also includes WFD river sub basins Barnakyle_010 and East Carrig_010. The Ballynaclogh_SC_010 falls within the Shannon Estuary South (24) catchment. The Shannon Estuary South catchment covers an area of 2,033km^2 and is predominantly low lying, flat and underlain by limestones except for a few isolated hills.

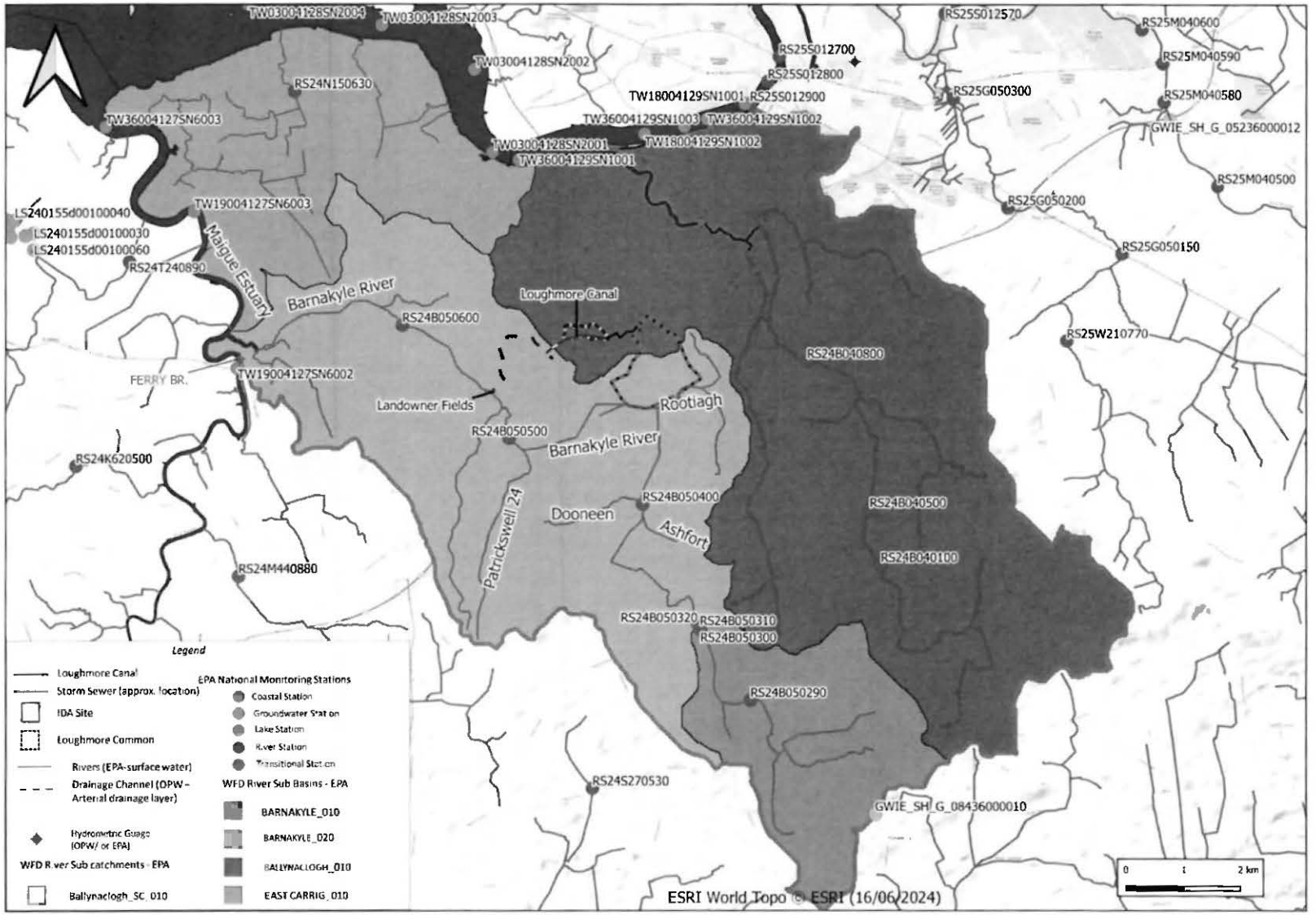
2.7.1.2 Surface Water Body WFD Status

Surface water quality and resource availability in Ireland is monitored and assessed under the Water Framework Directive (WFD). The WFD is implemented through River Basin Management Plans (RBMPs). The status of WFD groundwater bodies in Ireland is reported through Catchments.ie, the website is a collaboration between the Department of Housing, Local Government and Heritage, the Environmental Protection Agency, and the Local Authority Waters Programme. The WFD River Sub Basins is the basic unit of WFD assessment and reporting for WFD status of surface waters. The main elements of status for WFD for surface water bodies relevant to the study have been tabulated on 6 below.

Table 6 – WFD River Sub Basins Status (2016-2021 cycle)

Name	Code	Ecological Status or Potential	Assessment Technique	Confidence	WFD Risk
BallyNaclogh_010	IE_SH_24B040800	**Poor**	Modelling	low	Review
Barnakyle_010	**IE_SH_24B050300**	**Poor**	**Monitoring**	**Medium**	**At risk**
Barnakyle_020	IE_SH_24B050600	**Moderate**	Monitoring	High	At risk
East Carrig_010	**IE_SH_24N150630**	**Poor**	**Modelling**	**low**	**Review**

Figure 2-7: WFD River Sub Basins



Supporting Chemistry has been assessed for Barnakyle_020, not the other River Sub Basins. The status of the elements of the supporting chemistry of Barnakyle_020 are listed below:

- Oxygenation Conditions Pass;
- Dissolved Oxygen (% Sat) Pass;
- Other determinand for oxygenation conditions High;
- Acidification Conditions Pass;
- pH Pass;
- Nutrient Conditions Pass;
- Nitrogen Conditions Moderate;
- Nitrate Moderate;
- Ammonium High;
- Phosphorous Conditions High; and
- Orthophosphate High.

Monitoring point for Barnakyle_020 is Br SE of Clarina (RS24B050600) which is shown on Figure 2-72.

2.7.1.3 Pressures on Surface Water Body WFD Status

The EPA Maps database identifies potential pressures on WFD status for rivers and streams, a check of the EPA database of pressures on rivers and Streams pertinent to this assessment is summarised on Table 77.

Table 7 – Pressure on River/Stream WFD Status

EPA Maps – River Pressures	Pressures Identified			
	BallyNaclogh_010	Barnakyle_010	Barnakyle_020	East Carrig_010
River Abstraction Pressures	-	-	-	-
River Agriculture Pressures	-	Yes	Yes	-
River Anthropogenic Pressures	-	-	-	-
River Aquaculture Pressures	-	-	-	-
River Atmospheric Pressures	-	-	-	-
River Domestic Waste Water Pressures	-	-	-	-
River Extractive Industry Pressures	-	-	-	-
River Forestry Pressures	-	-	-	-
River Historically Polluted Site Pressures	-	-	-	-
River Hydromorphology Pressures	-	-	-	-
River Industry Pressures	-	-	-	-
River Invasive Species Pressures	-	-	-	-
River Other Anthropogenic Pressures	-	-	-	-
River Urban Run Off Pressures	-	-	Yes	-
River Urban Waste Water Pressures	-	-	-	-
River Waste Pressures	-	-	-	-
River Water Treatment Pressures	-	-	-	-
Significant Pressures – Urban Waste Water Plant Locations	-	-	-	-
Significant Pressures - Waste Facilities	-	-	-	-

Note: EPA Maps database accessed 30/11/2023

2.7.2 River Flow and Canal Flows

Hydrometric gauging stages for the area were plotted on Figure 2-74, which shows that there is only a OPW level gauge Ferry Br. (ID number) monitoring levels in Maigue Estuary.

Hydrotool, which provides EPA River Flow Estimates and is accessible through EPA Maps, has estimated flows values at various points Barnakyle River. The flow in the Barnakyle River at the point 300m upstream of where the Barnakyle stream joins Barnakyle River estimated to have a Q30 of 0.62 m^3/s and a Q95 of 0.07m^3/s.

2.7.3 Licensed Surface Water Abstractions

Limerick City and County Council were contacted regarding licenced surface water abstractions at the site or within the surrounding area. At the time of writing a response has not been received.

2.8 FLOODING

In Section 2.3, the topographic map shown on Figure 2-4 and topographic profile on Figure 2-3, shows that the common sits in a topographic basin with no natural outflow for surface water. A review of the Flood Maps[8] has shown the Loughmore Common is not at risk from fluvial flooding or coastal flooding at the site. There is historic groundwater flooding located on the eastern extent of the Loughmore Canal. The GSI Historic Floods Layer shows that flooding Loughmore Common is a combination of Groundwater and Surface Water Flooding. There are 3no. reports of past flood events which are recurring at the turlough at Loughmore Canal, of which 2 no. events occurred in 1992 and 2005. The third event did not have a date recorded. No further information is provided.

The fields owned by Tom Ryan nearest Barnakyle River, marked as landowner fields on topographic map on Figure 2-4, shows that this land occupies a topographically low area. A review of the Flood Maps shows land west and north of these fields at risk from fluvial flooding or coastal flooding.

2.9 POTENTIAL CONTAMINANT SOURCES

2.9.1 EPA Database

2.9.1.1 Waste Facilities & Historical or Active Landfills

EPA Maps database accessed through the online viewer[9], there are no licenced waste facilities or closed landfills within Loughmore Common or near Loughmore Canal.

2.9.1.2 IPPC Licensed Facilities

There are 5no. records of Integrated Pollution Prevention and Control (IPPC) facilities near to site. All are shown to be within the Raheen Business Park, and are associated with Adhesives Research Ireland Limited, IMAG Optical Storage Limited, Regeneron Ireland Designated Activity Company, Analog Devices International Unlimited Company, and Stryker Orthopaedics.

Of the 5no. records of Integrated Pollution Control (IPC) Licences within the vicinity of site within Raheen Business Park, points of note include:

- IPC licence P0224 owned by Analog Devices International Unlimited Company for discharging process effluent from the manufacture of integrated circuits and printed circuit boards. The 2023 AER submitted by Analog Devices International makes reference to the requirement for the licensee to monitoring

[8] https://www.floodinfo.ie/map/floodmaps/
[9] EPA, EPA MAPS, https://gis.epa.ie/EPAMaps/ (accessed 09/06.2024)

groundwater. As part of the routine groundwater monitoring at the site, Tetrachloroethene (PCE), Trichloroethene (TCE) and cis-Dichloroethene (cis-DCE) have been identified in onsite wells. Concentrations of TCE 13ug/L were report at location GW5 in November 2023. Cis-DCE was detected at a concentration of 12ug/L in November 2022 and PCE was detected at location RW01 in November 2023.

- IPC licence P0265 owned by IMAG Optical Storage Limited for discharging process effluent from the surface coating sector.
- IPC licence P0452 owned by Adhesives Research Ireland Limited for discharging process effluent from the manufacture or use of coating materials in processes.

Trade effluent is defined by Irish Water as any liquid that is discharging from a business premises to the public sewer. For clarity, the IPPC licensed facilities listed above discharge trade effluent to the public sewers at the IDA Business Park. Further, it is likely that other businesses located within the business park are also discharging to the public sewer.

2.9.1.1 Fuel Stations or Storage.

Raheen Car Dismantlers is approximately 114 meters east of Loughmore Common, the site would have to store used engine oil and fuel onsite. There is potential for spillages and leakages at the site. Figure 1-1 shows that the drain from the Raheen business park passes under the breakers yard. The route of the pipe was shown LCCC Interim Report (2022).

2.9.2 Historical Maps and Aerial Photographs

A review of historical maps and aerial photographs on Geohive database[10] was undertaken to gain an understanding of historical land uses with potential ground contamination in the vicinity of site. A summary of this review is provided in Table 8 below.

Table 8 – Summary of Historic Mapping

OS Map	Description
1837 - 1842 Geohive	Site is undeveloped agricultural fields in the south of site shown immediately adjacent a stream. Surrounding area is primarily undeveloped agricultural land with a farm dwelling shown to be present nearby and lands denoted with 'liable to floods. In the northern portion of the site land appears to belong to Loughmore Racecourse and 'liable to floods' is noted.
1897-1913 Geohive	No significant changes since the previous epoch. Loughmore Racecourse is no longer denoted in the northern portion of site and appears to be undeveloped land. There is an additional surface watercourse shown along the field boundaries to north of the nearby farm dwelling.
1995 Geohive	Undeveloped agricultural fields remain in the south of site. Loughmore Canal has been constructed by this time in the northern portion of site with nearby housing along Caher Road. To the east of Loughmore Canal there is significant development including a number of industrial/commercial premises associated with Raheen Business Park.
2004-2006 **Geohive**	Site remains relativity unchanged. There is an additional industrial premises shown to have been constructed to the east of site.
2013-2018 Geohive	Site and surrounding area remain relativity unchanged.
2020 – 2022 Google Earth Pro	Site and surrounding area remain relativity unchanged. Present day industrial/commercial premises are located within Raheen Business Park including the following (not an exhaustive list): • Adhesives Research Ireland Limited • IMAG Optical Storage Limited • Regeneron Ireland Designated Activity Company • Analog Devices International Unlimited Company • Stryker Orthopaedics. • DPF Cleaning Ireland • Raheen Car Dismantlers • Brian Geary Toyota

A review of available historical mapping and aerial imagery has identified several industrial land uses, within the surrounding lands and in the vicinity of site, which have the potential to be sources of contamination. These potential sources of contamination are primarily associated with businesses located within Raheen Business

[10] Geohive, (Accessed on 09/06/2024) https://webapps.geohive.ie/mapviewer/index.html

Park and include various operating and manufacturing processes. These activities have the potential for the release of various organic and inorganic contaminants. A comprehensive list of industries / businesses with potential to cause contamination along with the anticipated contaminants of concern are presented at Appendix C.

2.10 PROTECTED AREAS & SPECIES

The Canal brought the drainage through the Loughmore Common turlough, which was identified in the early 1970's as an area of special scientific interest and was identified as a candidate Special Area of Conservation. The site was later removed from the final Natura 2000 list because of an appeal by another landowner.

A review of the EPA online maps portal on 29/04/2024 identified a number of protected areas relating to Loughmore canal and surrounding lands. The canal itself is situated in a proposed Natural Heritage Area which is the basic designation for wildlife protection in the Irish State, created by the Natural Parks & Wildlife Service.

The Canal also feeds into the Barnakyle River which is a main tributary of the larger Maigue Estuary, classified as a Special Area of Conservation (SAC). These areas are designated under the EU Habitats directive. The Maigue river is also classified as a Special Protection Area (SPA) for rare and vulnerable species of birds including ducks, geese, waders & other wetland species of international importance. This SPA designation falls under the EU Birds Directive (79/409/EEC).

The Barnakyle River & Maigue Estuary are also protected under the Water Frame Directive (WFD) which commits European member states to achieve good qualitative and quantitative health of all waterbodies.

3.0 PRELIMINARY CONCEPTUAL SITE MODEL

The ground conditions Conceptual Site Model (CSM) is presented in this section. The CSM qualitatively describes the ground conditions and environment within the subject site and surrounding lands. The CSM has been informed by the information contained within the desk-based study which will form the basis of the Preliminary Risk Assessment and will help with the appropriate identification and evaluation of environmental risks (Section 7).

This section qualitatively describes:

- The potential hazards and contaminant sources / ground conditions of the site;
- Receptors upon which contaminants could potentially have an impact; and
- Pathways that may exist to allow contaminants to impact upon the identified receptors.

If one of these elements is missing, there can be no risk. If all are present, then the magnitude of risk is a function of the potential risk posed by the source; the sensitivity of the receptor and the nature of the pathway.

To assess the potential impact from an identified hazard or source of contamination, a risk assessment has been undertaken (Section 6). The process of risk assessment is an evaluation of the Significant Possibility of Significant Harm (SPOSH) and comprises the identification of sources of contamination, receptors that may be affected by the contamination and pathways by which the receptors may be harmed.

A summary of the identified sources/ hazards, pathways and receptors are summarised below.

3.1 SOURCES/HAZARDS

The main sources of potential contamination or hazards to the ground conditions identified at the site are summarised below:

S1. Current Industrial Sources

Raheen Business Park is located to the east within proximity of Loughmore Canal and comprises numerous industrial land uses that include various operating and manufacturing processes which have the potential for release of various organic and inorganic contaminants. As outlined in section 2.9, a number of potential sources of contamination have been identified that may be discharging trade effluent to the public sewer in the Raheen Business Park. The foul drain is understood to be hydrologically linked to the storm drainage network within the business park, as confirmed in the CCTV survey carried out in the IDA Business Park, which discharges to the Loughmore Canal. Refer to Appendix C for a list of activities currently being undertaken at the business park and associated potential contaminants of concern.

S2. Other Connections

The road and other business with connections to sewer main. Run-off from the road could include petroleum hydrocarbons from spills, mineral oil from leaks, salt applied during winter months and residues from the rubber in vehicle tyres.

S3. Breakers yard

There may have been historical spills of petroleum hydrocarbons, break fluids, lubricating oils or leaks from containers.

S4. Deposition of contaminated sediments from dredging

It is understood that the IDA have undertaken dredging of sediments from the canal. The dredged sediments were placed on the banks of the canal. Sediment samples collected by Tetra Tech have confirmed that the sediment is of reduced quality.

3.2 PATHWAYS

Pathways are how a contaminant can reach a receptor. Active pathways are primarily dependent on the physical characteristics of the site and the surrounding area between source and receptor.

P1. Surface Water and drainage;

Storm drainage from Raheen Business Park Site discharges to the storm drain Loughmore canal and subsequently the Barnakyle Stream and Barnakyle river. With reference to section 2.6.8 Groundwater and Surface Water interaction, there is a direct hydrogeological connection between the storm discharge pipe in the IDA Business Park and surface water/groundwater via the swallow hole upon which the canal was build (Tynan Environmental 2021).

P2: Flood Water and sediment deposition. As discussed in Section 2.6.8, there is a link between surface water and groundwater. There is a turlough mapped in the vicinity of the canal which means that the area is prone to groundwater flooding

P3. Dermal contact/Ingestion of contaminated soils determined to be present on the banks of the canal by grazing animals.

P4: Migration of flood / canal waters into swallow hole. As discussed in Section 2.6.8, there is a link between surface water and groundwater. There is a turlough mapped in the vicinity of the canal which means that the area is prone to groundwater flooding

P5. Contaminated sediments remobilised during high flow events. Flow monitoring undertaken by LCC (2022) confirmed a periodic pulse flow was noted from the canal at regular 50-minute intervals which lasted 10-15mins each in duration.

P6: Migration through karstic aquifer- Vertical migration through the swallow hole and further migration via the Limerick City Southwest Groundwater Body (GWB).

3.3 RECEPTORS

Receptors are defined by their potential for being adversely affected by a contaminant and can be grouped into those that impact human health, and those that affect environmental targets, including controlled waters and sensitive ecological sites.

R1. Loughmore Common - grazing lands and associated livestock. Potential for deposition of suspended solids or contaminants via receding flood waters and/or disposition of dredged material, subsequent plant uptake and ingestion of grass / solids. This receptor is considered to be of High Sensitivity.

R2. Fish, invertebrates and any dependent connected wildlife

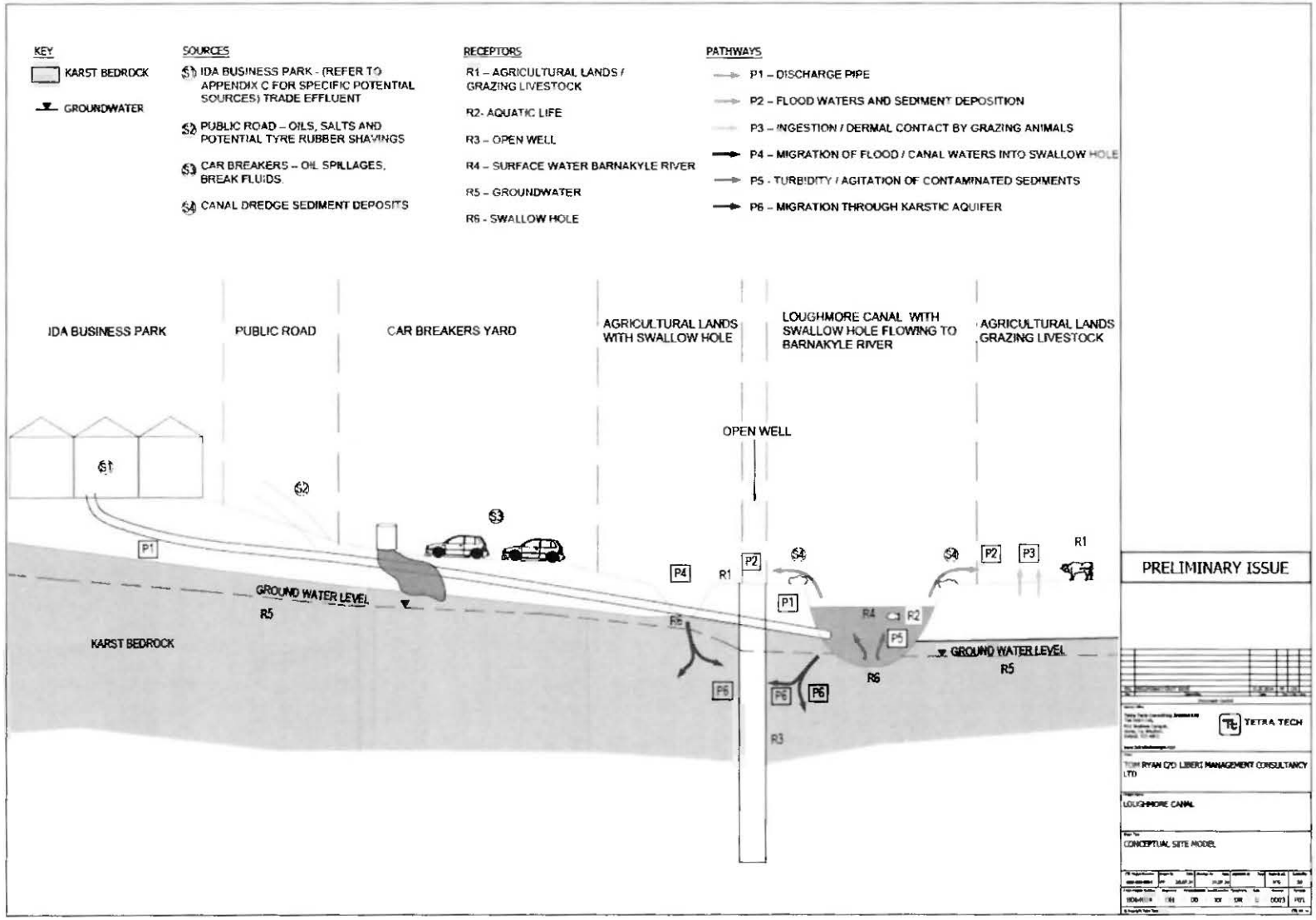
R3 Open wells identified close to Barnakyle stream, may draw water from the stream depending on their construction

R4. Surface Watercourse - The nearest WFD classified surface watercourse belongs to the Barnakyle River network which the Loughmore canal discharges. This receptor has protection under Irish statues and WFD as such is considered to be of high sensitivity. Loughmore canal may be an artificial waterbody but it too has water quality & habitat obligations under the WFD as such is considered high sensitivity receptor.

R5/R6. Groundwater/Swallow Hole - The bedrock underlying the site is shown to be Visean Limestones (undifferentiated) which is classified as a Locally Important Aquifer. Groundwater vulnerability at the site is classified as High. Loughmore Canal itself is classified to have 'Rock at or near Surface' or 'Karst'. This receptor is considered to be of High sensitivity.

The CSM is presented in graphical format, in Figure 3.1 below:

Figure 3.1: Conceptual Site Model (CSM)



4.0 FIELD WORK

The following section will outline the sampling work carried out by Tetra Tech on 7th May 2024.

4.1 SAMPLING

4.1.1 Sampling Locations

4.1.1.1 Soil & Sediment Samples

Contamination in the form or organic, inorganic and metals compounds may exist in in phases of matter, either solid, liquid or gas. The relationship between a substance phase and the interaction between different media is varied per substance and typically dependant on temperature or pressure. Sediment samples were taken by Tetra Tech as part of this investigation as some contaminants may be deposited (adsorbed or absorbed) in sediment rather than remaining dissolved in the water. Therefore, if contamination is not detected or detected at low levels in water, it may be present, persist and/or accumulate in sediment. Some contaminants are often found in higher concentrations in sediments as opposed to those concentrations reported in dissolved phase in water as contaminants. In the dissolved phase, contaminant are typically attenuated vis dilution and dispersion and can be mobile in the water, whereas where a contaminant drops out of solution into the solid phase it will be precipitated as a sediment. In some instances, this sediment may float in other they will sink, settle and accumulate at the base of a waterbody. By sampling the sediment material in the canal, the aim was to determine if there was a residual mass of contaminant that had been deposited at the base of the canal.

Where contaminants are discharged to water intermittently or via pulsed higher flow events, it can be difficult to sample during the discharge event as such the contaminant loading may have passed the monitoring point prior to sampling and naturally attenuated via dilution and dispersion in water. Sediment sampling can in many instances be more representative of contaminative status as contaminant will more readily accumulate and persist in the sediment matrix. Soil and sediment sampling can typically retain contaminations for longer periods compared to water as substances can disperse or degrade more rapidly in the dissolved phase.

Garland Consulting emailed the IDA on the 16/11/2022 in relation to high levels of zinc 2,000mg/kg in a sediment sample collected on behalf of the IDA at Loughmore Canal. However, there was no reference to sediment samples in the reports which were provided to Tetra Tech.

Sediment sampling has been conducted by Tetra Tech, to get a more comprehensive understanding of the contamination (if any) in both the soil and sediment matrix.

The locations of soil and sediment samples taken are presented on Figure 4-1. The soil and sediment sampling focused on the portion of Loughmore Canal nearest the outflow from drain flowing from the Raheen business park and the nearby banks of the Loughmore Canal and adjacent fields in Loughmore Common. The sample ID's have been listed on Table 99, along with the material sampled and location description. There were two sediment samples taken offsite upstream (US1 and US2) in Barnakyle River to act as reference for natural sediment quality. Similarly, there were two background soil samples (BLS1 and BLS2) taken in the field in Loughmore Common to act as a reference for natural soil quality. The location the samples were taken is shown on Figure 4-2.

Table 9 – Soil & Sediment Sample Inventory

Sample ID	Type	Description
BLS1	soil	Field in Loughmore Common north of the canal
BLS2	soil	Field in Loughmore Common south of the canal

SL1	soil	Bank of the canal
SL2	soil	Bank of the canal
SL3	soil	Bank of the canal
SL4	soil	Bank of the canal
SWD1	sediment	Sediment near the drain outflow
SWD2	sediment	Sediment near the drain outflow
US1	sediment	Upstream sediment sample
US2	sediment	Upstream sediment sample

4.1.1.2 Surface Water Samples

Two surface water samples (SWD1 & SWD2) were taken from the portion of Loughmore Canal nearest the outflow from drain flowing from the Raheen business park, the location of which are shown on Figure 4-2. Two sample (US1 & US2) were taken upstream from Barnakyle River at location shown on Figure 4-2 to provide a reference for background surface water quality.

Figure 4-1: Soils & Sediment Sampling Locations

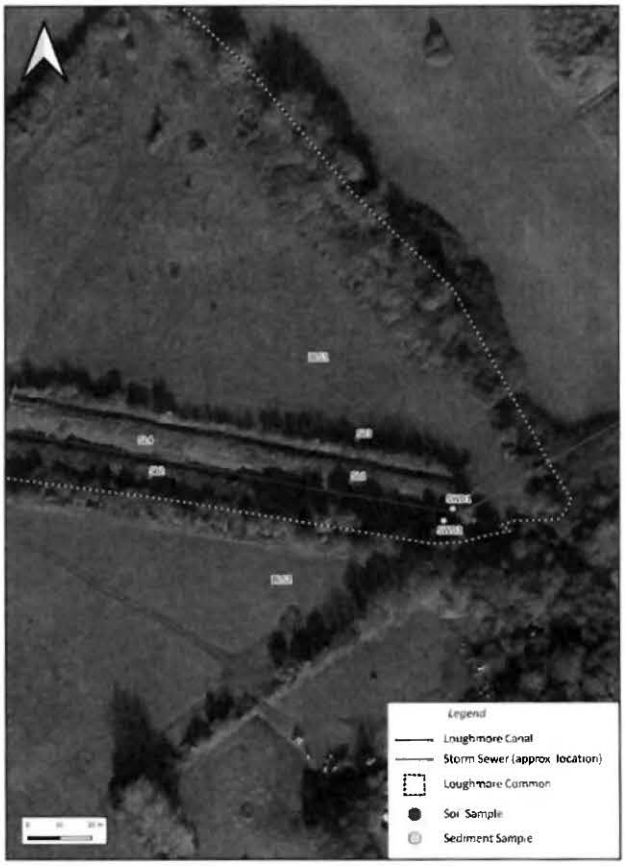


Figure 4-2: Surface Water Sampling & Sediment Sample (US2) Locations

4.1.2 Sampling Methodology and Handling

Soil & sediment samples were taken and transferred into the laboratory provided containers at each investigation location as outlined in Section 4.1.1.1. Description of the soils and of any visual and olfactory indicators of contamination and (in line with current good practice guidance were recorded.

Water samples taken could be described as grab samples and were taken using container on the end of a pole. = Samples requiring field filtering, were filtered using filters and syringes provided by Laboratory. Sampling equipment was decontaminated between sampling locations.

The samples were stored in the appropriate containers provided by the laboratory and transported in cooler boxes with ice packs to maintain appropriate temperatures. The cooler boxes were sealed and travelled under chain of custody documentation. The testing was carried out in UKAS accredited laboratory.

Soil & Sediment samples were tested for the following parameters.

- Heavy metals.
- Total phenols.
- Polycyclic Aromatic Hydrocarbons (PAHs).
- Volatile Organic Compounds (VOCs).
- Semi-Volatile Organic Compounds (SVOCs).
- Speciated Total Petroleum Hydrocarbons (TPH-CWG incl. BTEX); and,
- Several inorganic parameters

Water samples underwent the following suites of analysis:

- Heavy metals.
- Total phenols.
- Polycyclic Aromatic Hydrocarbons (PAHs).
- Volatile Organic Compounds (VOCs).
- Semi-Volatile Organic Compounds (SVOCs).
- Speciated Total Petroleum Hydrocarbons (TPH-CWG incl. BTEX).
- Several inorganic parameters including ammoniacal Nitrogen, phosphorous and suspended solids.

The laboratory analytical report for the analysis of the samples is provided in Appendix D.

5.0 RESULTS AND DISCUSSION

5.1 ASSESSMENT OF SOIL & SEDIMENT ANALYTICAL DATA

The collated results following the laboratory analysis of the soil and sediment samples are presented on a Screening Table in Appendix E. The analytes have been screened for substances considered hazardous substances and non-hazardous substances under Groundwater Regulations (2010, amendments 2012 & 2016) and classification included on Screening Table presented in Appendix E. Additionally EPA ranges for trace elements for non-polluted agricultural soils from Table 2.3 of EPA (2002)[11] has been included on the screening sheet. Careful consideration has been given to considering the appropriate criteria to assess the analytical data from laboratory analysis of the soil and sediment samples and risk that a contaminant may pose to receptors.

Human Health

For assessing the risk to human health EPA 2013[12] endorsed the use soil screening, based on the UKEA Contaminated Land Exposure Assessment (CLEA) model, either produced by the UKEA itself (known as Soil Guideline Values/SGVs) or values generated using the CLEA model by reputable third-party organisations such as Land Quality Management (LQM). The SGVs are based on number of land use scenarios (conceptual models) such as residential property with vegetable garden, commercial or public parks. Loughmore Common is not accessible to public and no vegetables are grown in the common area, as such the SGVs for assessing risk to human health are not appropriate.

Livestock / Farm Animals

The aforementioned SGVs do not provide a scenario to assess risks to grazing animals. Horses were observed on the common at the of sampling, see Plate 1 in Section 2.2.1.

Sediments & Soils

The National Water Forum is the only statutory stakeholder body established to advise the Minister on water policy and management in Ireland. National Water Forum publication regarding Legacy Sediment Contamination in the freshwater environment[13], identified the following:

- There is an Issue of legacy contamination in sediment in freshwater environment;
- Sediments acting as a reservoir for contaminants –
    - absorbing them from the water;
    - storing contaminants for decades and longer;
    - releasing contaminants back into the overlying waters;
- The absence of screening criteria and the need to establish screening criteria;
- Negative impacts on overall waterbody status, ecosystems and as drinking water source.
- Freshwater sediment is home to the rich community of benthic fauna that act as a food source for fish and, by extension, birds and mammals that feed on the fish. A view of freshwaters that omits the sediment is necessarily incomplete.

The WFD and its daughter directive the Groundwater Directive (GWD) 2006/118/EC) are given effect in Irish Statues through the groundwater regulations

- European Union Environmental Objectives (Groundwater) Regulations, 2016 (S.I. No. 366 of 2016)
- European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2012 (S.I. No. 149/2012);

[11] EPA (2002) Setting Environmental Quality Objectives for Soil, Developing a Soil Protection Strategy for Ireland

[12] EPA (2013) Guidance on The Management of Contaminated Land And Groundwater At EPA Licensed Sites

[13] The Water Forum (2021) Legacy Sediment Contamination (accessed 10/06/2024) https://thewaterforum.ie/app/uploads/2021/10/WaterForum_LegacySedimentContamination_Report_Final.pdf

- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010);

Key requirements and definitions of these regulations:

> *"The input of hazardous substances into groundwater is prohibited"; and "The input of non-hazardous substances shall be limited so as to ensure that such inputs do not cause deterioration in groundwater status or cause significant and sustained upward trends in the concentration of pollutants in groundwater",*
>
> *"The Agency shall, as it considers necessary, periodically review and publish the list of substances considered hazardous or non-hazardous, and shall prepare and make publicly available a technical report setting out the basis for the Agency's determination in relation to the substances listed therein"*

On 31st January 2018, the Joint Agencies Groundwater Directive Advisory Group (JAGDAG), which comprises the regulator from Republic of Ireland, the EPA and the UK regulatory authorities Environment Agency, Natural Resources Wales, Scottish Environment Protection Agency and Northern Ireland Environment Agency published an updated list of hazardous and non-hazardous substances[14]. The JAGDAG list of hazardous and non-hazardous substances was used to identify hazardous and non-hazardous substances of the analytical parameters presented on screening Table in Appendix E. The soil/sediment results are summarised in the following sections of the report:

5.1.1 Soil & Sediment Results

5.1.1.1 PAHs classed as Hazardous Substances

Soil Samples

All soil samples collected on the banks of the canal, SL1, SL2, SL3 and

SL4 contained PAHs, with soil sample SL1 and SL3 particularly impacted with PAHs. SL1 had the highest number of PAH compounds detected however SL3 had a higher concentration of Total PAH's. The soil samples (BLS1 & BLS2) taken from the fields, did not contain detectable concentrations of PAHs.

Sediment Samples

The offsite samples (US1 & US2) had no PAH detections. The samples (SWD1 & SWD2) nearest the drain outflow into Loughmore Canal did not contain PAHs.

5.1.1.2 VOCs classed as Hazardous Substances

Soil Samples

Soil samples taken from the canal bank at SL3 contained concentrations of toluene (7ug/kg) and o-Xylene (4ug/kg) while samples from SL4 contained concentrations of m/p-Xylene (12ug/kg) and o-Xylene (7ug/kg). No VOCS, classed as hazardous substances were detected at SL1 and SL2 on the canal bank or from the field samples (BLS1 & BLS2) however, VOCs classed as non-hazardous substances were detected and are discussed in section 5.1.3.

Sediment Samples

The offsite samples (US1 & US2) had no concentrations of VOC detected which are classed as hazardous substances. The samples (SWD1 & SWD2) nearest to the drain outflow into Loughmore Canal, did contain

[14] JAGDAG, list of hazardous substances (Accessed 11/06/2024)
https://wfduk.org/sites/default/files/Media/JAGDAG/2018%2001%2031%20Confirmed%20hazardous%20substances%20list_0.pdf

detectable concentrations of VOCs which are classed as hazardous substances. SWD1 contained concentrations of Toluene (104ug/kg) and SWD2 contained concentrations of Vinyl Chloride (29ug/kg) and Toluene (24ug/kg). VOCs classed as non-hazardous substances were detected in SWD2 and are discussed in section 5.1.3.

5.1.1.3 Metals – Hazardous & Non Hazardous substance

Soil Samples

Hazardous metals including Arsenic, Mercury, Nickel and Lead, were reported at concentrations within the background range for non-polluted agricultural soils published in EPA.

Soil samples taken from the bank of the canal at SL1(42mg/kg), SL2(43mg/kg), SL3(57mg/kg) and SL4 (64mg/kg) and the northern field BLSL1 (57mg/kg) reported marked elevated Lead **(Hazardous substance)** concentrations in comparison to the soil sample taken at the field to the south at BLS2 (28mg/kg).

Mercury concentrations **(Hazardous substance)** were reported at or below the laboratory level of detection (LOD) of 0.1mg/kg at SL1, SL2, BLS1 and BLS2, However, concentrations were marginally higher on the canal bank sampled at SL3 and SL4, with reported concentrations of 0.2mg/kg and 0.3mg/kg, respectively

Metals which are 'Non-hazardous' are discussed below as the presence in soil or sediment samples indicate impact.

Cadmium concentrations were marginally elevated above the typical range for Cadmium (Non-Hazardous) concentrations in non-polluted agricultural soils of 0.1 – 1mg/kg on the bank of the canal at SL3 and SLB4. Cadmium concentrations were reported at 1.3mg/kg at both SL3 and SL4. All other soil sample concentrations were within the typical range for metal concentrations in non-polluted agricultural soils. Cadmium concentrations reported in the fields reported concentrations at or below the laboratory LOD of 0.1mg/l.

Zinc (Non-hazardous substance) concentrations were within the typical range of non-polluted agricultural soils published by the EPA (10-200mg/kg) on the fields of Loughmore common (BLS1 & BLS2). However, Zinc concentrations were markedly higher on the banks of the canal, with reported concentrations of 350mg/kg (SL1), 255mg/kg (SL2), 559mg/kg (SL3) and 489mg/kg (SL4) in comparison to the field background samples of BLS1(51mg/kg) and BLS2(43mg/kg).

Elevated Chromium (Non Hazardous substance) concentrations were detected on the bank of canal at SL1 (128.1mg/kg), SL2(111.6mg/kg), SL3(120.3mg/kg) and SL4(129.7mg/kg) in comparison to the soil samples collected at BLS1(34.3mg/kg) and BLS2(34.8mg/kg) in the field adjacent to the north and south of the canal.

Sediment Samples

No sediment samples reported metal concentrations above the EPA background range published in 2001. However, samples taken at the drain outflow into the canal (SWD1 & SWD2) reported elevated Lead **(Hazardous substance)** concentration in comparison to those taken offsite upstream in Barnakyle River (US1 and US2)

Although Chromium (non hazardous) concentrations in sediment samples collected from the outflow of the drain at SWD1(125.8mg/kg) and SWD2 (181.5mg/kg) are within the EPA background range of 2-250mg/kg, concentrations are noticeably elevated above the concentrations reported for background samples (US1 (23mg/kg) and US2 (21.9mg/kg). These concentrations are well above Chromium levels (35-35mg/kg) published in the Soil Geochemical Atlas of Ireland[15] for County Limerick.

Copper (Non-hazardous) was detected at relatively low concentrations in samples from the offsite location US1 (6mg/kg) and US2 (9mg/kg) in comparison to those collected from the drain outflow into the canal at SWD1 (160mg/kg) and SWD2(72mg/kg) which are significantly higher.

[15] Fay, D., Kramers, G., Zhang, C., McGrath, D & Grennan, D (2007) Soil Geochemical Atlas of Ireland. Teagasc & the EPA Ireland.

5.1.2 Other Anthropogenic Compounds

Whilst these other anthropogenic compounds were not identified on lists of Hazardous substance/non-hazardous substances, their presence in soil or sediment samples indicate impact.

5.1.2.1 VOC

The samples SL1, SL2, SL3 and SL4 (banks of Loughmore Canal) BLS1 & BLS2 (fields Loughmore Common) and SWD1 & SWD2 (drain outflow into the canal) samples contained concentrations of one or more substances classed as VOC. These included chloromethane, vinyl chloride, chloroethane, cis-1,2 dichloroethene, 4-isopropyltoluene, toluene, m/p xylene and o-xylene.

5.1.2.2 SVOCs - Phenols

Soil

SL3 (soil from the canal bank) contained concentrations of 4-Methylphenol which was detected at 62ug/kg.

Sediment

SWD1 (outflow from the drain), concentrations of 4-Methylphenol were reported at a concentration of 294ug/kg.

5.1.2.3 sVOCs – Phthalates

The phthalates bis(2-ethlyhexyl)phthalate and di-n-butyl phthalate were detected at concentrations of at the surface water discharge (SWD1 and 2) and in the soil samples collected from the banks of the canal at concentrations between 1,025-,4842ug/kg for bis(2-ethlyhexyl)phthalate and 275 – 619ug/kg for di-n-butyl phthalate.

5.1.2.4 sVOCs – Petroleum Hydrocarbons

Detected Extractable Petroleum Hydrocarbons (EPH >C12-C16, EPH>C16-C21, EPH >C21-C40 (Total) and EPH >C8-C40 (Total)) concentrations have been reported in organised groupings based on the number carbon atoms in the molecule. All the samples including the offsite samples had concentrations of Extractable Petroleum Hydrocarbons indicating human impact.

Soil

EPH >C8-C40 (Total) are noticeably higher at samples taken from the canal bank at SL1 (1226mg/kg), SL2 (619mg/kg), SL3 (1641mg/kg) and SL4 (1232mg/kg) in comparison to soil samples taken from the adjacent fields, where EPH >C8-C40 (Total) concentrations were reported at 159mg/kg (BLS1) and 83mg/kg (BLS2).

Sediment

EPH >C8-C40 (Total) concentrations at the drain outflow into the canal SWD1 (797mg/kg) and SD2 (721mg/kg) are similar to those reported off site at US2 (718mg/kg). However, offsite EPH concentrations at US1 are significantly lower with a reported Total EPH >C8-C40 reported at 229mg/kg.

5.1.2.5 TPH CWG – Aliphatic / Aromatic Hydrocarbons

Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) provides concentrations of Petroleum Hydrocarbon present in groupings based on the number of carbon atoms present in their molecules but also provides further speciation of the Petroleum compounds present in sample by splitting the results into aromatic and aliphatic compounds.

Soils

Aliphatic hydrocarbons were detected in all soil samples taken from the bank, with total aliphatic hydrocarbons (c5-35) concentrations of 458mg/kg (SL1),144mg/kg (SL2), 367mg/kg (SL3) and 491mg/kg (SL4). Conversely, no aliphatic hydrocarbons were reported in offsite soils taken in the adjacent fields in Loughmore Common (BLS1 and BLS2).

Aromatics were detected in all soil samples along the bank with reported concentrations of 604mg/kg (SL1), 336mg/kg (SL2) and 461mg/kg (SL3), 531mg/kg (SL4). In comparison, soil samples taken at the fields, adjacent to the canal samples reported no aromatics detected in the southern field (BLS2) however, aromatics were reported in the field to the north in BLS1(132mg/kg).

Sediment

No aliphatic hydrocarbons were detected in the offsite sediment samples (US1 and US2), however aliphatic were detected at sediment samples collected at the outflow of the drain with total concentration reported at 128mg/kg (SWD1) and (SWD2) 135mg/kg.

Aromatic hydrocarbons were detected in all sediment samples but were notably higher in concentration at samples taken at the outflow of the drain at SWD1 (297mg/kg), SWD2(281mg/kg) and off site at US2(298mg/kg), in comparison to US1 (67mg/kg).

5.2 – LEACHATE ANALYSIS

As discussed in Section 2.4.3.5 Brendan Moore (on behalf of Tom Ryan) provided analysis results for the TRLC sample points. Leachate was prepared from two of the sediment samples collected on 8th February 2024 and underwent laboratory analysis. The results were screened against Water Quality Standards (WQS) under the Groundwater Regulations and Surface Water Regulations detailed below.

Surface Water Regulation

The laboratory data was screened against the threshold values set out in the Surface Water Regulations (2009) amendments 2019 & 2022. For the screening assessment, threshold values published from Surface Water Regulations 2022 will take precedence over 2019 threshold values, which take precedence over 2009 threshold values.

Groundwater Regulations

Due to canal and groundwater being in hydraulic continuity, the laboratory data was also assessed Groundwater Threshold Values (GTV) from the Groundwater Regulations (2009) amendments 2019 & 2022. In the absence of a GTV, Interim Guideline Value (IGV)[16] was used. Additionally, the parameter status as hazardous or non-hazardous has been included on the screening sheet.

The full screening sheet is presented in Appendix E. The substance classification as a hazardous / non hazardous classification in the groundwater regulations has been included for reference.

Hazardous substance Lead is reported at concentrations above its respective WQS. Non-hazardous pollutants Chromium (total), Copper, Nickel, Zinc and Cadmium were at concentrations above their respective WQS.

5.3 SURFACE WATER SAMPLES

5.3.1 Assessment of Analytical Data of Surface Water Samples

Selection of Water Quality Standards for screening assessment.

Drinking Water Standards

[16] EPA (2003), Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report. Environmental Protection Agency, Wexford

As discussed in Section 2.7. there are no registered abstractions on national databases from Loughmore Canal and Barnakyle stream.

There are Open Wells which, identified on the basemap of Landdirect WebViewer, (discussed in Section 2.6.11) may or may not have hydraulic continuity with Barnakyle stream or groundwater. Additionally Open Wells may be subject to contamination from overland run-off. Comparing water samples taken from Loughmore Canal to assess risk to the Open Wells would not be appropriate, until the source of water for the Open Wells is better understood and likelihood of overland flow or flood water entering Open Wells can be determined. The results of the analytical analysis of the surface water samples will not be compared against threshold values set out European Union (Drinking Water) Regulations 2023 (S.I. No. 99/2023), as it will not enhance understanding of potential risk to drinking water receptors.

Surface Water Regulation

The laboratory data from the analysis of the surface water samples screened against the threshold values set out in the Surface Water Regulations (2009) amendments 2019 & 2022. For the screening assessment, threshold values published from Surface Water Regulations 2022 will take precedence over 2019 threshold values, which take precedence over 2009 threshold values.

Groundwater Regulations

Due to canal and groundwater being in hydraulic continuity, the laboratory data from the analysis of samples from the canal were also assessed Groundwater Threshold Values (GTV) from the Groundwater Regulations (2009) amendments 2019 & 2022. In the absence of a GTV, Interim Guideline Value (IGV)[17] was used. Additionally, the parameters status as hazardous or non-hazardous has been included on the screening sheet.

All the data available to TetraTech at the time of writing this report was assessed. The samples included in this assessment have been taken by different entities and the samples have not undergone the same analysis as such the determinants are not consistent throughout each of the sampling events. This study has focused on samples from the Outflow, the canal and baseline samples collected from upstream (water and sediment) and the fields adjacent to the canal.

5.3.2 Outflow Samples

The full screening sheet of laboratory data for water samples taken at the outflow is presented in Appendix F. Chromium ()Hazardous), Lead (Hazardous substances), copper (non-hazardous) and Nickel (non-hazardous) has been present in the water samples at the outflow. Nutrients (Ammonia & Phosphate) are also detected in the outflow samples and are classed as Non-hazardous pollutants. The PAH compounds fluorene (non hazardous), pyrene (hazardous) and fluoranthene (hazardous) were all detected in the outflow samples collected by Tetra Tech in May 2024.

5.3.3 Loughmore Canal Samples

The full screening sheet of laboratory data for water samples taken from the canal is presented in Appendix F.

Two substances classed as hazardous substances (Lead and Chloroform) were detected in water samples taken from the canal. Nutrients ammonia (various tests) and phosphate (orthophosphate) were also detected in water samples collected from the canal.

The BOD for samples from the canal also frequently exceeded the WQS, indicating an issue for species that would depend on dissolved oxygen in the canal.

The electrical conductivity was frequently high, **Error! Reference source not found.** shows there was several samples with readings above the IGV 1000 µS/cm, this could be related to road salt run-off entering the canal

[17] EPA (2003), Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report. Environmental Protection Agency, Wexford

via storm strain. TPH compounds in the following ranges were detected in samples from the canal TPH (C21-C30), TPH (C30-C35), TPH (C35-C40), TPH (C16-C21), Sum of TPH (C10-C40) and Total Petroleum Hydrocarbons (> C5 - C44). These were detected on 08/06/2021, 30/03/2022, 01/04/2022, 19/04/2022, 20/04/2022, 27/05/2022 and 22/12/2021. These detections of TPH compounds could be potentially from the outflow or may have dissolved from the TPH detected in the sediments in the canal.

5.4 BARNAKYLE STREAM SAMPLES

The full screening sheet of laboratory data for water samples taken from Barnakyle Stream Samples is presented in Appendix F.

Background concentrations for zine in the Barnakyle Stream were determined to be 4ug/L for Zinc.

The upstream sample (US1) on the Barnakyle Stream (see Figure 4-2) taken by Tetra Tech on 7th May 2024, had one detection for Free Cyanide, 0.04mg/l at US1. US2 had no detection for Free Cyanide.

The sample taken on 2nd November 2021 Upstream of confluence of Barnakyle Stream with Loughmore Canal was above the WQS for Ammoniacal Nitrogen, likely due to nearby agricultural land use.

5.5 CONCLUSION

Samples analysed from Loughmore Common and upstream at Barnakyle Stream had generally lower concentrations for metals, PAH, VOC`s and hydrocarbons in comparison to those taken at the outflow of the drain at Raheen Business Park and the nearby banks of Loughmore Canal (previously discussed in Section 5.1).

There are currently no threshold values published to determine safe levels for these substances in freshwater sediments however, EPA ranges for trace elements for non-polluted agricultural soils were used as a proxy with all Hazardous substances below or within the EPA ranges. Chromium a non-hazardous pollutant under the JAGDAG marginally exceeded the EPA range for non-polluted agricultural soils at SL3 and SL4.

It is noted the elevated contaminant concentrations detected within this assessment closely correlate to the DoE industry profile list of anticipated contaminants when compared to onsite activities within the Raheen business park.

PAHs classed as Hazardous Substances, as previously discussed (Section 5.1) were reported to be present in soil samples taken from the bank of Loughmore Canal. Notably concentrations of 2-Methylnaphthalene were detected in SL1 and SL3 which is potentially linked to pesticides or plastic production. VOC's were reported in both the sediment and soils samples however, only soil samples on the canal bank at SL3 & SL4 contained VOCs classified as 'Hazardous substances'.

The impacted soils detected on the canal bank and Loughmore Common pose a potential risk to grazing animals, farmers or people working on the canal. The results indicate that the nature of the contamination is largely anthropogenic in origin and classified as organic contaminations which would typically result from trade effluent or industrial activity.

The sediments along the base of the canal act like a reservoir for contaminants to bioaccumulate over time. A number of contaminants including VOCs, metals (lead, chromium, copper), phenols, phthalates and hydrocarbons. The canal has been dredged in the past, and this is likely why the soils sampled from the banks of the canal have these anthropogenic compounds present as it is reported that the dredged material was deposited on the banks of the canal.

The water in Loughmore Canal is in continuity with groundwater (see section 2.6.8), via swallow hole and diffuse flow over the length of the canal. As such there is potential for Hazardous substances and non-hazardous substances present in the waters or sediments to enter groundwater via these hydrogeological connections. The aim of the WFD is prevent the entry of hazardous substances into groundwater and reduce or limit the entry of non-hazardous substances.

5.6 RECOMMENDATIONS

It is recommended that further works are required to understanding the potential sources of anthropogenic hazardous substances in the discharge into the Loughmore canal. This will require understanding all connections to the storm drain including any potential misconnections to the foul drain arising within the Raheen Business Park.

The extents of the impacted water, sediment and soil impacts are not fully understood, as such sampling plan should be developed to further understand that scale of the impact. The sampling plan at the Loughmore Canal should include taking samples along the length of canal, the canal banks and include further testing of additional soils samples in Loughmore Common.

A continuous sampler (auto sampler) could be deployed to the outflow from the storm sewer into Loughmore Common and at strategic points in the drainage network from the Raheen Business Park site, as other connections could be contributing to the sporadic events when concentrations of contaminants are high.

Installation of groundwater monitoring wells at the site to determine the scale and nature of any potential impact to groundwater.

APPENDICES

APPENDIX A – REPORT CONDITIONS

Tetra Tech Consulting Ireland Limited

Terms of Appointment for Consultant's Appointment (Environment)

TETRA TECH

1 General

1.1 These Terms of Appointment and the attached and/or relevant fee letter (if any) (the "**Fee Letter**") shall constitute the entire contract between the Client and the Consultant (**"the Contract"**) in respect of the relevant Services.

1.2 This Contract shall apply in preference to and supersede any previous terms and conditions referred to, offered or relied upon by the Client, whether in writing or otherwise, in relation to the Services.

1.3 This Contract shall be governed by and construed and interpreted in accordance with the laws of Ireland.

1.4 Without prejudice to any right of either party to refer a payment dispute to adjudication under the Construction Contracts Act 2013, the courts of Ireland have non-exclusive jurisdiction to hear and decide any suit, action or proceedings and to settle any disputes that may arise out of or in connection with the Contract and, for these purposes, each party irrevocably submits to the non-exclusive jurisdiction of the courts of Ireland.

2 Definitions

The following definitions shall apply to this Contract:

"Additional Services" means any services undertaken by the Consultant beyond the Services which are instructed by the Client pursuant to the Fee Letter and/or these Terms of Appointment.

"Client" means the organisation identified as the client in the relevant Fee Letter.

"Consultant" means Tetra Tech Consulting Ireland Limited (Company #665968) of Unit 13, Classon House, Dundrum Business Park, Dundrum, Dublin, Ireland.

"**Contract**" has the meaning described in clause 1.1

"**Contractor**" means a contractor (if any) appointed by the client to execute, co-ordinate and supervise or procure the execution, coordination and supervision of all or part of the Works.

"**Fee Letter**" has the meaning described in clause 1.1

"Fees" means the fees for the performance of the Services and Additional Services if any, as specified in the Fee Letter (or as otherwise agreed between the Consultant and the Client pursuant to the Contract).

"**Individual**" means any employee or member of the Consultant, including any officer or director of a company.

"Insolvency" means if a party is unable to pay its debts within the meaning of section 570 of the Companies Act 2014, summons a meeting of its creditors, makes a proposal for or becomes subject to a voluntary arrangement, has a receiver, manager, administrative receiver or examiner appointed over any of its assets, has passed a resolution for its winding-up (except for the purpose of a voluntary reconstruction or amalgamation previously approved in writing by the other party), is subject to a petition presented to any court for its winding-up (except for the purpose of a voluntary reconstruction or amalgamation previously approved in writing by the other party), has a provisional liquidator appointed or has any other analogous insolvency proceedings initiated against it whether in Ireland or any other jurisdiction.

"**party**" means each of the Client and/or the Consultant as applicable (and "**parties**" shall be construed accordingly).

"**contested payment notice**" has the meaning described in clause 5.5.

"**Payment Claim Notice"** has the meaning described in clause 5.2

"**payment claim date**" has the meaning described in clause 5.2.

"**payment due date**" has the meaning described in clause 5.2.

"**Report**" means the document prepared by the Consultant reporting on the services.

"Services" means the initial services described in the Fee Letter, together with any Additional Services instructed pursuant to the Fee Letter and/or these Terms of Appointment.

"**Standard of Care**" means the standard described in clause 3.1.

"**Site**" means the site stipulated as such on the attached Fee Letter subject to clarification at the start of the Services.

"**Terms of Appointment**" means these conditions of contract.

"Works" means the works, project and/or scope set out (or referred to) in the Fee Letter in connection with which the Client has engaged the Consultant to perform the Services.

3 Obligations of the Consultant

3.1 The Consultant shall exercise reasonable skill, care and diligence in the performance of the Services (the **"Standard of Care"**). If in the performance of the services the Consultant has discretion exercisable as between the Client and any contractor, the Consultant shall exercise that discretion fairly.

3.2 The obligations of the Consultant do not include a duty to advise as to the actual or possible presence of pollution or contamination or deleterious materials or asbestos or as to the risks of such matters having occurred, being present or occurring in the future unless the provision of such advice is specifically detailed within the Services.

3.3 The Consultant may at its discretion sub-contract the performance of any of the Services to an appropriate sub-consultant. The Consultant shall be responsible for the performance of any of the Services by any sub-consultant and the payment of any such sub-consultant.

3.4 The Consultant shall not be responsible for detailed design by contractors or sub-contractors appointed by (or on behalf of) the Client or liable for defects in or omissions from such detailed design.

3.5 Except to the extent that the Consultant is prevented from doing so by to conditions beyond its reasonable control, the Consultant shall use the Standard of Care to perform the Services in accordance with the programme agreed between the Consultant and Client if any and any subsequent programmes agreed between the Consultant and the Client.

4 Obligations of the Client

4.1 The Client shall use its reasonable endeavours to provide to the Consultant without charge and in such time so as not to delay or disrupt the performance of the Services by the Consultant all necessary and relevant data and information in the possession of the Client, its agents, servants, other consultants or contractors and give such assistance and make such decisions as shall reasonably be required by the Consultant in the performance of the Services and the Consultant shall be entitled to rely on such data, information, assistance and decisions. The Consultant shall be entitled to rely on the accuracy of such data and information and the Consultant shall be entitled to use in the Services and/or refer to in

the Services such data and information. The Consultant shall not be responsible for such data and information or liable for defects or omissions from it.

4.2 The Client shall appoint Contractor(s) and require that the Contractors execute the Works in accordance with the terms of the relevant contract. Neither provision of site staff nor periodic visits by the Consultant or its staff to the Site shall in any way affect the responsibilities of the Contractors or any sub-contractors for constructing the Works in compliance with the relevant contract documents and any instructions issued by the Consultant.

4.3 The Client shall provide the Consultant with such access to the Site and any facilities as may be reasonably required by the Consultant for the purposes of performing the Services.

4.4 The Consultant will prepare a Report based on the Services undertaken at the Site on the dates specified in the Report. The Client acknowledges that the Report may not be relied upon as an indication of the condition of the Site on any other dates.

4.5 The Client acknowledges that the Consultant will not undertake the Services in respect of, and that the Report will not cover, any:

4.5.1 area which the Consultant cannot access; and/or

4.5.2 material which is hidden.

5 Payment

5.1 Payment by the Client to the Consultant for the performance of the Services shall comprise the Fees and expenses as set out in the Fee Letter.

5.2 The Consultant shall send an invoice (a "**Payment Claim Notice**") to the Client no more often than monthly (or such other period stated in the Fee Letter) for each instalment and/or portion of the Fees and other sums payable under this Contract. Each Payment Claim Notice shall specify the sum which the Consultant considers will become due on the payment claim date and the basis on which that sum is calculated. Payment due to the Consultant under this Contract shall become due 5 days after submission of the Payment Claim Notice (the "**payment claim date**"). Unless another date is stated in the Fee Letter, the final date for payment shall be 28 days after the relevant payment claim date (the "**payment due date**"). Interest on any late payment shall be calculated in accordance with the European Communities (Late Payment in Commercial Transactions) Regulations 2012 (as amended).

5.3 The Consultant's Payment Claim Notice under clause 5.2 shall be the payment claim notice for the purposes of section 4(1) of the Construction Contracts Act 2013.

5.4 On or before the payment due date the Client shall pay to the Consultant either (i) the sum stated as due in the Consultant's relevant Payment Claim Notice issued under clause 5.2 or (ii) if and to the extent that an alternative sum is specified in a contested payment notice issued pursuant to clause 5.5, the sum that the Client reasonably considers to be due pursuant to such contested payment notice.

5.5 Not later than twenty one days after the relevant payment claim date, the Client may give the Consultant a notice that it intends to pay less than the amount specified in the Payment Claim Notice (a "**contested payment notice**"). Any contested payment notice shall specify the sum which the Client reasonably considers to be due to the Consultant on the date the notice is served, the reasons for the amount in the contested payment notice being less than the amount in the Consultant's Payment Claim Notice and the basis on which that sum is calculated. Where a contested payment notice is given, the payment to be made on or before the payment due date shall not be less than the amount stated in the contested payment notice.

5.6 All Fees are exclusive of Value Added Tax, the amount of which, at the rate and in the manner prescribed by law, shall be paid by the Client to the Consultant unless agreed otherwise.

6 Additional Payment

6.1 If the Client (acting reasonably) requests that the Consultant perform Additional Services, and/or if the Consultant has to carry out Additional Services and/or suffers delay and/or disruption in the performance of the Services for reasons beyond the Consultant's control (including any failure by the Client to comply with clauses 4.1, 4.2 and/or 4.3 and the occurrence of any event of force majeure), the Consultant shall notify the Client of the same and the Client shall make an additional payment to the Consultant in respect of all Additional Services carried out and the reasonable additional resources employed by the Consultant as a result of such delay and/or disruption.

6.2 The additional payment described in clause 6.1 shall be made in accordance with clause 5 and shall be fair and reasonable in the circumstances. The Consultant shall where practicable and if so requested by the Client give an initial estimate of the additional payment likely to be incurred.

7 Limitation of Liability

7.1 Notwithstanding anything to the contrary contained elsewhere in this Contract, and without prejudice to clause 7.2, the total aggregate liability of the Consultant under or in connection with this Contract whether in contract (including any indemnity), in tort, in negligence, for breach of statutory duty or otherwise (other than in respect of personal injury or death or fraud) shall not exceed the sum that is equivalent to the lesser of either (i) ten times (10x) the Fees or (ii) €1,000,000 (one million euros).

7.2 The Consultant's liability in respect of asbestos, mould or pollution whether in contract or in tort, in negligence, for breach of statutory duty or otherwise (other than in respect of personal injury or death) is excluded.

7.3 Without prejudice to any other exclusion or limitation of liability (including clause 7.1 and 7.4), the Consultant's liability (if any) for any damages, loss, expense, costs or other liability under (or in connection with) this Contract shall not exceed such sum as it would be just and equitable for the Consultant to pay having regard to the extent of its responsibility for the loss or damage and on the assumptions, that:

7.3.1 All other consultants, contractors, sub-contractors, project managers and advisers engaged in connection with the project for which the Services are supplied have provided contractual undertakings to the Client on terms no less onerous than those set out in clause 3.1 above;

7.3.2 There are no exclusions of or limitations of liability nor joint insurance or coinsurance provisions between the Client and any other party referred to in this clause 7.3 and any such other party who is responsible to any extent for the loss and damage is contractually liable to the Client for the loss and damage; and

7.3.3 All the parties referred to in this clause 7.3 have paid to the Client such proportion of the loss and damage which it would be just and equitable for them to pay having regard to the extent of their responsibility for the loss and damage.

7.4 Other than in respect of personal injury or death, the Consultant shall not be liable to the Client, whether in contract (including any indemnity), tort (including negligence) or restitution, or for breach of statutory duty or misrepresentation, or otherwise, for:

7.4.1 any loss of profits, loss of use, loss of goodwill, loss of revenue, incursion of financial charges or loss of contracts; and/or

7.4.2 any indirect or consequential losses or damages,

under or in connection with this Contract.

7.5 No action or proceedings under or in respect of this Contract, whether in contract (including any indemnity) or in tort, in negligence or for breach of statutory duty or otherwise shall be commenced against the Consultant after the expiry of 6 years after the completion of the Services or the termination of this Contract if earlier.

7.5 The Client agrees not to pursue any claims in contract, tort or in negligence or for breach of statutory duties or otherwise against any Individual as a result of carrying out its obligations under or in connection with this Contract at any time whether named expressly in this agreement or not.

7.6 A failure by the Consultant to fulfil its obligations under this Contract shall not be considered to be a breach of this Contract if and/or to the extent that such failure arises due to any event beyond the Consultant's reasonable control.

8 Insurance

8.1 The Consultant shall maintain public liability, employers liability and professional indemnity insurance sufficient to cover the Consultant's liabilities for each and every claim (save for claims in relation to asbestos, mould and pollution, for which such insurance shall have a limit of indemnity of such sum in the aggregate) under this Contract and for the period of six years after completion of the Services or the termination of this Contract if earlier, provided always that such insurance is available at commercially reasonable rates.

9 Rights of Third Parties

9.1 Nothing in this Contract confers or purports to confer on any third party any benefit or any right to enforce any term of this Contract.

10 Copyright, Licence and Publicity

10.1 The copyright in the Report and/or all design, reports, bills of quantities, calculations and other documents provided by the Consultant in connection with the services shall remain vested in the Consultant, but the Client shall have a non-exclusive, royalty-free licence to use the Report and/or all completed drawings and other documents issued to the Client, other consultants or contractors for the purpose of the Services. In the event of the Client being in default of payment of any Fees or other amounts due to the Consultant under this Contract, the Consultant may revoke the licence herein granted on seven days' written notice to the Client. The Consultant shall not be liable for the use by any person of the Report and/or any such drawings or documents for any purpose other than that for which the same were prepared by or on behalf of the Consultant.

11 Adjudication

11.1 Where this Contract is a construction contract within the meaning of the Construction Contracts Act 2013, either party may refer any payment dispute arising under the Contract to adjudication in accordance with the code of practice governing the conduct of adjudications current at the time of the referral of the dispute. The adjudicator shall be appointed at the request of either party by the Board of Engineers Ireland. The statement of case to be sent by the referring party to the adjudicator in accordance with that code of practice shall where reasonably possible not exceed eight single-sided sheets of A4-sized paper excluding any attachments.

12 Termination and suspension

12.1 In the event of a material breach of this Contract by either party the party who is not in breach may terminate this Contract upon not less than two weeks' written notice to the other party (provided that the defaulting party has not, during that notice period but before the expiry of it, made good and/or remedied the relevant material breach). In the event of the Insolvency of one of the parties the party who is not insolvent may terminate this Contract upon written notice to the other party.

12.2 Upon such termination the Client shall pay the Consultant all monies accrued due to the Consultant up to the date of such termination following submission of the Consultant's invoice therefore and the provisions of clause 5 of this Contract shall then apply to such payment.

12.3 Termination of the Consultant's appointment under this Contract shall not prejudice or affect the accrued rights or claims of either party.

13 Assignment

13.1 Neither party may assign or transfer any benefit or obligation under this Contract without the prior written consent of the other party.

14 Non-Solicitation

14.1 Neither party shall (except with the prior written consent of the other party) directly or indirectly solicit or entice away (or attempt to solicit or entice away) from the employment of the other party any person employed or engaged by such other party in the provision of the Services or in the receipt of the Services at any time during the period in which the Services are performed by the Consultant or for a further period of 12 months after completion of the Services or the termination of this Contract whichever is earlier, other than by means of a national advertising campaign open to all

comers and not specifically targeted at any of the staff of the other party.

15 Collateral Warranties

15.1 Where it is set out in the Fee Letter that the Consultant has agreed to provide collateral warranties, it shall be a condition of their provision that all fees due to the Consultant at the date of execution of the collateral warranty have been paid.

16 Compliance with Requirements

16.1 The Client and the Consultant shall each comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Criminal Justice (Corruption Offences) Act 2018.

16.2 Save as required by law or as may be necessary for the performance of its duties (including the carrying out and/or sub-contracting of the Services), neither party shall during or following termination of this Agreement or thereafter disclose to any third party or make use of any confidential information relating to the Works.

17 Report Conditions

The Report will be subject to a statement of relevant limits of the advice arising from practical factors such as by the extent of the investigation, the timescales and context of the agreed brief, and assessed using current UK and/or Irish risk guidelines.

18 Physical Ground Conditions

18.1 The Consultant has designed the scope of investigation for the purposes of producing the Report to meet, subject to the Standard of Care, its understanding of the Client's requirements (as defined and/or clarified in the Fee Letter) and to provide a reasonable balance between commercial and technical objectives.

18.2 The Consultant is not liable for any damages to unadopted or private and/or site specific buried services, unless the positions and nature of these services have been clearly and accurately set out and notified to the Consultant in writing by (or on behalf of) the Client reasonably in advance of the commencement of the Services.

18.3 Unless specifically stated to the contrary in the Fee Letter, the Consultant has allowed for backfilling excavations with arisings only, and not for resurfacing. Following on from backfilling, any surplus material shall be reasonably mounded over the relevant investigation location, or elsewhere on site at an agreed stockpile location. The Consultant will not be liable for any claims (other than in respect of personal injury or death) arising out of or in connection with the condition of the investigation locations thereafter. Unless otherwise stated in the Fee Letter, no allowance has been made by the Consultant for the disposal off-site of arisings.

18.4 Unless otherwise identified in the Fee Letter, the Consultant has not allowed for meeting the costs of any damage, including (but not limited to) damage to surfacing, that is necessarily caused in executing the Services. All reasonable efforts will be made by the Consultant to practically minimize any necessary damage.

18.5 Unless specifically stated in the Fee Letter, the Consultant has made no allowance for penetrating through substantial and/or unreasonable concrete, steel, rock, reinforcement, timber or other obstructions.

18.6 Any standing time in relation to the Services incurred by the Consultant due to circumstances beyond the Consultant's reasonable control, including which is attributable to the Client or his agents, or through the action of third parties with a controlling interest in the Site, which is not assumed in the Fee Letter to be included in the Fees will be charged as Additional Services in accordance with clause 6.

18.7 The Consultant shall use reasonable endeavours to keep noise, vibrations and emissions to a reasonable level in the relevant circumstances. Unless specifically advised by the Client prior to the Consultant issuing the Fee Letter, the Consultant shall require reimbursement for any requirements to instigate enhanced controls or restrictions in this respect (which shall be treated as Additional Services in accordance with clause 6).

18.8 Unless otherwise identified in the Fee Letter, the Consultant has assumed the relevant Site operations can be completed during one visit to Site, and also that they can be carried out without interruption during normal weekday working hours.

18.9 Unless otherwise instructed in writing by the Client, all samples shall be disposed of after a period of four weeks from the issue of the first version of the Report relating to those samples. Further storage would attract additional charges, which shall be treated as Additional Services in accordance with clause 6 and details of which can be supplied by the Consultant on request.

19 Counterparts

19.1 Each party may execute and (where relevant) witness the Contract using online electronic execution software. An electronic signature is conclusive evidence of a party's intention to be bound by the Contract and has the same legal validity and enforceability as a wet ink signature for all purposes.

19.2 The Contract may be executed and (where relevant) witnessed in any number of counterparts, including electronic counterparts, and by the different parties on separate counterparts, each of which when executed and delivered shall constitute an original, all the counterparts together constituting the same agreement. Transmission of an executed counterpart of the Contract, including an electronic counterpart, by email (in PDF, JPEG or other agreed format) shall take effect as delivery of an executed counterpart of the Contract and each party shall provide the others with the original of any wet ink counterpart as soon as reasonably possible thereafter.

19.3 If a party stores a duly executed copy of the Contract in an electronic format that maintains its integrity and allows unchanged reproduction of the stored information, this constitutes an original of the Contract and may be relied on as evidence of the Contract.

APPENDIX B – HISTORIC LABORATORY DATA

Sample Location	Units	Surface Water EQS Annual Average	Groundwater Threshold Values	EPA Interim Groundwater Value	Capital Water Systems 2022					LCCC Interim Report (Case 440371) Environmental Inspection of alleged pollution from Storm sewer at the Loughmore Canal									
					SP10	SP11	SP12	SP13	SP14	LCCC Sampling - Canal Discharge								IDA Sampling - MH SL09	
					Complete Laboratory Solutions - 451787					N/A									
					08/06/2021	08/06/2021	08/06/2021	08/06/2021	08/06/2021	01/02/2022	16/02/2022	01/03/2022	15/03/2022	22/03/2022	28/03/2022	04/04/2022	06/06/2022	22/04/2022	25/04/2022
Suspended Solids	mg/L	-	-	-	4	2808	7	25	4	-	-	-	-	-	-	-	-	-	-
BOD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH		Soft(3)Water 4 5< pH < 9 0 Hard(4)Water 6 0< pH < 9 0	-	≥ 6 5 and ≤9 5	7 4	6 5	7 1	7 2	7 2	-	-	-	-	-	-	-	-	-	-
Total P	mg/L	-	-	-	0 57	18	0 3	1 23	0 63	0.572	0.045	0 143	0.273	0.259	3 806	0.196	1 208	0 1	0.161
Nitrate N03	mg/L	-	37 5	25	<0 44	<0 44	<0 44	<0 44	<0 44	-	-	-	-	-	-	-	-	-	-
Ammonia NH3	mg/L	-	-	-	0 356	20 2	0 871	0 009	0 036	-	-	-	-	-	-	-	-	-	-
Ammonia as N	mg/L	-	-	0 15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	ug/l		7 5	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	ug/l	-	75	100	18	<5	<5	<5	<5	111	42	25	161	38	<3	66	50	73	181
Chrominum (total)	ug/l		37 5	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	ug/l	-	-	30	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
Nickel	ug/l			20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	ug/l	-	7 5	10	1	1	<0 5	<0 5	<0 5	-	-	-	-	-	-	-	-	-	-
Antimony	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	ug/l	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (total)	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Heavy Metals	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E. coli	ug/l	-	-	-	2030	500	400	8	4	-	-	-	-	-	-	-	-	-	-

LCC Investigation Progress Report 2023																				
Outfall									Downstream						Complete Laboratory Soutions (Report No.547438) - Water			Complete Laboratory Soutions (Report No.547438) - leachate	
BHP Labs - Lab number not provided															TRLC 001	TRLC 001A	TRLC 004	TR/LC 002	TRLC 005
30/11/2022	07/03/2023	09/05/2023	13/06/2023	04/07/2023	08/08/2023	07/09/2023	17/10/2023	08/11/2023	13/06/2023	04/07/2023	08/08/2023	07/09/2023	17/10/2023	08/11/2023	08/02/2024	08/02/2024	08/02/2024	08/02/2024	08/02/2024
<10	5.6	50	<10	13	<10	<10	42	<10	<10	<13	<10	<10	<10	<10	-	-	-	-	-
<2.7	4	3	<6.5	13	<3.2	0.8	5.6	1.2	<6.5	13	<3.2	0.9	5.4	1.3	-	-	-	-	-
<50	<50	<50	57	<50	<50	<50	<50	<50	54	<50	<50	<50	<50	<50	-	-	-	-	-
7.59	7.73	7.92	7.26	7.75	7.98	7.73	8.03	7.02	7.27	8.97	7.46	7.43	7.72	7.06	-	-	-	-	-
<0.5	0.89	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.11	0.41	0.58	-	-
<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	2.6	-	-	-	-	-
<0.122	0.15	0.39	0.38	0.48	0.19	0.61	0.27	<0.122	<0.122	<0.122	<0.122	0.59	0.39	<0.122	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.026	0.029	0.117	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	6	1	1.37	2.75
55	50	43	[illegible]	73	31	38	[illegible]	<25	26	<25	<25	<25	73	51	[illegible]	53	53	[illegible]	[illegible]
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	15	3	15.78	13.41
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	10	4	34.04	53.99
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	17	3	5.64	11.31
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	17	2	14.79	13.91
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	<0.01	<0.01
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	0.33	0.23
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5	1	20.7	6.67
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	1	<0.01	2.04
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	1.627	1.994
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	0.35	0.61
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	17	3	5.09	13.27
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	9	2	4.128	0.87
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	<0.6	<0.6	2.31	2.27
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	<0.6	<0.6	0.44	0.22
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	133	154	75	3,369	7,616
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Groundwater Threshold Values: European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (S.I. No.366 of 2016)

Surface Water (Freshwater) EQS (AA) : European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2019 (S.I. No.77 of 2019)

Environment Protection Agency (EPA) Interim Guideline Value (IGV): Towards setting guideline values for the protection of groundwater in Ireland. Interim Report

In the legistaltion where a range was given, the lowest value was applied.

Sample Location	Units	Surface Water EQS Annual Average	Groundwater Threshold Values	EPA Interim Groundwater Value	Capital Water Systems 2022					LCCC Interim Report (Case 440371) Environmental Inspection of alleged pollution from Storm sewer at the Loughmore Canal									
					SP10	SP11	SP12	SP13	SP14	LCCC Sampling - Canal Discharge								IDA Sampling - MH SL09	
					Complete Laboratory Solutions - 451787					N/A									
					08/06/2021	08/06/2021	08/06/2021	08/06/2021	08/06/2021	01/02/2022	16/02/2022	01/03/2022	15/03/2022	22/03/2022	28/03/2022	04/04/2022	06/06/2022	22/04/2022	25/04/2022
TPH	ug/l	-	-	-	238	391	487	114	214	-	-	-	-	-	-	-	-	-	-
PCBs (sum of 7 congeners)	mg/L	-	-	0 00001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCB 28	mg/L	-	-	-															
PCB 52	mg/L	-	-	-															
PCB 101	mg/L	-	-	-															
PCB 118	mg/L	-	-	-															
PCB 138	mg/L	-	-	-															
PCB 153	mg/L	-	-	-															
PCB 180	mg/L	-	-	-															
PAH Total	ng/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (non-DW)	ug/L	-	0	0 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Groundwater Threshold Values: European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (S.I. No.366 of 2016)

Surface Water (Freshwater) EQS (AA) : European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2019 (S.I. No.77 of 2019)

Environment Protection Agency (EPA) Interim Guideline Value (IGV): Towards setting guideline values for the protection of groundwater in Ireland. Interim Report

In the legistaltion where a range was given, the lowest value was applied.

LCC Investigation Progress Report 2023																				
Outfall									Downstream							Complete Laboratory Soutions (Report No.547438) - waters			Complete Laboratory Soutions (Report No.547438) - Leachate	
BHP Labs - Lab number not provided																TRLC 001	TRLC 001A	TRLC 004	TR/LC 002	TRLC 005
30/11/2022	07/03/2023	09/05/2023	13/06/2023	04/07/2023	08/08/2023	07/09/2023	17/10/2023	08/11/2023	13/06/2023	04/07/2023	08/08/2023	07/09/2023	17/10/2023	08/11/2023		08/02/2024	08/02/2024	08/02/2024	08/02/2024	08/02/2024
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	<50	<50
																<2	-	<2	<0.000034	<0.000034
																<2	-	<2	<0.000028	<0.000028
																<2	-	<2	<0.000034	<0.000034
																<3	-	<3	<0.000050	<0.000050
																<2	-	<2	<0.000037	<0.000037
																<2	-	<2	<0.000030	<0.000030
																<3	-	<3	<0.000047	<0.000047
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		35	604	9	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		<5	-	<0.5	<50	-

Sample Location	Units	Surface Water EQS Annual Average	Groundwater Threshold Values	EPA Interim Groundwater Value	Complete Laboratory Soutions (Report No.547438)	
					TRLC 001	TRLC 004
					08/02/2024	08/02/2024
1,2,4-Trichlorobenzene	mg/L	-	-	-	<0.0010	<0.00010
1,2-Dichlorobenzene	mg/L	-	-	-	<0.0010	<0.00010
1,3-Dichlorobenzene	mg/L	-	-	-	<0.0010	<0.00010
1,4-Dichlorobenzene	mg/L	-	-	-	<0.0010	<0.00010
2,4-Dinitrotoluene	mg/L	-	-	-	<0.010	<0.0010
2,6-Dinitrotoluene	mg/L	-	-	-	<0.010	<0.0010
2-Chloronaphthalene	mg/L	-	-	-	<0.0010	<0.00010
2-Methylnaphthalene	mg/L	-	-	-	<0.0010	<0.00010
4-Bromophenyl phenyl ether	mg/L	-	-	-	<0.010	<0.0010
Acenaphthene	mg/L	-	-	-	<0.0010	<0.00010
Acenaphthylene	mg/L	-	-	-	<0.0010	<0.00010
Anthracene	mg/L	0.0001	-	10	<0.0010	<0.00010
Benz(a)anthracene	mg/L	-	-	-	<0.0010	<0.00010
Benzo(a)pyrene	mg/L	0.00027	-	0.00001	<0.0010	<0.00010
Benzo(b)fluoranthene	mg/L	-	-	0.005	<0.0010	<0.00010
Benzo(ghi)perylene	mg/L	-	-	-	<0.0010	<0.001
Benzo(k)fluoranthene	mg/L	-	-	-	<0.0010	<0.0001
Benzyl butyl phthalate	mg/L	-	-	-	<0.010	<0.0001
Bis(2-chloroethoxy)methane	mg/L	-	-	-	<0.010	<0.0001
Bis(2-chloroethyl)ether	mg/L	-	-	-	<0.010	
Bis(2-ethylhexyl)phthalate	mg/L	-	-	-	<0.010	
Bis(chloroisopropyl)ether	mg/L	-	-	-	<0.010	-
Bis(2- chloroethoxy)methane	mg/L	-	-	-	<0.010	-
Bis(2-chloroethyl)ether	mg/L	-	-	-	<0.010	-
Bis(2-ethylhexyl)phthalate	mg/L	-	-	-	<0.010	-
Bis(chloroisopropyl)ether	mg/L	-	-	-	<0.010	-
Carbazole	mg/L	-	-	-	<0.010	-
Chrysene	mg/L	-	-	-	<0.0010	-
Dibenzo(ah)anthracene	mg/L	-	-	-	<0.0010	-
Dibenzofuran	mg/L	-	-	-	<0.0010	-
Diethylphthalate	mg/L	-	-	-	<0.010	-
Dimethylphthalate	mg/L	-	-	-	<0.010	-
Di-n-butylphthalate	mg/L	-	-	-	<0.050	-
Di-n-octyl phthalate	mg/L	-	-	-	<0.010	-
Diphenylamine	mg/L	-	-	-	<0.010	-
Fluoranthene	mg/L	-	-	-	<0.0010	-
Fluorene	mg/L	-	-	-	<0.0010	-
Hexachlorobenzene	mg/L	0.00005	-	0.00003	<0.0010	-
Hexachlorobutadiene	mg/L	0.0006	-	0.0001	<0.0010	-
Hexachloroethane	mg/L	-	-	-	<0.010	-
Indeno(1,2,3-cd)Pyrene	mg/L	-	-	-	<0.0010	-
Isophorone	mg/L	-	-	-	<0.010	-
Naphthalene	mg/L	-	-	-	<0.0010	-
Nitrobenzene	mg/L	-	-	-	<0.010	-
n-Nitroso-di-n-propylamine	mg/L	-	-	-	<0.010	-
Phenanthrene	mg/L	-	-	-	<0.0010	-
Pyrene	mg/L	-	-	-	<0.0010	-
o-xylene	mg/L	-	-	-	0.3283	-
2,4,7,9-Tetramethyl-5-decyn-4,7-diol	mg/L	-	-	-	0.03359	-
Benzyl 2-chloroethyl sulfone	mg/L	-	-	-	-	0.002
2,4,7,9-Tetramethyl-5-decyn-4,7-diol	mg/L	-	-	-	-	0.004

Groundwater Threshold Values: European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (S.I. No.366 of 2016)

Surface Water (Freshwater) EQS (AA) : European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2019 (S.I. No.77 of 2019)

Environment Protection Agency (EPA) Interim Guideline Value (IGV): Towards setting guideline values for the protection of groundwater in Ireland. Interim Report

In the legistaltion where a range was given, the lowest value was applied.

Sediment Sample Location	TR/LC 002	TRLC 005	Units
	08/02/2024	08/02/2024	
1,1,1,2-tetrachloroethane (Solid) VOC	<1	<1	mg/kg
1,1,1-Trichloroethane (Solid) VOC	<1	<1	mg/kg
1,1,2,2-Tetrachloroethane (Solid) VOC	<1	<1	mg/kg
1,1,2-Trichloroethane (Solid) VOC	<1	<1	mg/kg
1,1-Dichloroethane (Solid) VOC	<1	<1	mg/kg
1,1-Dichloroethene (Solid) VOC	<1	<1	mg/kg
1,1-Dichloropropene (Solid) VOC	<1	<1	mg/kg
1,2 Dichlorobenzene (Solid) VOC	<1	<1	mg/kg
1,2 Dichloropropane (Solid) VOC	<1	<1	mg/kg
1,2,3-Trichlorobenzene (Solid) VOC	<1	<1	mg/kg
1,2,3-Trichloropropane (Solid) VOC	<1	<1	mg/kg
1,2,4-Trichlorobenzene (Solid) VOC	<1	<1	mg/kg
1,2,4-Trimethylbenzene (Solid) VOC	<1	<1	mg/kg
1,2-Dibromo-3-chloropropane (Solid) VOC	<1	<1	mg/kg
1,2-Dibromoethane (Solid) VOC	<1	<1	mg/kg
1,2-Dichloroethane (Solid) VOC	<1	<1	mg/kg
1,3,5-Trimethylbenzene (Solid) VOC	<1	<1	mg/kg
1,3-Dichlorobenzene (Solid) VOC	<1	<1	mg/kg
1,3-Dichloropropane (Solid) VOC	<1	<1	mg/kg
1,2-Dichlorobenzene	<1	<1	mg/kg
1,4-Dichlorobenzene (Solid) VOC	<1	<1	mg/kg
2,2-Dichloropropane (Solid) VOC	<1	<1	mg/kg
2-Chlorotoluene (Solid) VOC	<1	<1	mg/kg
4-Chlorotoluene (Solid) VOC	<1.00	<1.00	mg/kg
Benzene (Solid) VOC	<1	<1	mg/kg
Bromobenzene (Solid) VOC	<1	<1	mg/kg
Bromochloromethane (Solid) VOC	<1	<1	mg/kg
Bromodichloromethane (Solid) VOC	<1	<1	mg/kg
Bromoform (Solid) VOC	<1	<1	mg/kg
Bromomethane (Solid) VOC	<1.00	<1.00	mg/kg
BTEX Total (Solid) VOC	<1	<1	mg/kg
Carbon tetrachloride (Solid) VOC	<1	<1	mg/kg
Chlorobenzene (Solid) VOC	<1	<1	mg/kg
Chloroethane (Solid) VOC	<1	<1	mg/kg
Chloroform (Solid) VOC	<1	<1	mg/kg
Chloromethane (Solid) VOC	<1	<1	mg/Kg
cis-1,2-Dichloroethene (Solid) VOC	<1	<1	mg/kg
cis-1,3-Dichloropropene (Solid) VOC	<1	<1	mg/kg
Dibromochloromethane (Solid) VOC	<1	<1	mg/kg
Dibromomethane (Solid) VOC	<1	<1	mg/kg
Dichlorodifluoromethane (Solid) VOC	<1	<1	mg/kg
Dichloromethane (Solid) VOC	<1.00	<1.00	mg/kg
Ethylbenzene (Solid) VOC	<1	<1	mg/kg
Hexachlorobutadiene (Solid) VOC	<1	<1	mg/kg
Isopropylbenzene (Solid) VOC	<1.00	<1.00	mg/kg
m- + p-Xylene (Solid) VOC	<1	<1	mg/kg

Naphthalene (Solid) VOC	<1	<1	mg/kg
n-Butylbenzene (Solid) VOC	<1	<1	mg/kg
n-Propylbenzene (Solid) VOC	<1.00	<1.00	mg/kg
o-Xylene (Solid) VOC	<1	<1	mg/kg
p-Isopropyltoluene (Solid) VOC	<1	<1	mg/kg
sec-Butylbenzene (Solid) VOC	<2.5	3.1	mg/kg
Semi VOC (Solid)	<1	<1	mg/kg
Styrene (Solid) VOC	<1	<1	mg/kg
tert-Butylbenzene (Solid) VOC	<1	<1	mg/kg
Tetrachloroethene (Solid) VOC	<1.00	<1.00	mg/kg
Toluene (Solid) VOC	<1	<1	mg/kg
trans-1,2-Dichloroethene (Solid) VOC	<1	<1	mg/kg
trans-1,3-Dichloropropene (Solid) VOC	<1	<1	mg/kg
Trichloroethene (Solid) VOC	<1	<1	mg/kg
Trichlorofuoromethane (Solid) VOC	<1	<1	mg/kg
Vinyl Chloride (Solid)	<1	<1	mg/kg
Xylene	-	-	mg/kg

APPENDIX C – SUMMARY OF INDUSTRIAL LAND USES AND POTENTIAL CONTAMINANTS OF CONCERN

Company Name	Distance from Loughmore Canal (metres)	Location Coordinates	Industry type	Potential Contaminants of Concern	EPA licence number
Raheen Car Dismantlers	145	52°37'30"N 8°40'13"W	Car dismantlers	Hydrocarbons, metals, organic compounds, fuels & oils, inorganic compounds, acids, alkalis	
Empire Trade Sales Ltd	320	52°37'30"N 8°39'57"W	New & used car sales	Hydrocarbons, metals, organic compounds, fuels & oils, inorganic compounds, acids, alkalis, detergents & soaps	
Stryker Orthopaedics	590	52°37'32"N 8°39'43"W	Medical Technology Maufacturing	Metals, inorganic compunds, acids, alkalis, organic solvents, tars from primary processes,fuel oils & coal, PCB's	P0023-01/02/03
Analog Devices International	740	52°37'40"N 8°39'37"W	Electronics Manufacturing - Semiconductors	Metals, inorganic compunds, acids, alkalis, PCB's, organic solvents, halogenated compounds, mineral oils, effluent treatment chemicals	P0224-01/02/03/03/04/05
Regeneron IT	745	52°37'17"N 8°39'32"W	Pharamaceautical - Biotechnology	Metals, inorganic compunds, acids, alkalis, organic solvents, tars from primary processes,fuel oils & coal, PCB's	P0991-01/02
DPF Cleaning Ireland	980	52°37'24"N 8°39'22"W	Diesel particulate filter cleaning service	Hydrocarbons, metals, organic compounds, fuels & oils, inorganic compounds	
Novostrat Ltd	1000	52°37'16"N 8°39'14"W	Industrial Products	Metals, inorganic compunds, acids, alkalis, PCB's, organic solvents, halogenated compounds, mineral oils, effluent treatment chemicals	
Adhesives Research Ireland	1005	52°37'08"N 8°39'29"W	Chemical Manufacturing	Metal, metaloids & their compounds, inorganic compounds, organic compounds, pesticides & biocides, fuels, PCB's.	P0452-01
Ambassador Dry Cleaning	1160	52°37'29"N 8°39'10"W	Personal and Laundry Services	Detergents, mineral acids, organic compunds, metal compounds, alkalis, inorganic compunds.	
Initial Hygiene Ireland	1200	52°36'54"N 8°39'43"W	Hygiene & healthcare waste	Metals, inorganic compunds, acids, alkalis, PCB's, organic solvents, halogenated compounds, mineral oils, effluent treatment chemicals	
Rentokill Pest Control Limerick	1200	52°36'53"N 8°39'46"W	Pest control	Acids & alkalis, organic comounds, pathogens	
Abriso Jiffy Ireland	1200	52°37'15"N 8°39'13"W	Insulataion, packaging solutions	Metals & metallic compounds, inorganic compunds, acids, alkalis, PCB's, organic solvents, oils, effluent treatment chemicals	
Abrel	1200	52°37'23"N 8°39'09"W	Semiconductors	Metals, inorganic compunds, acids, alkalis, PCB's, organic solvents, halogenated compounds, mineral oils, effluent treatment chemicals	
Takumi Precision Engineering	1200	52°36'53"N 8°39'49"W	Medical, aerospace and industrial component assembly and manufacturing.	Metal & metaloids, inorganic compunds, acids & alkalis, organic compunds, detergents, scale, ash.	
Irish Pride Limerick	1300	52°36'54"N 8°39'30"W	Food manufacturer (bakery)	Metals & metallic compounds, inorganic & organic compunds, fats, acids, alkalis, PCB's, organic solvents, oils, effluent treatment chemicals	
Safety Storage Systems	1300	52°36'53"N 8°39'40"W	Chemical storage facility	Metals & metallic compounds, inorganic compunds, acids, alkalis, PCB's, organic solvents, oils, effluent treatment chemicals	
Public Health Lab	1300	52°37'13"N 8°39'10"W	Biological testing	Medical waste, fats oils & fuels, organic compounds, acids, effluent treatment chemicals	
JJ O' Toole	1300	52°37'20"N 8°39'04"W	Packaging manufacturer	Metals & metallic compounds, inorganic compunds, acids, alkalis, PCB's, organic solvents, oils, effluent treatment chemicals	
Curran Aluminium	1300	52°37'15"N 8°39'04"W	Architectural and Structural Metals Manufacturing	Alkalis, mineral acids, organic acids, oils/fuels, organic solvents, metals, metaloids	
Westrock Limerick	1350	52°37'02"N 8°39'19"W	Printing & packaging	Metals & metallic compounds, inorganic compunds, acids, alkalis, PCB's, organic solvents, oils, effluent treatment chemicals	
Anucell Biosystems	1370	52°37'17"N 8°39'04"W	Biomedical devices	Metals, inorganic compunds, acids, alkalis, organic solvents, tars from primary processes,fuel oils & coal, PCB's	
Tungco Worldwide	1400	52°36'57"N 8°39'21"W	Metal recycling	Metals & metaloids, inorganic compunds, acids, organic compunds, biodegradable items	
Global Sauces	1460	52°37'07"N 8°39'05"W	Food products manufacturing & packaging	Metals & metallic compounds, inorganic & organic compunds, fats, acids, alkalis, PCB's, organic solvents, oils, effluent treatment chemicals	
GoBia	1500	52°37'04"N 8°39'08"W	Food products manufacturing	Metals & metallic compounds, inorganic & organic compunds, fats, acids, alkalis, PCB's, organic solvents, oils, effluent treatment chemicals	
CP Ingredients	1500	52°37'05"N 8°39'07"W	Food products manufacturing	Metals & metallic compounds, inorganic & organic compunds, fats, acids, alkalis, PCB's, organic solvents, oils, effluent treatment chemicals	
Varbatim Ltd	N/A	Historical- Unit 3 Raheen Business Park	Surface Coatings	Various organic and inorganic compounds	P0036-01

APPENDIX D – LABORATORY REPORTS

Element Materials Technology
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The Hatch Lab
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Wexford
Ireland
Y25 A8H2

Attention :	Olivia Hall
Date :	7th June, 2024
Your reference :	632-B064924
Our reference :	Test Report 24/8021 Batch 1
Location :	Loughmore Canal
Date samples received :	10th May, 2024
Status :	Final Report
Issue :	202406071437

Fourteen samples were received for analysis on 10th May, 2024 of which fourteen 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.
This report issue supercedes all previous versions and includes corrected EPH results.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 55.314 kg of CO2

Scope 1&2&3 emissions - 130.72 kg of CO2

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Client Name: Tetra Tech
Reference: 632-B064924
Location: Loughmore Canal
Contact: Olivia Hall
EMT Job No: 24/8021

Report : Solid

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

EMT Sample No.	8-10	18-20	28-30	38-40	41-43	44-46	47-49	50-52	53-55	56-58	LOD/LOR	Units	Method No.
Sample ID	US1	US2	SWD1	SWD2	SL1	SL2	SL3	SL4	BLS1	BLS2			
Depth	0.60	0.20	0.20	0.20	0.30	0.20	0.30	0.20	0.30	0.30			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B			
Sample Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024			
Sample Type	Sediment	Sediment	Sediment	Sediment	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024			
Arsenic#	3.7	3.5	5.4	4.9	9.5	5.7	8.4	8.7	9.8	6.7	<0.5	mg/kg	TM30/PM15
Cadmium#	0.2	0.4	0.5	0.3	0.8	0.8	1.3	1.3	<0.1	0.1	<0.1	mg/kg	TM30/PM15
Chromium#	23.0	21.9	125.8	181.5	128.1	111.6	120.3	129.7	34.4	34.8	<0.5	mg/kg	TM30/PM15
Copper#	6	9	160	72	68	78	95	73	18	10	<1	mg/kg	TM30/PM15
Lead#	6	8	28	31	42	43	57	60	57	28	<5	mg/kg	TM30/PM15
Mercury#	0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.2	0.3	0.1	0.1	<0.1	mg/kg	TM30/PM15
Nickel#	7.9	9.8	27.1	29.2	28.4	25.2	27.5	33.7	26.9	16.0	<0.7	mg/kg	TM30/PM15
Selenium#	<1	1	<1	<1	<1	<1	1	1	<1	<1	<1	mg/kg	TM30/PM15
Water Soluble Boron#	0.7	2.5	0.5	0.5	0.7	0.5	1.6	3.2	1.0	1.8	<0.1	mg/kg	TM74/PM32
Zinc#	30	61	370	410	350	255	559	489	51	43	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene#	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene#	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene#	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene#	<0.03	<0.03	<0.03	<0.03	0.06	<0.03	0.09	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene#	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene#	<0.03	<0.03	<0.03	<0.03	0.09	<0.03	0.11	0.07	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene#	<0.03	<0.03	<0.03	<0.03	0.11	0.03	0.15	0.07	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene#	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene#	<0.02	<0.02	<0.02	<0.02	0.09	<0.02	0.12	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene#	<0.07	<0.07	<0.07	<0.07	0.12	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene#	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.08	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene#	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	0.09	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene#	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene#	<0.04	<0.04	<0.04	<0.04	0.17	0.07	0.22	0.10	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6	<0.6	0.7	<0.6	0.9	<0.6	<0.6	<0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	97	94	101	75	95	99	94	97	103	97	<0	%	TM4/PM8
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	104	34	<3	<3	7	<3	<3	<3	<3	ug/kg	TM15/PM10
Ethylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
m/p-Xylene#	<5	<5	<5	<5	<5	<5	<5	12	<5	<5	<5	ug/kg	TM15/PM10
o-Xylene#	<3	<3	<3	<3	<3	<3	4	7	<3	<3	<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	96	90	77	85	81	86	65	75	84	86	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	83	72	67	69	62	67	50	58	70	69	<0	%	TM15/PM10
EPH >C8-C10 (EH_1D_Total)#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	TM5/PM8
EPH >C10-C12 (EH_1D_Total)#	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8
EPH >C12-C16 (EH_1D_Total)#	<10	<10	<10	14	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8

Please see attached notes for all abbreviations and acronyms

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EMT Job No: 24/8021

Report : Solid

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

EMT Sample No.	8-10	18-20	28-30	36-40	41-43	44-46	47-49	50-52	53-55	56-58			
Sample ID	US1	US2	SWD1	SWD2	SL1	SL2	SL3	SL4	BLS1	BLS2			
Depth	0.80	0.20	0.20	0.20	0.30	0.20	0.30	0.20	0.30	0.30	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B			
Sample Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024			
Sample Type	Sediment	Sediment	Sediment	Sediment	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024			
EPH >C16-C21 (EH_1D_Total) #	19	70	61	77	51	19	61	51	<10	<10	<10	mg/kg	TM5/PM8
EPH >C21-C40 (EH_1D_Total)	210	648	736	630	1175	600	1550	1181	159	83	<10	mg/kg	TM5/PM8
EPH >C8-C40 (EH_1D_Total)	229	718	797	721	1226	619	1641	1232	159	83	<30	mg/kg	TM5/PM8
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	0.3 SV	0.3 SV	<0.1	<0.1 SV	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1 SV	0.1	<0.1	<0.1	<0.1	0.1 SV	0.2 SV	<0.1	<0.1 SV	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3.4	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	<4	<4	<4	<4	<4	9	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	<7	12	<7	10	<7	21	27	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	<7	<7	116	135	448	144	333	463	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	<19	<19	128	135	458	144	367	491	<19	<19	<19	mg/kg	Tetra Tech/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<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 (EH_CU_1D_AR) #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	<7	26	18	26	21	17	20	19	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	67	271	263	272	583	319	441	512	132	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH_CU+HS_1D_AR) #	67	297	281	298	604	336	461	531	132	<19	<19	mg/kg	Tetra Tech/PM16
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)	67	297	409	433	1062	480	828	1022	132	<38	<38	mg/kg	Tetra Tech/PM16
Total Phenols HPLC	<0.15	<0.15	0.32	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	60.5	133.2	31.7	29.7	23.3	11.3	32.0	70.7	57.2	31.8	<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) #	0.0873	0.2522	0.1075	0.0434	0.0099	0.0051	0.0160	0.0060	0.0064	<0.0015	<0.0015	g/l	TM38/PM20
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
pH #	7.53	7.29	7.56	7.84	7.97	8.13	7.80	7.94	8.10	7.91	<0.01	pH units	TM73/PM11

Client Name: Tetra Tech
Reference: 632-B064924
Location: Loughmore Canal
Contact: Olivia Hall
EMT Job No: 24/8021

Report : Liquid

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

EMT Sample No.	1-7	11-17	21-27	31-37							LOD/LOR	Units	Method No.
Sample ID	US1	US2	SWD1	SWD2									
Depth	0.80	0.80	0.20	0.20									
COC No / misc													
Containers	V H HN N P G	V H HN N P G	V H HN N P G	V H HN N P G									
Sample Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	10/05/2024	10/05/2024	10/05/2024	10/05/2024									
Dissolved Arsenic #	4.8	3.6	<2.5	2.9							<2.5	ug/l	TM30/PM14
Dissolved Boron	20	20	33	31							<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	34	24							<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2	<2	<2							<2	ug/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3							<3	ug/l	TM30/PM14
Dissolved Zinc #	4	4	41	35							<3	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Acenaphthene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Fluorene #	<0.005	<0.005	<0.005	0.020							<0.005	ug/l	TM4/PM30
Phenanthrene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Anthracene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Fluoranthene #	<0.005	<0.005	<0.005	0.027							<0.005	ug/l	TM4/PM30
Pyrene #	<0.005	<0.005	0.006	0.032							<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Chrysene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.008	<0.008	<0.008	<0.008							<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.005	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
PAH 16 Total #	<0.173	<0.173	<0.173	<0.173							<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.008	<0.008	<0.008	<0.008							<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.008	<0.008	<0.008	<0.008							<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	101	99	99	85							<0	%	TM4/PM30
Methyl Tertiary Butyl Ether #	<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	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	91	98	96	95							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	103	101	99	103							<0	%	TM15/PM10
EPH (C8-C40) (EH_1D_Total) #	<10	<10	<10	<10							<10	ug/l	TM5/PM30

Please see attached notes for all abbreviations and acronyms

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Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HNO_3

EMT Sample No.	1-7	11-17	21-27	31-37							LOD/LOR	Units	Method No.
Sample ID	US1	US2	SWD1	SWD2									
Depth	0.80	0.80	0.20	0.20									
COC No / misc													
Containers	V H HN N P G	V H HN N P G	V H HN N P G	V H HN N P G									
Sample Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	10/05/2024	10/05/2024	10/05/2024	10/05/2024									
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<10	<10	90	51							<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL)#	<10	<10	25	16							<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL)#	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<5	<5	<5	<5							<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL)#	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL)#	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL)#	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL)#	<10	<10	115	67							<10	ug/l	TM5/PM16/PM30/PM36
Aromatics													
>C5-EC7 (HS_1D_AR)#	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5							<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)#	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)#	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)#	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)#	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30/PM36
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)#	<10	<10	115	67							<10	ug/l	TM5/PM16/PM30/PM36
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15							<0.15	mg/l	TM26/PM0
Sulphate as SO4#	14.8	15.5	120.0	105.1							<0.5	mg/l	TM38/PM0
Free Cyanide#	0.04	<0.01	0.02	0.01							<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N	0.03	0.02	0.06	0.22							<0.01	mg/l	TM38/PM0
Total Alkalinity as CaCO3#	392	390	232	244							<1	mg/l	TM75/PM0
pH#	8.19	8.22	7.64	7.49							<0.01	pH units	TM73/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Tetra Tech
Reference: 632-B064924
Location: Loughmore Canal
Contact: Olivia Hall
EMT Job No: 24/8021

SVOC Report : **Solid**

EMT Sample No.	8-10	18-20	28-30	38-40	41-43	44-46	47-49	50-52	53-55	56-58			
Sample ID	US1	US2	SWD1	SWD2	SL1	SL2	SL3	SL4	BLS1	BLS2			
Depth	0.80	0.20	0.20	0.20	0.30	0.20	0.30	0.20	0.30	0.30	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B			
Sample Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024			
Sample Type	Sediment	Sediment	Sediment	Sediment	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	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	294	<10	<10	<10	62	<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	<10	<10	46	<10	16	<10	<10	<10	<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100	<100	1025	3763	4796	4842	2938	2229	<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	619	<100	275	<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
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	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/kg	TM16/PM8
Dibenzofuran#	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<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	107	101	105	106	108	106	105	107	105	105	<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	100	98	107	117	111	121	108	114	101	116	<0	%	TM16/PM8

Client Name: Tetra Tech
Reference: 632-B064924
Location: Loughmore Canal
Contact: Olivia Hall
EMT Job No: 24/8021

SVOC Report : **Liquid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	11-17	21-27	31-37							LOD/LOR	Units	Method No.
Sample ID	US1	US2	SWD1	SWD2									
Depth	0.80	0.80	0.20	0.20									
COC No / misc													
Containers	VHHNNPG	VHHNNPG	VHHNNPG	VHHNNPG									
Sample Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	10/05/2024	10/05/2024	10/05/2024	10/05/2024									
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<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	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<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	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<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	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<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	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	98	108	93	88							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	104	123	105	101							<0	%	TM16/PM30

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

Client Name: Tetra Tech
Reference: 632-B064924
Location: Loughmore Canal
Contact: Olivia Hall
EMT Job No: 24/8021

VOC Report : Solid

EMT Sample No.	8-10	18-20	28-30	38-40	41-43	44-46	47-49	50-52	53-55	56-58			
Sample ID	US1	US2	SWD1	SWD2	SL1	SL2	SL3	SL4	BLS1	BLS2			
Depth	0.80	0.20	0.20	0.20	0.30	0.20	0.30	0.20	0.30	0.30			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B			
Sample Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024			
Sample Type	Sediment	Sediment	Sediment	Sediment	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	10/05/2024	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	12	6	26	36	8	11	<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	29	<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	4	3	9	9	<2	<2	<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	35	<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	104	34	<3	<3	7	<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
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	12	<5	<5	<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3	<3	4	7	<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	34	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
n-Butylbenzene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	96	90	77	85	81	86	65	75	84	86	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	83	72	67	69	62	67	50	58	70	69	<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Tetra Tech
Reference: 632-B064924
Location: Loughmore Canal
Contact: Olivia Hall
EMT Job No: 24/8021

VOC Report : Liquid

EMT Sample No.	1-7	11-17	21-27	31-37									
Sample ID	US1	US2	SWD1	SWD2									
Depth	0.80	0.80	0.20	0.20									
COC No / misc													
Containers	V H HN N P G	V H HN N P G	V H HN N P G	V H HN N P G									
Sample Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	10/05/2024	10/05/2024	10/05/2024	10/05/2024									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	91	98	96	95							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	103	101	99	103							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Tetra Tech
Reference: 632-B064924
Location: Loughmore Canal
Contact: Olivia Hall

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/8021						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/8021

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 24/8021

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs 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
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	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

EMT Job No: 24/8021

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
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 8260B v2 1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis	Yes			
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis	Yes		AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM16	Modified USEPA 8270D v5:2014. 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

EMT Job No: 24/8021

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 8270D v5.2014. 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
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec 1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec 1996	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
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B v2.1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2 2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2.1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev 2 1993), Nitrite 354 1 (1971), Hex Cr 7196A (1992), NH4+ 350 1 (Rev 2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM0	No preparation is required.				

EMT Job No: 24/8021

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. Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev 2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev 2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	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
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev 2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev 2 1993) – All anions comparable to BS ISO 15923-1: 2013I	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
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	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
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667 (1999) 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			
TM89	Modified USEPA method OIA-1667 (1999) 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, Sulphide and Thiocyanate analysis			AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

APPENDIX E – SOIL & SEDIMENT SCREENING

TETRA TECH

Groundwater -Hazardous Non hazardous Substances Screening
Surface Water - Priority Substances and Priority Hazardous S
ubstances

							Sample ID	US1	US2	SWD1	SWD2	SL1	SL2	SL3	SL4	SLS1	SLS2
							Depth	0.85	0.20	0.20	0.20	0.30	0.20	0.30	0.20	0.30	0.30
							Sample Type	Sediment	Sediment	Sediment	Sediment	Soil	Soil	Soil	Soil	Soil	Soil
	Groundwater Regs						Sampled Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024
Test	Hazardous / non-hazardous		Units	LOD	Min	Max	Average										
Metals																	
Arsenic	Hazardous substance	JAGDAG 2017	mg/kg	<0.5	3.5	9.8	6.6	3.7	9.5	5.4	4.9	9.5	5.7	8.4	8.7	9.8	8.7
Cadmium	Non hazardous pollutant	JAGDAG 2017	mg/kg	<0.1	0.19	1.30	0.63	0.2	0.4	0.5	0.3	0.8	0.6	1.3	1.3		0.1
Chromium	Non Hazardous substance	JAGDAG 2001	mg/kg	<2.5	22	180	91	23	21.9	125.8	181.5	128.1	111.8	126.1	129.7	34.4	34.8
Copper	Non hazardous pollutant (depend on form)	JAGDAG 2001	mg/kg	<1	6	160	59	6	9	160	72	68	78	95	73	18	10
Lead	Hazardous substance	JAGDAG 2017	mg/kg	<5	6	60	36	6	8	28	31	42	43	57	60	57	28
Mercury (depend on form)	Hazardous substance	JAGDAG 2017	mg/kg	<0.1	0.10	0.30	0.15	0.1		0.1				0.2	0.3	0.1	0.1
Nickel	Hazardous pollutant (depend on form)	JAGDAG 2017	mg/kg	<0.7	8	34	23	7.9	9.8	27.1	29.2	28.4	25.2	27.5	30.7	26.9	16
Selenium	Non hazardous pollutant	JAGDAG 2017	mg/kg	<1	1.00	1.00	1.00		1					1	1		
Water Soluble Boron			mg/kg	<0.1	0.50	3.20	1.30	0.7	2.5	0.5	0.5	0.7	0.5	1.6	3.2	1	1.6
Zinc	Non hazardous pollutant	JAGDAG 2001	mg/kg	<5	30	559	262	30	81	372	410	360	255	559	486	61	43
PAH MS																	
Naphthalene	Non hazardous pollutant	JAGDAG 2017	mg/kg	<0.04	0	0	0										
Acenaphthylene			mg/kg	<0.03	0	0	0										
Acenaphthene	Hazardous substance	JAGDAG 2002	mg/kg	<0.05	0	0	0										
Fluorene			mg/kg	<0.04	0	0	0										
Phenanthrene			mg/kg	<0.03	0.060	0.090	0.075					0.06		0.09			
Anthracene	Hazardous substance	JAGDAG 2017	mg/kg	<0.04	0	0	0										
Fluoranthene	Hazardous substance	JAGDAG 2001	mg/kg	<0.03	0.07	0.11	0.09					0.06		0.11	0.07		
Pyrene		-	mg/kg	<0.03	0.03	0.15	0.09					0.11	0.03	0.15	0.07		
Benzo(a)anthracene		-	mg/kg	<0.06	0	0	0										
Chrysene		-	mg/kg	<0.02	0.09	0.12	0.11					0.09		0.12			
Benzo(b)fluoranthene			mg/kg	<0.07	0.12	0.12	0.12					0.12					
Benzo(a)pyrene	Hazardous substance	JAGDAG 2017	mg/kg	<0.04	0.08	0.08	0.08							0.09			
Indeno(1,2,3-cd)pyrene	Hazardous substance	JAGDAG 2017	mg/kg	<0.04	0.060	0.090	0.075					0.06		0.09			
Dibenz(a,h)anthracene			mg/kg	<0.04	0	0	0										
Benzo(g,h,i)perylene	Hazardous substance	JAGDAG 2017	mg/kg	<0.04	0.07	0.22	0.14					0.17	0.07	0.22	0.1		
PAH 16 Total			mg/kg	<1.6	0.76	0.90	0.80					0.7		0.9			
Benzo(b)fluoranthene	Hazardous substance	JAGDAG 2017	mg/kg	<0.05	0.09	0.09	0.09					0.09					
Benzo(k)fluoranthene	Hazardous substance	JAGDAG 2017	mg/kg	<0.02	0.030	0.030	0.030					0.03					
VOC MS																	
Dichlorodifluoromethane			ug/kg	<2	0	0	0										
Chloromethane			ug/kg	<3	6	28	17					<2	6	28	28	8	11
Vinyl Chloride	Hazardous substance	JAGDAG 2017	ug/kg	<2	29	29	29				29						
Bromomethane			ug/kg	<1	0	0	0										
Chloroethane			ug/kg	<2	3.00	9.00	6.25					4	3	9	9		
Trichlorofluoromethane	-		ug/kg	<2	0	0	0										
1,1-Dichloroethene (1,1-DCE)	Non hazardous pollutant	JAGDAG 2017	ug/kg	<6	0	0	0										
Dichloromethane (DCM)	Non hazardous pollutant	JAGDAG 2017	ug/kg	<7	0	0	0										
trans-1,2-Dichloroethene			ug/kg	<3	0	0	0										
1,1-Dichloroethane	Non hazardous pollutant	JAGDAG 2017	ug/kg	<3	0	0	0										
cis-1,2-Dichloroethene			ug/kg	<3	35	35	35				35						
2,2-Dichloropropane			ug/kg	<4	0	0	0										
Bromochloromethane			ug/kg	<3	0	0	0										
Chloroform	Hazardous substance	JAGDAG 2001	ug/kg	<3	0	0	0										
1,1,1-Trichloroethane	Non hazardous pollutant	JAGDAG 2017	ug/kg	<3	0	0	0										
1,1-Dichloropropene			ug/kg	<3	0	0	0										
Carbon tetrachloride	Hazardous substance	JAGDAG 2001	ug/kg	<4	0	0	0										
1,2-Dichloroethane	Non hazardous pollutant	JAGDAG 2017	ug/kg	<4	0	0	0										
Trichloroethene (TCE)	Hazardous substance	JAGDAG 2017	ug/kg	<3	0	0	0										
1,2-Dichloropropane	Hazardous substance	JAGDAG 2001	ug/kg	<5	0	0	0										
Dibromomethane			ug/kg	<3	0	0	0										
Bromodichloromethane			ug/kg	<3	0	0	0										
cis-1,3-Dichloropropene			ug/kg	<4	0	0	0										
trans-1,3-Dichloropropene			ug/kg	<3	0	0	0										
1,1,2-Trichloroethane	Non hazardous pollutant	JAGDAG 2017	ug/kg	<3	0	0	0										
Tetrachloroethene (PCE)	Non hazardous pollutant	JAGDAG 2017	ug/kg	<3	0	0	0										
1,3-Dichloropropane			ug/kg	<3	0	0	0										
Dibromochloromethane			ug/kg	<3	0	0	0										
1,2-Dibromoethane	Hazardous substance	JAGDAG 2001	ug/kg	<3	0	0	0										
Chlorobenzene	Hazardous substance	DETR 1998	ug/kg	<3	8	8	0										
1,1,1,2-Tetrachloroethane	Hazardous substance	JAGDAG 2001	ug/kg	<3	0	0	0										
Styrene	Hazardous substance	JAGDAG 2001	ug/kg	<3	0	0	0										
Bromoform			ug/kg	<3	0	0	0										
Isopropylbenzene			ug/kg	<3	0	0	0										
1,1,2,2-Tetrachloroethane			ug/kg	<3	0	0	0										
Bromobenzene			ug/kg	<2	0	0	0										
1,2,3-Trichloropropane			ug/kg	<4	0	0	0										
Propylbenzene			ug/kg	<4	0	0	0										
2-Chlorotoluene	Hazardous substance	DETR 1998	ug/kg	<3	0	0	0										
1,3,5-Trimethylbenzene			ug/kg	<1	0	0	0										
4-Chlorotoluene	Hazardous substance	JAGDAG 2001	ug/kg	<1	0	0	0										
tert-Butylbenzene			ug/kg	<5	0	0	0										
1,2,4-Trimethylbenzene	Hazardous substance	JAGDAG 2001	ug/kg	<6	0	0	0										
sec-Butylbenzene			ug/kg	<4	0	0	0										
4-Isopropyltoluene		-	ug/kg	<4	34	34	34			34							
1,3-Dichlorobenzene	Hazardous substance	DETR 1998	ug/kg	<4	0	0	0										
1,4-Dichlorobenzene	Hazardous substance	DETR 1998	ug/kg	<4	0	0	0										
n-Butylbenzene			ug/kg	<4	0	0	0										
1,2-Dichlorobenzene	Hazardous substance	DETR 1998	ug/kg	<4	0	0	0										
1,2,3-dibromo-3-chloropropane			ug/kg	<4	0	0	0										
1,2,4-Trichlorobenzene	Hazardous substance	DETR 1998	ug/kg	<7	0	0	0										
Hexachlorobutadiene	Hazardous substance	JAGDAG 2017	ug/kg	<4	0	0	0										
1,2,3-Trichlorobenzene			ug/kg	<7	0	0	0										
Methyl Tertiary Butyl Ether	Non hazardous pollutant	JAGDAG 2001	ug/kg	<2	0	0	0										
Benzene	Hazardous substance	JAGDAG 2017	ug/kg	<3	0	0	0										
Toluene	Hazardous substance	JAGDAG 2001	ug/kg	<3	7	124	48			104	34			7			
Ethylbenzene	Hazardous substance	JAGDAG 2001	ug/kg	<3	0	0	0										
m,p-Xylene	Hazardous substance	JAGDAG 2001	ug/kg	<5	12	12	12								12		
o-Xylene	Hazardous substance	JAGDAG 2001	ug/kg	<3	4.00	7.00	5.50							4	7		
SVOC MS																	
Phenols																	
2-Chlorophenol	Hazardous substance	DETR 1998	ug/kg	<10	0	0	0										
2-Methylphenol	Non hazardous pollutant	JAGDAG 2001	ug/kg	<10	0	0	0										
2-Nitrophenol	-		ug/kg	<10	0	0	0										
4-Chlorophenol	Hazardous substance	DETR 1998	ug/kg	<10	0	0	0										
4-Dimethylphenol			ug/kg	<10	0	0	0										
2,4,5-Trichlorophenol	Hazardous substance	DETR 1998	ug/kg	<10	0	0	0										
2,4,6-Trichlorophenol	Hazardous substance	DETR 1998	ug/kg	<10	0	0	0										
4-Chloro-3-methylphenol	Hazardous substance	DETR 1998	ug/kg	<10	0	0	0										
4-Methylphenol			ug/kg	<10	62	294	178			294				62			
4-Nitrophenol			ug/kg	<10	0	0	0										
Pentachlorophenol	Hazardous substance	DETR 1998	ug/kg	<10	0	0	0										
Phenol	Non hazardous pollutant	JAGDAG 2002	ug/kg	<10	0	0	0										
PAHs																	
2-Chloronaphthalene	-	-	ug/kg	<10	0	0	0										
2-Methylnaphthalene	-	-	ug/kg	<10	16	46	31					46		16			
Phthalates																	
Bis(2-ethylhexyl) phthalate	Non hazardous pollutant	JAGDAG 2017	ug/kg	<100	1025	4640	3266			1025	3763	4796	4842	2936	2229		
Butylbenzyl phthalate	-	-	ug/kg	<100	0	0	0										
Di-n-butyl phthalate	Non hazardous pollutant	JAGDAG 2017	ug/kg	<100	275	619	447			619		275					
Di-n-Octyl phthalate	-	-	ug/kg	<100	0	0	0										
Diethyl phthalate	-	-	ug/kg	<100	0	0	0										
Dimethyl phthalate	-	-	ug/kg	<100	0	0	0										
Other SVOCs																	

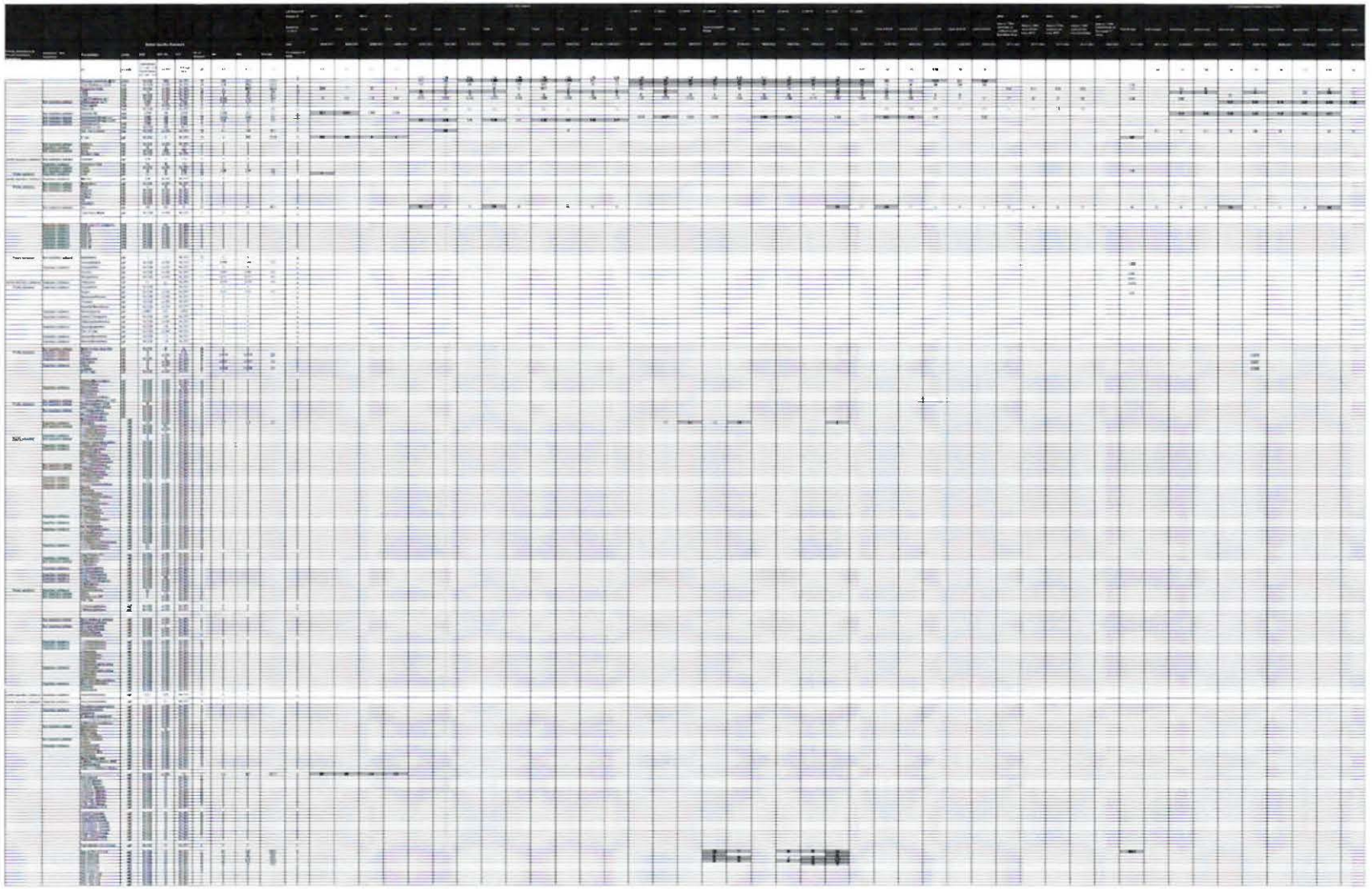
							Sample ID	US1	US2	SW01	SW02	SL1	SL2	SL3	SL4	SL51	SL52
							Depth	0.60	0.20	0.20	0.20	0.30	0.20	0.30	0.20	0.30	0.30
							Sample Type	Sediment	Sediment	Sediment	Sediment	Soil	Soil	Soil	Soil	Soil	Soil
	Groundwater flags						Sampled Date	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024
Test	Hazardous / non-hazardous		Units	LOD	Min	Max	Average										
2-Nitroaniline	-	-	ug/kg	<10	0	0	0										
2,4-Dinitrotoluene	-	-	ug/kg	<10	0	0	0										
2,6-Dinitrotoluene	-	-	ug/kg	<10	0	0	0										
3-Nitroaniline	-	-	ug/kg	<10	0	0	0										
4-Bromophenylphenylether	-	-	ug/kg	<10	0	0	0										
4-Chloroaniline	Hazardous substance	JAGDAG, 2001	ug/kg	<10	0	0	0										
4-Chlorophenylphenylether	-	-	ug/kg	<10	0	0	0										
4-Nitroaniline	-	-	ug/kg	<10	0	0	0										
Azobenzene	-	-	ug/kg	<10	0	0	0										
Bis(2-chloroethoxy)methane	-	-	ug/kg	<10	0	0	0										
Bis(2-chloroethyl)ether	-	-	ug/kg	<10	0	0	0										
Carbazole	-	-	ug/kg	<10	0	0	0										
Dibenzofuran	-	-	ug/kg	<10	0	0	0										
Hexachlorobenzene	Hazardous substance	JAGDAG, 2017	ug/kg	<10	0	0	0										
Hexachlorocyclopentadiene	-	-	ug/kg	<10	0	0	0										
Hexachloroethane	Hazardous substance	DETR, 1998	ug/kg	<10	0	0	0										
Isophorone	-	-	ug/kg	<10	0	0	0										
N-Nitrosodi-n-propylamine	-	-	ug/kg	<10	0	0	0										
Nitrobenzene	-	-	ug/kg	<10	0	0	0										
EPH >C8-C10	-	-	mg/kg	<5	0	0	0										
EPH >C10-C12	-	-	mg/kg	<10	0	0	0										
EPH >C12-C16	-	-	mg/kg	<10	14	14	14				14						
EPH >C16-C21	-	-	mg/kg	<10	19	91	54	19	70	61	77	51	19	81	51		
EPH >C21-C40 (Total)	-	-	mg/kg	<10	83	1560	698	210	646	736	830	1175	800	1560	1181	159	83
EPH >C8-C40 (Total)	-	-	mg/kg	<30	83	1641	743	229	716	797	721	1226	819	1641	1232	159	83
TPH CWG	-	-															
Aliphatics	-	-															
>C5-C8 Aliphatics	-	-	mg/kg	<0.1	0.10	0.10	0.10							0.1			
>C8-C9 Aliphatics	-	-	mg/kg	<0.1	0.30	0.30	0.30							0.3	0.3		
>C9-C10 Aliphatics	-	-	mg/kg	<0.1	0.10	0.20	0.13			0.1				0.1	0.2		
>C10-C12 Aliphatics	-	-	mg/kg	<0.2	0.40	0.40	0.40							0.4			
>C12-C16 Aliphatics	-	-	mg/kg	<4	9	9	9							9			
>C16-C21 Aliphatics	-	-	mg/kg	<7	10	27	18			12		10		21	27		
>C21-C35 Aliphatics	-	-	mg/kg	<7	116	460	273			116	135	446	144	331	460		
Total aliphatics C5-35	-	-	mg/kg	<19	126	491	291			128	135	456	144	361	491		
Aromatics	-	-															
>C5-EC7 Aromatics	-	-	mg/kg	<0.1	0	0	0										
>EC7-EC8 Aromatics	-	-	mg/kg	<0.1	0	0	0										
>EC8-EC10 Aromatics	-	-	mg/kg	<0.1	0	0	0										
>EC10-EC12 Aromatics	-	-	mg/kg	<0.2	0	0	0										
>EC12-EC16 Aromatics	-	-	mg/kg	<4	0	0	0										
>EC16-EC21 Aromatics	-	-	mg/kg	<7	17	28	21		28	18	26	21	17	20	18		
>EC21-EC35 Aromatics	-	-	mg/kg	<7	67	580	318	67	271	263	272	583	319	441	512	132	
Total aromatics	-	-	mg/kg	<19	67	604	314	67	297	281	298	604	336	461	531	132	
Total aliphatics and aromatics(C5-35)	-	-	mg/kg	<38	67	1061	529	67	297	409	433	1060	480	828	1022	132	
Total Phenols HPLC	-	-	mg/kg	<0.15	0.32	0.32	0.32			0.32							
Natural Moisture Content	-	-	%	<0.1	11	133	46	80.5	133.2	31.7	29.7	23.3	11.3	32	22.7	57.2	31.8
Hexavalent Chromium	Hazardous substance	JAGDAG, 2017	mg/kg	<0.3	0	0	0										
Sulphate as SO4 (2:1 Ext)	-	-	g/l	<0.0015	0.005	0.258	0.059	0.0873	0.2522	0.1075	0.0434	0.0095	0.0051	0.016	0.006	0.0064	
Free Cyanide	Non hazardous pollutant	JAGDAG, 2017	mg/kg	<0.5	0	0	0										
pH	-	-	pH units	<0.01	7.9	8.1	7.9	7.43	7.29	7.56	7.84	7.97	8.13	7.8	7.94	8.1	7.91

TETRA TECH

		Units	Water Qaulity Standard								Brendan Moore	
										Lab Report ID		
										Sample ID	TR/LC 002	TRLC 005
										Sampling Location		
Hazardous / Non hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Date / Exceedance of limit	08/02/2024	08/02/2024
	pH	pH Units		no IGV		0	0	0	-	0		
	Electrical conductivity @25C	µS/cm	No EQS		1000 No GTV	0	0	0	-	0		
	Total Alkalinity as $CaCO_3$	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0		
	Suspended Solids	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0		
	BOD	mg/L	1.5	no IGV	No GTV	0	0	0	-	0		
	COD	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0		
	Total Phosphorus as P	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0		
Non hazardous pollutant	Orthphosphate (as P)	mg/L	0.035	0.03	0.035	0	0	0	-	0		
	Free Cyanide	mg/L	0.01	no IGV	No GTV	0	0	0	-	0		
	Nitrate NO_3	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0		
Non hazardous pollutant	Ammonia NH_3	mg/L	0.078	150	0.078	0	0	0	-	0		
Non hazardous pollutant	Ammoniacal Nitrogen as N	mg/L	0.065	150	0.065	0	0	0	-	0		
Non hazardous pollutant	Ammoniacal Nitrogen as NH3		0.078	150	0.078	0	0	0	-	0		
Non hazardous pollutant	Ammonia as N	mg/L	0.065	150	0.065	0	0	0	-	0		
	Sulphate as SO_4	mg/L	No EQS	200	187.5	0	0	0	-	0		
	Oils, Fats & Grease	mg/l	No EQS	no IGV	No GTV	0	0	0	-	0		
	E. coli	ug/l	No EQS	0	No GTV	0	0	0	-	0		
Non hazardous pollutant	Antimony	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Arsenic	ug/l	25	10	7.5	2	1.37	2.75	2.1	0	1.37	2.75
Non hazardous pollutant	Boron	ug/l	No EQS	1000	750	0	0	0	-	0		
	Beryllium (total)	ug/l	No EQS	no IGV	No GTV	2	0.22	0.44	0.3	0	0.44	0.22
Non hazardous pollutant	Cobalt	ug/l	No EQS	no IGV	No GTV	2	6.67	20.7	13.7	0	20.7	6.67
Hazardous substance	Mercury	ug/l	0.05	no IGV	No GTV	0	0	0	-	0		
Non hazardous pollutant	Molybdenum	ug/l	No EQS	no IGV	No GTV	2	0.87	4.128	2.5	0	4.128	0.87
Non hazardous pollutant	Selenium	ug/l	No EQS	no IGV	No GTV	2	2.04	2.04	2.0	0		2.04
	Tellurium	ug/l	No EQS	no IGV	No GTV	2	1.627	1.994	1.8	0	1.627	1.994
	Thallium	ug/l	No EQS	no IGV	No GTV	2	0.35	0.61	0.5	0	0.35	0.61
	Tin	ug/l	No EQS	no IGV	No GTV	2	2.27	2.31	2.3	0	2.31	2.27
	Vanadium	ug/l	No EQS	no IGV	No GTV	2	5.09	13.27	9.2	0	5.09	13.27
Non hazardous pollutant	Cadmium	ug/l	0.25	5	3.75	2	0.22	0.33	0.3	1	0.33	0.23
non Hazardous substance	Chrominum (total)	ug/l	3.4	30	7.5	2	13.41	15.78	14.6	2	15.78	13.41
Non hazardous pollutant	Copper	ug/l	30	30	1500	2	34.04	53.99	44.0	2	34.04	53.99
Hazardous substance	Lead	ug/l	1.2	10	0.75	2	13.91	14.79	14.4	2	14.79	13.91
Non hazardous pollutant	Nickel	ug/l	4	20	15	2	5.64	11.31	8.5	2	5.64	11.31
Non hazardous pollutant	Zinc	ug/l	100	100	75	2	266.44	359.81	313.1	2	266.44	359.81
	Total Heavy Metals	ug/l	No EQS	no IGV	No GTV	2	3369	7616	5492.5	0	3.369	7.616
Hazardous substance	PCBs (sum of 7 congeners)	mg/L	No EQS	0.01	No GTV	2	0	0	-	0		
Hazardous substance	PCB 28	mg/L	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	PCB 52	mg/L	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	PCB 101	mg/L	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	PCB 118	mg/L	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	PCB 138	mg/L	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	PCB 153	mg/L	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	PCB 180	mg/L	No EQS	no IGV	No GTV	2	0	0	-	0		
Non hazardous pollutant	Naphthalene	ug/l	2		1 No GTV	2	0	0	-	0		
	Acenaphthylene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Acenaphthene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Fluorene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Phenanthrene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Anthracene	ug/l	0.1	0.1	No GTV	2	0	0	-	0		
Hazardous substance	Fluoranthene	ug/l	No EQS		1 No GTV	2	0	0	-	0		
	Pyrene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Benzo(a)anthracene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Chrysene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Benzo(bk)fluoranthene	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0		
Hazardous substance	Benzo(a)pyrene	ug/l	0.00017	0.01	0.0075	2	0	0	-	0		
Hazardous substance	Indeno(123cd)pyrene	ug/l	No EQS	0.05	No GTV	2	0	0	-	0		
	Dibenz(ah)anthracene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Benzo(ghi)perylene	ug/l	No EQS	1.05	No GTV	2	0	0	-	0		
	PAH 16 Total	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0		
Hazardous substance	Benzo(b)fluoranthene	ug/l	No EQS	1.5	No GTV	2	0	0	-	0		
Hazardous substance	Benzo(k)fluoranthene	ug/l	No EQS	1.05	No GTV	2	0	0	-	0		
Non hazardous pollutant	Methyl Tertiary Butyl Ether	ug/l	No EQS	30	10	0	0	0	-	0		
Hazardous substance	Benzene	ug/l	10	1	0.75	2	0	0	-	0		
Hazardous substance	Toluene	ug/l	10	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Ethylbenzene	ug/l	No EQS	10	No GTV	2	0	0	-	0		
	m/p-Xylene	ug/l	10	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Xylene	ug/l	10	no IGV	No GTV	2	0	0	-	0		
	o-Xylene	ug/l	10	11	No GTV	1	0.3283	0.3283	0.3	0	0.3283	
	BTEX Total	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Dichlorodifluoromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Chloromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Vinyl Chloride	ug/l	No EQS	no IGV	0.375	2	0	0	-	0		
	Bromomethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Chloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Trichlorofluoromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Non hazardous pollutant	1,1-Dichloroethene (1,1 DCE)	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0		
Non hazardous pollutant	Dichloromethane (DCM)	ug/l	20	no IGV	No GTV	2	0	0	-	0		
	trans-1-2-Dichloroethene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Non hazardous pollutant	1,1-Dichloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	cis-1-2-Dichloroethene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	2,2-Dichloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Bromochloromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Chloroform	ug/l	2.5	no IGV	No GTV	2	1.75	1.75	1.8	0		1.75
Non hazardous pollutant	1,1,1-Trichloroethane	ug/l	No EQS	501	No GTV	2	0	0	-	0		
	1,1-Dichloropropene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	1,2 Dichlorobenzene	ug/l	No EQS	11	No GTV	2	0	0	-	0		
Hazardous substance	Carbon tetrachloride	ug/l	12	no IGV	No GTV	2	0	0	-	0		
Non hazardous pollutant	1,2-Dichloroethane	ug/l	10	no IGV	No GTV	2	0	0	-	0		
	Benzyl 2-chloroethyl sulfone	ug/l	No EQS	no IGV	No GTV	1	0.002	0.002	0.0	0		0.002
Hazardous substance	Trichloroethene (TCE)	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	1,2-Dichloropropane	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0		
	Dibromomethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Bromodichloromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	cis-1-3-Dichloropropene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	trans-1-3-Dichloropropene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Non hazardous pollutant	1,1,2-Trichloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Non hazardous pollutant	Tetrachloroethene (PCE)	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	1,3-Dichloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Dibromochloromethane	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0		
Hazardous substance	1,2-Dibromoethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Chlorobenzene	ug/l	1.5		1 No GTV	2	0	0	-	0		
Hazardous substance	1,1,1,2-Tetrachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
Hazardous substance	Styrene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Bromoform	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Isopropylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	1,1,2,2-Tetrachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		
	Bromobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0		

	1,2,3-Trichloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	Propylbenzene	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	n-Propylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	p-Isopropyltoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	2-Chlorotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	1,3,5-Trimethylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	4-Chlorotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	tert-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	1,2,4-Trimethylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	sec-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	4-Isopropyltoluene	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	n-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	1,2-Dibromo-3-chloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	1,2,4-Trichlorobenzene	ug/l	0.4	no IGV	No GTV	2	0	0	0	0		
	1,2,3-Trichlorobenzene	ug/l	0.4	no IGV	No GTV	2	0	0	0	0		
	Total Phenols HPLC	mg/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Hazardous substance	2-Chlorophenol	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Non hazardous pollutant	2-Methylphenol	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	2-Nitrophenol	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Hazardous substance	2,4-Dichlorophenol	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	2,4-Dimethylphenol	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Hazardous substance	2,4,5-Trichlorophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	2,4,6-Trichlorophenol	ug/l	No EQS	200	No GTV	0	0	0	0	0		
Hazardous substance	4-Chloro-3-methylphenol	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	4-Methylphenol	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	4-Nitrophenol	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Hazardous substance	Pentachlorophenol	ug/l	0.4	no IGV	No GTV	0	0	0	0	0		
Non hazardous pollutant	Phenol	ug/l	8	1.5	No GTV	0	0	0	0	0		
Non hazardous pollutant	Phenols (non-DW)	ug/l	8	no IGV	No GTV	1	0	0	0	0		
	PAH Total	ug/l		no IGV	No GTV	0	0	0	0	0		
	2-Chloronaphthalene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	2-Methylnaphthalene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Non hazardous pollutant	Bis(2-ethylhexyl) phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	Butylbenzyl phthalate	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Non hazardous pollutant	Di-n-butyl phthalate	ug/l	No EQS	2	No GTV	2	0	0	0	0		
	Di-n-Octyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	Diethyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	Dimethyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	1,2-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	1,3-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	1,4-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	2-Nitroaniline	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	2,4-Dinitrotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	2,6-Dinitrotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	3-Nitroaniline	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	4-Bromophenylphenylether	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	4-Chloroaniline	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	4-Chlorophenylphenylether	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	4-Nitroaniline	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	Azobenzene	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	Bis(2-chloroethoxy)methane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	Bis(2-chloroethyl)ether	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	Carbazole	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	Dibenzofuran	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Hazardous substance	Hexachlorobenzene	ug/l	0.01	0.03	No GTV	2	0	0	0	0		
Hazardous substance	Hexachlorobutadiene	ug/l	0.1	0.1	No GTV	2	0	0	0	0		
	Hexachlorocyclopentadiene	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Hazardous substance	Hexachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	Isophorone	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	N-nitrosodi-n-propylamine	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	2,4,7,9-Tetramethyl-5-decyn-4,7-diol	ug/l	No EQS	no IGV	No GTV	2	0.004	0.03359	0.0	0	0.03359	0.004
	n-Nitroso-di-n-propylamine	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
Non hazardous pollutant	Diphenylamine	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0		
	Nitrobenzene	ug/l	No EQS	10	No GTV	2	0	0	0	0		
	Ethyl Acetate	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	Tribromomethane	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Non hazardous pollutant	Carbon Disulphide	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	Acetone	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
Hazardous substance	Epichlorohydrin	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	1-Chlorobutane	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	2-Butanone (MEK)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	2-Hexanone	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	Methyl Methacrylate	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	4-Methyl -2 Pentanone (MIBK)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	Tetrahydrofuran	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	Trans-1,4-Dichloro-2-Butene	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	Total Petroleum Hydrocarbons C5 - C44	ug/l	No EQS	10	7.5	0	0	0	0	0		
	EPH (C8-C40)	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C5-C8 Aliphatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C8-C8 Aliphatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C8-C10 Aliphatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C10-C12 Aliphatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C12-C16 Aliphatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C16-C21 Aliphatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C21-C35 Aliphatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C35 - C44 Aliphatic	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	Total aliphatics C5-35	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C5-EC7 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>EC7-EC8 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>EC8-EC10 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>EC10-EC12 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>EC12-EC16 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>EC16-EC21 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>EC21-EC35 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	>C35 - C44 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	Total aromatics C5-35	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	Total aliphatics and aromatics	ug/l	No EQS	10	No GTV	0	0	0	0	0		
	Sum of TPH (C10-C40)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH (C35-C40)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH (C30-C35)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH (C21-C30)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH (C16-C21)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH (C12-C16)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH (C10-C12)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH > (C21 -C40)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH >(C10 -C21)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH >(C8 -C10)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		
	TPH > (C8 -C40)	ug/l	No EQS	no IGV	No GTV	0	0	0	0	0		

APPENDIX F – SURFACE WATER SCREENING



											Lab Report ID		Capital Water Systems /	22/12/2021								TRLC 001	TRLC 001A	TRLC 004	SW01	SW02
											Sample ID		SP10		SP01												
											Sampling Location		Outflow	Outfall	Discharge to Canal	Outflow	Outflow	Outflow	Outflow	Outflow	Outflow				Outflow	Outflow
			Water Quality Standard								Date		08/06/2021	22/12/2021	02/11/2021	13/06/2023	04/07/2023	08/08/2023	07/09/2023	17/10/2023	08/11/2023	08/02/2024	08/02/2024	08/02/2024	07/08/2024	07/08/2024
Priority Substances & Priority Hazardous Substances	Hazardous / Non hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Exceedance of WQS																
		pH	pH Units	Soft(CaWater 4.5< pH < 9.0 Hard(HWater 6.5< pH < 9.0	no IGV	≥ 6.5 and ≤9.5	11	7.08	8.67	7.6		0	7.4	7.5		7.27	8.07	7.46	7.43	7.72	7.06				7.84	7.49
		Electrical conductivity @20°	µS/cm	No EQS	1000	No GTV	1	0	0	-		0															
		Total Alkalinity as $CaCO_3$	mg/L	No EQS	no IGV	No GTV	3	232	244	238.0		0													210	244
		Suspended Solids	mg/L	No EQS	no IGV	No GTV	9	4	18	10.0		0	4	18	8												
		BOD	mg/L	1.3	no IGV	No GTV	8	0.9	13	6.2		0					13		0.9	6.4	1.3						
		COD	mg/L	No EQS	no IGV	No GTV	7	54	54	54.0		0				54											
		Total Phosphorus as P	mg/L	No EQS	no IGV	No GTV	12	0.11	24	4.1		0	0.57	0.2	24							0.11	0.41	0.56		
	Non hazardous pollutant	Orthophosphate (as P)	mg/L	0.035	0.03	0.035	8	0.013	0.26	0.1		1				0.26	0.013	0.061	0.024	0.044	0.027						
		Free Cyanide	mg/L	0.01	no IGV	No GTV	2	0.01	0.02	0.0		1													0.02	0.01
		Nitrate NO_3	mg/L	No EQS	no IGV	No GTV	9	0.04	2.6	1.4		0		0.04	1.6						2.6					
	Non hazardous pollutant	Ammonia NH_3	mg/L	0.078	15	0.091	7	0.356	0.58	0.4		3	0.356						0.59	0.59						
	Non hazardous pollutant	Ammoniacal Nitrogen as N	mg/L	0.065	150	0.065	4	0.46	0.75	0.1		2		0.46											0.06	0.42
	Non hazardous pollutant	Ammoniacal Nitrogen as NH_3	mg/L	0.078	150	0.091	0	-	-	-		0														
	Non hazardous pollutant	Ammonia as N	mg/L	0.065	150	0.065	10	0.006	0.117	0.1		1										0.006	0.029	0.117		
		Sulphate as SO_4	mg/L	No EQS	200	187.5	2	105.1	120	112.6		0													120	105.1
		Oils, Fats & Grease	mg/l	No EQS	no IGV	No GTV	6	7.9	42	26.2		0				19	7.9	32	15	42	41					
		E. coli	cfu/l	No EQS	0	No GTV	1	2000	2000	2000		1	2000														
	Non hazardous pollutant	Antimony	µg/l	No EQS	no IGV	No GTV	3	2	4	2.5		0										2	3	2			
	Hazardous substance	Arsenic	µg/l	10	10	7.5	12	1	6	2.9		0										1	6	1			2.9
	Non hazardous pollutant	Boron	µg/l	No EQS	1000	790	3	33	33	32.8		0													33	33
		Beryllium (total)	µg/l	No EQS	no IGV	No GTV	3	1	1	1.0		0										1					
priority hazardous substance	Non hazardous pollutant	Cadmium	µg/l	0.25	6	3.75	5	0	0	-		0															
	Hazardous substance	Chromium (total)	µg/l	3.4	30	7.5	12	3	15	7.0		1										3	15	3			
	Non hazardous pollutant	Cobalt	µg/l	No EQS	no IGV	No GTV	3	1	1	1.0		0										1	1	1			
	Non hazardous pollutant	Copper	µg/l	30	30	1500	8	4	34	14.4		1										7	15	4	34	24	
Priority substance	Hazardous substance	Lead	µg/l	1.2	10	0.75	8	1	17	5.2		3	1	3								3	17	2			
priority hazardous substance	Hazardous substance	Mercury	µg/l	0.05	no IGV	No GTV	2	0	0	-		0															
	Non hazardous pollutant	Molybdenum	µg/l	No EQS	no IGV	No GTV	3	2	9	6.3		0										8	9	3			
Priority substance	Non hazardous pollutant	Nickel	µg/l	4	20	15	12	3	17	7.7		0										3	17	3			
	Non hazardous pollutant	Selenium	µg/l	No EQS	no IGV	No GTV	5	1	2	1.3		0										1	2	1			
		Tellurium	µg/l	No EQS	no IGV	No GTV	3	0	0	-		0															
		Thallium	µg/l	No EQS	no IGV	No GTV	3	0	0	-		0															
		Tin	µg/l	No EQS	no IGV	No GTV	3	1	1	1.0		0										1					
		Vanadium	µg/l	No EQS	no IGV	No GTV	3	3	17	8.0		0										4	17	3			
	Non hazardous pollutant	Zinc	µg/l	100	100	75	14	18	138	56.9		2	18	138	39	26				73	51	60	53	53	41	35	
		Total Heavy Metals	µg/l	No EQS	no IGV	No GTV	3	75	156	120.7		0										130	154	75			
	Hazardous substance	PCBs (sum of 7 congeners)	mg/l	No EQS	0.01	No GTV	1	0	0	-		0															
	Hazardous substance	PCB 28	mg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
	Hazardous substance	PCB 52	mg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
	Hazardous substance	PCB 101	mg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
	Hazardous substance	PCB 118	mg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
	Hazardous substance	PCB 138	mg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
	Hazardous substance	PCB 153	mg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
	Hazardous substance	PCB 180	mg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
Priority substance	Non hazardous pollutant	Naphthalene	µg/l	2	1	No GTV	3	0	0	-		0															
		Acenaphthylene	µg/l	No EQS	no IGV	No GTV	3	0	0	-		0															
	Hazardous substance	Acenaphthene	µg/l	No EQS	no IGV	No GTV	3	0	0	-		0															
		Fluorene	µg/l	No EQS	no IGV	No GTV	3	0.02	0.02	0.0		0															0.02
		Phenanthrene	µg/l	No EQS	no IGV	No GTV	3	0.015	0.015	0.0		0		0.015													
priority hazardous substance	Hazardous substance	Anthracene	µg/l	0.1	0.1	No GTV	3	0.002	0.002	0.0		0		0.002													
Priority substance	Hazardous substance	Fluoranthene	µg/l	No EQS	1	No GTV	3	0.027	0.027	0.0		0															0.027
		Pyrene	µg/l	No EQS	no IGV	No GTV	3	0.006	0.032	0.0		0		0.006											0.006	0.032	
		Benzo(a)anthracene	µg/l	No EQS	no IGV	No GTV	3	0	0	-		0															
		Chrysene	µg/l	No EQS	no IGV	No GTV	3	0	0	-		0															
		Benzo(b)fluoranthene	µg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
	Hazardous substance	Benzo(a)pyrene	µg/l	0.00017	0.01	0.0075	3	0	0	-		0															
	Hazardous substance	Indeno(1,2,3-cd)pyrene	µg/l	No EQS	0.05	No GTV	3	0.005	0.005	0.0		0		0.005													
		Dibenz(a,h)anthracene	µg/l	No EQS	no IGV	No GTV	3	0	0	-		0															
	Hazardous substance	Benzo(g,h,i)perylene	µg/l	No EQS	1.05	No GTV	3	0.005	0.005	0.0		0		0.005													
		PAH 16 Total	µg/l	No EQS	0.1	No GTV	3	0.02	0.02	0.0		0		0.02													
	Hazardous substance	Benzo(b)fluoranthene	µg/l	No EQS	1.5	No GTV	3	0.006	0.006	0.0		0		0.006													
	Hazardous substance	Benzo(k)fluoranthene	µg/l	No EQS	1.05	No GTV	3	0.006	0.006	0.0		0		0.006													
	Non hazardous pollutant	Methyl Tertiary Butyl Ether	µg/l	No EQS	30	10	3	0	0	-		0															
Priority substance	Hazardous substance	Benzene	µg/l	10	10	8.5	8	0	0	-		0															
	Hazardous substance	Toluene	µg/l	10	no IGV	No GTV	8	0	0	-		0															
	Hazardous substance	Ethylbenzene	µg/l	No EQS	10	No GTV	7	0	0	-		0															
		m/p-Xylene	µg/l	10	no IGV	No GTV	8	0	0	-		0															
	Hazardous substance	Xylene	µg/l	10	no IGV	No GTV	7	0	0	-		0															
		o-Xylene	µg/l	10	11	No GTV	7	0	0	-		0															
		BTEX Total	µg/l	No EQS	no IGV	No GTV	5	0	0	-		0															
		Dichlorodifluoromethane	µg/l	No EQS	no IGV	No GTV	2	0	0	-		0															
		Chloromethane	µg/l	No EQS	no IGV	No GTV	4	0	0	-		0															
	Hazardous substance	Vinyl Chloride	µg/l	No EQS	no IGV	0.375	4	0	0	-		0															
		Bromomethane	µg/l	No EQS	no IGV	No GTV	4	0	0	-		0															
		Chloroethane	µg/l	No EQS	no IGV	No GTV	4	0	0	-		0															
		Trichlorofluoromethane	µg/l	No EQS	no IGV	No GTV	4	0	0	-		0															
	Non hazardous pollutant	1,1-Dichloroethene (1,1-DCE)	µg/l	No EQS	no IGV	No GTV	4	0	0	-		0															
Priority substance	Non hazardous pollutant	Dichloromethane (DCM)	µg/l	20	no IGV	No GTV	3	0	0	-		0															

												Lab Report ID	Capital Water Systems /	22/12/2021										
												Sample ID	SP10		SP01						TRLC 001	TRLC 001A	TRLC 004	SWD1	SWD2
												Sampling Location	Outflow	Outfall	Discharge to Canal	Outflow	Outflow	Outflow	Outflow	Outflow	Outflow				Outflow	Outflow
			Water Qaulity Standard									Date	08/06/2021	22/12/2021	02/11/2021	13/06/2023	04/07/2023	08/08/2023	07/09/2023	17/10/2023	08/11/2023	06/02/2024	06/02/2024	06/02/2024	07/05/2024	07/05/2024
Priority Substances & Priority Hazardous Substances	Hazardous / Non hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Exceedance of WQS															
		trans-1,2-Dichloroethene	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
	Non hazardous pollutant	1,1-Dichloroethene	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		cis-1,2-Dichloroethene	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		1,2-Dichloropropane	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		Bromodichloromethane	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
	Hazardous substance	Chloroform	ug/l		2.5	no IGV	No GTV	1	2	2	2.0														2	
	Non hazardous pollutant	1,1,1-Trichloroethane	ug/l		No EQS	50	No GTV	1	0	0	0															
		1,1-Dichloropropene	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		1,2-Dichlorobenzene	ug/l		No EQS	11	No GTV	1	0	0	0															
	Hazardous substance	Carbon tetrachloride	ug/l		12	no IGV	No GTV	1	0	0	0															
Priority substance	Non hazardous pollutant	1,2-Dichloroethane	ug/l		10	no IGV	No GTV	1	0	0	0															
		Benzyl-2-chloroethyl sulfone	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
	Hazardous substance	Trichloroethene (TCE)	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
	Hazardous substance	1,2-Dichloropropane	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		Chloromethane	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		Bromodichloromethane	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		cis-1,3-Dichloropropene	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		trans-1,3-Dichloropropene	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
	Non hazardous pollutant	1,1,2-Trichloroethane	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
	Non hazardous pollutant	Tetrachloroethene (PCE)	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		1,2-Dichloropropane	ug/l		No EQS	no IGV	No GTV	1	0	0	0															
		Dibromochloromethane	ug/l		No EQS	no IGV	No GTV	1	0	0	0															

				Water Quality Standard								Lab Report ID	Capital Water Systems /	22/12/2021												
												Sample ID	SP10		SP01							TRLC 001	TRLC 001A	TRLC 004	SWD1	SWD2
												Sampling Location	Outflow	Outlet	Discharge to Canal	Outflow	Outflow	Outflow	Outflow	Outflow	Outflow				Outflow	Outflow
Priority Substances & Priority Hazardous Substances	Hazardous / Non Hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Exceedance of WQS	Date	08/09/2021	22/12/2021	03/11/2021	13/06/2023	04/07/2023	08/08/2023	07/09/2023	17/10/2023	09/11/2023	06/02/2024	08/02/2024	08/02/2024	07/06/2024	07/06/2024
	Hazardous substance	1,2-Dichloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	Chlorobenzene	ug/l	0.6	1	No GTV	2	0	0	0	0															
	Hazardous substance	1,1,1,2-Tetrachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	Dioxins	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Bromoform	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Isopropylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		1,1,2,2-Tetrachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Bromobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		1,2,3-Trichloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Propylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		n-Propylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Isopropyltoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	2-Chlorotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		1,3,5-Trimethylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	4-Chlorotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		tert-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	1,2,4-Trimethylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		sec-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		4-Isopropyltoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		n-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		1,2-Dibromo-3-chloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	1,2,4-Trichlorobenzene	ug/l	0.4	no IGV	No GTV	2	0	0	0	0															
		1,2,3-Trichlorobenzene	ug/l	0.4	no IGV	No GTV	2	0	0	0	0															
		Total Phenols HPLC	mg/l	No EQS	0.5	No GTV	2	0	0	0	0															
	Hazardous substance	2-Chlorophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Non hazardous pollutant	2-Methylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		3-Methylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	2,4-Dichlorophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		2,4-Dimethylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	2,4,5-Trichlorophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	2,4,6-Trichlorophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	200	100															
	Hazardous substance	4-Chloro-3-methylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		4-Methylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0.5	0															
		4-Nitrophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
Priority Substance	Hazardous substance	Pentachlorophenol	ug/l	0.4	no IGV	No GTV	2	0	0	0	0															
	Non hazardous pollutant	Phenol	ug/l	8	7.7	No GTV	2	0	0	0	0															
	Non hazardous pollutant	Phenols (non-CW)	ug/l	8	no IGV	No GTV	2	0	0	0	0															
		Flow (l/sec)			no IGV	No GTV	10	9	604	248.2	0											35	604	9		
		1,2-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		1,4-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Non hazardous pollutant	Bis(2-ethylhexyl) phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Butylbenzyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Non hazardous pollutant	Di-n-butyl phthalate	ug/l	No EQS	8	No GTV	2	0	0	0	0															
		Di-n-octyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Diethyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Dimethyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	1,2-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	1,3-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	1,4-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		2-Nitroaniline	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		4-Chloroaniline	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		2-Nitrobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		3-Nitroaniline	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		4-Nitroaniline	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Anthracene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Bis(2-chloroethoxy)methane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	Bis(2-chloroethyl)ether	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Carbazole	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Dibenzofuran	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
priority hazardous substance	Hazardous substance	Hexachlorobenzene	ug/l	0.01	0.03	No GTV	2	0	0	0	0															
priority hazardous substance	Hazardous substance	Hexachlorobutadiene	ug/l	0.1	0.1	No GTV	2	0	0	0	0															
		Hexachlorocyclopentadiene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	Hexachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Isophorone	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Naphthalene-hydroxylamine	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		2,4,7,9-Tetramethyldec-5-yne-4,7-diol	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		n-Nitrosodi-n-propylamine	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Non hazardous pollutant	Triphenylphosphine	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Nitrobenzene	ug/l	No EQS	10	No GTV	2	0	0	0	0															
		Ethyl Acetate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Tributylphosphate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Non hazardous pollutant	Carbon Disulphide	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Acetone	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
	Hazardous substance	Cyclohexanone	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		1,4-Dioxane	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		2-Butanone (MEK)	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		2-Hexanone	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Methyl Methacrylate	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		4-Methyl - 2 Pentanone (MIBK)	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Tetrahydrofuran	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Trans 1,4 -Dichloro-2-Butene	ug/l	No EQS	no IGV	No GTV	2	0	0	0	0															
		Total Petroleum Hydrocarbons (C5 - C44)	ug/l	No EQS	10	7.5	5	0.25	4800	2412	2	28					4800									
		BTEX (C5-C9)	ug/l	No EQS	10	No GTV	2	0	0	0	0															
		>C5-C6 Aliphatics	ug/l	No EQS	10	No GTV	2	0	240	122	1						240									
		>C6-C8 Aliphatics	ug/l	No EQS	10	No GTV	2	10	32	21	1														25	15
		>C8-C10 Aliphatics	ug/l	No EQS	10	No GTV	2	5000	5000	5000	1						5000									
		>C10-C12 Aliphatics	ug/l	No EQS	10	No GTV	2	12000	12000	12000	1						12000									
		>C12-C16 Aliphatics	ug/l	No EQS	10	No GTV	2	11000	11000	11000	1						11000									
		>C16-C21 Aliphatics	ug/l	No EQS	10	No GTV	2	130	130	130	1						130									
		>C21-C35 Aliphatics	ug/l	No EQS	10	No GTV	2	0	0	0	0															
		>C35 - C44 Aliphatic	ug/l	No EQS	10	No GTV	2	0	0	0	0															
		Total aliphatics (C5-35)	ug/l	No EQS	10	No GTV	2	67	32240	16227	1						32000								115	87
		>C8-C10 Aromatics	ug/l	No EQS	10	No GTV	2	0	0	0	0															
		>C10-C12 Aromatics	ug/l	No EQS	10	No GTV	2	0	0	0	0															

				Water Quality Standard								Lab Report ID	Clonlar WWT Systems /	22/12/2021									TRLC 001	TRLC 001A	TRLC 004	SWD1	SWD2
												Sample ID	SP10		SP01												
												Sampling Location	Outflow	Outfall	Discharge to Canal	Outflow	Outflow	Outflow	Outflow	Outflow	Outflow				Outflow	Outflow
Priority Substances & Priority Hazardous Substances	Hazardous / Non hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Exceedance of WQS	Date	09/08/2021	22/12/2021	02/11/2021	13/06/2023	04/07/2023	09/08/2023	07/09/2023	17/10/2023	08/11/2023	08/02/2024	08/02/2024	08/02/2024	07/05/2024	07/05/2024
		EC10-EC12 Aromatics	µg/l	No EQS		No GTV	1	4500	4500	4500	1							4500								
		EC10-EC12 Aromatics	µg/l	No EQS		No GTV	1	5100	5100	5100	1							5100								
		EC12-EC16 Aromatics	µg/l	No EQS		No GTV	1	5100	5100	5100	1							5100								
		EC16-EC21 Aromatics	µg/l	No EQS		No GTV	1	0	0	0	0															
		EC21-EC35 Aromatics	µg/l	No EQS		No GTV	1	0	0	0	0															
		C35 - C44 Aromatics	µg/l	No EQS		No GTV	4	0	0	0	0															
		Total aromatics EC5-35	µg/l	No EQS		No GTV	1	10000	10000	10000	1							10000								
		Total aliphatics and aromatics	µg/l	No EQS		No GTV	2	67	115	91.0	2														115	67
		Sum of TPH (C10-C40)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH (C6-C40)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH (C8-C40)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH (C21-C40)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH (C6-C12)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH (C12-C16)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH (C16-C21)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH + (C21-C40)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH (C6-C21)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH (C8-C16)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															
		TPH + (C8-C40)	µg/l	No EQS	no IGV	No GTV	0	0	0	0	0															

																	TetraTech 2024	
											Lab Report ID	JRE 2021					
											Sample ID	SP08	SP07	SP06	SP05	US1	US2
											Sampling Location	Barnakyle River Downstream of confluence with Loughmore Canal	Barnakyle River Upstream of confluence with Loughmore Canal	Mixing zone of Loughmore Canal and Barnakyle River	Approx 100m upstream of confluence with Barnakyle River	Upstream	Upstream
				Water Qaulity Standard							Date	02/11/2021	02/11/2021	02/11/2021	02/11/2021	07/05/2024	07/05/2024
Priority Substances & Priority Hazardous Substances	Hazardous / Non hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Excedance of WQS						
		Free Cyanide	mg/L	0 01	no IGV	No GTV	2	0 04	0 04	0 0	1					0 04	
	Non hazardous pollutant	Ammoniacal Nitrogen as N	mg/L	0 065	150	0 065	6	0 02	0 07	0 0	1	0 05	0 07	0 04		0 03	0 02
		pH	pH Units	Soft:3 Water 4 5< pH < 9 0 Hard:4 Water 6 0< pH < 8 5	no IGV	≥ 6 5 and ≤9 5	6	8 19	8 22	8 2	0					8 19	8 22
		Electrical conductivity @25C	µS/cm	No EQS	1000	No GTV	2	0	0	-	0						
		Total Alkalinity as $CaCO_3$	mg/L	No EQS	no IGV	No GTV	4	390	392	391 0	0					392	390
		Suspended Solids	mg/L	No EQS	no IGV	No GTV	4	7 54	8 04	7 8	0	7 88	7 73	7 54	8 04		
		BOD	mg/L	1 5	no IGV	No GTV	2	0	0	-	0						
		COD	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0						
		Total Phosphorus as P	mg/L	No EQS	no IGV	No GTV	4	27	55	40 8	0	46	55	39	27		
	Non hazardous pollutant	Orthophosphate (as P)	mg/l	0 035	0 03	0 035	0	0	0	-	0						
		Nitrate NO_3	mg/L	No EQS	no IGV	No GTV	4	3	15 5	7 0	0	5 4	15 5	3 9	3		
	Non hazardous pollutant	Ammonia NH_3	mg/L	0 078	150	0 078	0	0	0	-	0						
	Non hazardous pollutant	Ammoniacal Nitrogen as NH3		0 078	150	0 078	0	0	0	-	0						
	Non hazardous pollutant	Ammonia as N	mg/L	0 065	150	0 065	0	0	0	-	0						
		Sulphate as SO_4	mg/L	No EQS	200	187 5	2	14 8	15 5	15 2	0					14 8	15 5
		Oils, Fats & Grease	mg/l	No EQS	no IGV	No GTV	0	0	0	-	0						
		E. coli	ug/l	No EQS	0	No GTV	0	0	0	-	0						
	Non hazardous pollutant	Antimony	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	Arsenic	ug/l	25	10	7 5	2	3 6	4 8	4 2	0					4 8	3 6
	Non hazardous pollutant	Boron	ug/l	No EQS	1000	750	2	20	20	20 0	0					20	20
		Beryllium (total)	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
priority hazardous substance	Non hazardous pollutant	Cadmium	ug/l	0 25	5	3 75	2	0	0	-	0						
	Hazardous substance	Chromium (total)	ug/l	3 4	30	7 5	2	0	0	-	0						
	Non hazardous pollutant	Cobalt	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
	Non hazardous pollutant	Copper	ug/l	30	30	1500	6	0	0	-	0						
Priority substance	Hazardous substance	Lead	ug/l	1 2	10	0 75	6	0	0	-	0						
priority hazardous substance	Hazardous substance	Mercury	ug/l	0 05	no IGV	No GTV	2	0	0	-	0						
	Non hazardous pollutant	Molybdenum	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
Priority substance	Non hazardous pollutant	Nickel	ug/l	4	20	15	2	0	0	-	0						
	Non hazardous pollutant	Selenium	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Tellurium	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
		Thallium	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
		Tin	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
		Vanadium	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
	Non hazardous pollutant	Zinc	ug/l	100	100	75	6	4	30	16 7	0	26	8	28	30	4	4
		Total Heavy Metals	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	PCBs (sum of 7 congeners)	mg/L	No EQS	0 01	No GTV	0	0	0	-	0						
	Hazardous substance	PCB 28	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	PCB 52	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	PCB 101	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	PCB 118	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	PCB 138	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	PCB 153	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	PCB 180	mg/L	No EQS	no IGV	No GTV	0	0	0	-	0						
Priority substance	Non hazardous pollutant	Naphthalene	ug/l	2	1	No GTV	2	0	0	-	0						
		Acenaphthylene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	Acenaphthene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Fluorene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Phenanthrene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
priority hazardous substance	Hazardous substance	Anthracene	ug/l	0 1	0 1	No GTV	2	0	0	-	0						
Priority substance	Hazardous substance	Fluoranthene	ug/l	No EQS	1	No GTV	2	0	0	-	0						
		Pyrene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Benzo(a)anthracene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Chrysene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Benzo(bk)fluoranthene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						

TETRA TECH

																	TetraTech 2024	
											Lab Report ID	JRE 2021					
											Sample ID	SP08	SP07	SP06	SP05	US1	US2
											Sampling Location	Barnakyle River Downstream of confluence with Loughmore Canal	Barnakyle River Upstream of confluence with Loughmore Canal	Mixing zone of Loughmore Canal and Barnakyle River	Approx 100m upstream of confluence with Barnakyle River	Upstream	Upstream
			Water Qaulity Standard								Date	02/11/2021	02/11/2021	02/11/2021	02/11/2021	07/05/2024	07/05/2024
Priority Substances & Priority Hazardous Substances	Hazardous / Non hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Excedance of WQS						
	Hazardous substance	Benzo(a)pyrene	ug/l	0.00017	0.01	0.0075	2	0	0	-	0						
	Hazardous substance	Indeno(123cd)pyrene	ug/l	No EQS	0.05	No GTV	2	0	0	-	0						
		Dibenzo(ah)anthracene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	Benzo(ghi)perylene	ug/l	No EQS	1.05	No GTV	2	0	0	-	0						
		PAH 16 Total	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	Benzo(b)fluoranthene	ug/l	No EQS	1.5	No GTV	2	0	0	-	0						
	Hazardous substance	Benzo(k)fluoranthene	ug/l	No EQS	1.05	No GTV	2	0	0	-	0						
	Non hazardous pollutant	Methyl Tertiary Butyl Ether	ug/l	No EQS	30	10	6	0	0	-	0						
Priority substance	Hazardous substance	Benzene	ug/l	10	1	0.75	6	0	0	-	0						
	Hazardous substance	Toluene	ug/l	10	no IGV	No GTV	6	0	0	-	0						
	Hazardous substance	Ethylbenzene	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		m/p-Xylene	ug/l	10	no IGV	No GTV	6	0	0	-	0						
	Hazardous substance	Xylene	ug/l	10	no IGV	No GTV	0	0	0	-	0						
		o-Xylene	ug/l	10	11	No GTV	6	0	0	-	0						
		BTEX Total	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
		Dichlorodifluoromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Chloromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	Vinyl Chloride	ug/l	No EQS	no IGV	0.375	2	0	0	-	0						
		Bromomethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Chloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Trichlorofluoromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Non hazardous pollutant	1,1-Dichloroethene (1,1 DCE)	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
Priority substance	Non hazardous pollutant	Dichloromethane (DCM)	ug/l	20	no IGV	No GTV	2	0	0	-	0						
		trans-1,2-Dichloroethene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Non hazardous pollutant	1,1-Dichloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		cis-1,2-Dichloroethene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		2,2-Dichloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Bromochloromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	Chloroform	ug/l	2.5	no IGV	No GTV	2	0	0	-	0						
	Non hazardous pollutant	1,1,1-Trichloroethane	ug/l	No EQS	501	No GTV	2	0	0	-	0						
		1,1-Dichloropropene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		1,2 Dichlorobenzene	ug/l	No EQS	11	No GTV	0	0	0	-	0						
	Hazardous substance	Carbon tetrachloride	ug/l	12	no IGV	No GTV	2	0	0	-	0						
Priority substance	Non hazardous pollutant	1,2-Dichloroethane	ug/l	10	no IGV	No GTV	2	0	0	-	0						
		Benzyl 2-chloroethyl sulfone	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	Trichloroethene (TCE)	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	1,2-Dichloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Dibromomethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Bromodichloromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		cis-1,3-Dichloropropene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		trans-1,3-Dichloropropene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Non hazardous pollutant	1,1,2-Trichloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Non hazardous pollutant	Tetrachloroethene (PCE)	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		1,3-Dichloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Dibromochloromethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	1,2-Dibromoethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	Chlorobenzene	ug/l	1.5	1	No GTV	2	0	0	-	0						
	Hazardous substance	1,1,1,2-Tetrachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	Styrene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Bromoform	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Isopropylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		1,1,2,2-Tetrachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Bromobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		1,2,3-Trichloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		Propylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		n-Propylbenzene	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
		p-Isopropyltoluene	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0						
	Hazardous substance	2-Chlorotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		1,3,5-Trimethylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	4-Chlorotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		tert-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
	Hazardous substance	1,2,4-Trimethylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						
		sec-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0						

TETRA TECH

											Lab Report ID	JRE 2021					TetraTech 2024	
											Sample ID	SP08	SP07	SP06	SP05	US1	US2	
											Sampling Location	Barnakyle River Downstream of confluence with Loughmore Canal	Barnakyle River Upstream of confluence with Loughmore Canal	Mixing zone of Loughmore Canal and Barnakyle River	Approx 100m upstream of confluence with Barnakyle River	Upstream	Upstream	
				Water Qaulity Standard							Date	02/11/2021	02/11/2021	02/11/2021	02/11/2021	07/05/2024	07/05/2024	
Priority Substances & Priority Hazardous Substances	Hazardous / Non hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Excedance of WQS							
		4-Isopropyltoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		n-Butylbenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		1,2-Dibromo-3-chloropropane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	1,2,4-Trichlorobenzene	ug/l	0 4	no IGV	No GTV	2	0	0	-	0							
		1,2,3-Trichlorobenzene	ug/l	0 4	no IGV	No GTV	2	0	0	-	0							
		Total Phenols HPLC	mg/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	2-Chlorophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Non hazardous pollutant	2-Methylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		2-Nitrophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	2,4-Dichlorophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		2,4-Dimethylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	2,4,5-Trichlorophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	2,4,6-Trichlorophenol	ug/l	No EQS	200	No GTV	2	0	0	-	0							
	Hazardous substance	4-Chloro-3-methylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		4-Methylphenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		4-Nitrophenol	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
Priority substance	Hazardous substance	Pentachlorophenol	ug/l	0 4	no IGV	No GTV	2	0	0	-	0							
	Non hazardous pollutant	Phenol	ug/l	8	1 5	No GTV	2	0	0	-	0							
	Non hazardous pollutant	Phenols (non-DW)	ug/l	8	no IGV	No GTV	0	0	0	-	0							
		PAH Total	ug/l		no IGV	No GTV	0	0	0	-	0							
		2-Chloronaphthalene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		2-Methylnaphthalene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Non hazardous pollutant	Bis(2-ethylhexyl) phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		Butylbenzyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Non hazardous pollutant	Di-n-butyl phthalate	ug/l	No EQS	2	No GTV	2	0	0	-	0							
		Di-n-Octyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		Diethyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		Dimethyl phthalate	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	1,2-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	1,3-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	1,4-Dichlorobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		2-Nitroaniline	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		2,4-Dinitrotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		2,6-Dinitrotoluene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		3-Nitroaniline	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		4-Bromophenylphenylether	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	4-Chloroaniline	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		4-Chlorophenylphenylether	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		4-Nitroaniline	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		Azobenzene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		Bis(2-chloroethoxy)methane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	Bis(2-chloroethyl)ether	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		Carbazole	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		Dibenzofuran	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
priority hazardous substance	Hazardous substance	Hexachlorobenzene	ug/l	0 01	0 03	No GTV	2	0	0	-	0							
priority hazardous substance	Hazardous substance	Hexachlorobutadiene	ug/l	0 1	0 1	No GTV	2	0	0	-	0							
		Hexachlorocyclopentadiene	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
	Hazardous substance	Hexachloroethane	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		Isophorone	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		N-nitrosodi-n-propylamine	ug/l	No EQS	no IGV	No GTV	2	0	0	-	0							
		2,4,7,9-Tetramethyl-5-decyn-4,7-diol	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		n-Nitroso-di-n-propylamine	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
	Non hazardous pollutant	Diphenylamine	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		Nitrobenzene	ug/l	No EQS	10	No GTV	2	0	0	-	0							
		Ethyl Acetate	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		Tribromomethane	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
	Non hazardous pollutant	Carbon Disulphide	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		Acetone	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
	Hazardous substance	Epichlorohydrin	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		1-Chlorobutane	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		2-Butanone (MEK)	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		2-Hexanone	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		Methyl Methacrylate	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		4-Methyl -2 Pentanone (MIBK)	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		Tetrahydrofuran	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		Trans-1 4 -Dichloro-2-Butene	ug/l	No EQS	no IGV	No GTV	0	0	0	-	0							
		Total Petroleum Hydrocarbons (>C5 - C44)	ug/l	No EQS	no IGV	7 5	0	0	0	-	0							

TETRA TECH

																	TetraTech 2024	
											Lab Report ID	JRE 2021					
											Sample ID	SP08	SP07	SP06	SP05	US1	US2
											Sampling Location	Barnakyle River Downstream of confluence with Loughmore Canal	Barnakyle River Upstream of confluence with Loughmore Canal	Mixing zone of Loughmore Canal and Barnakyle River	Approx 100m upstream of confluence with Barnakyle River	Upstream	Upstream
			Water Qaulity Standard								Date	02/11/2021	02/11/2021	02/11/2021	02/11/2021	07/05/2024	07/05/2024
Priority Substances & Priority Hazardous Substances	Hazardous / Non hazardous	Parameter	Units	EQS	EPA IGV	GTV	No of Samples	Min	Max	Average	Excedance of WQS						
		EPH (C8-C40)	ug/l	No EQS	10	No GTV	2	0	0	-	0						
		>C5-C6 Aliphatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>C6-C8 Aliphatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>C8-C10 Aliphatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>C10-C12 Aliphatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>C12-C16 Aliphatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>C16-C21 Aliphatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>C21-C35 Aliphatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>C35 - C44 Aliphatic	ug/l	No EQS	10	No GTV	4	0	0	-	0						
		Total aliphatics C5-35	ug/l	No EQS	10	No GTV	2	0	0	-	0						
		>C5-EC7 Aromatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>EC7-EC8 Aromatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>EC8-EC10 Aromatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>EC10-EC12 Aromatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>EC12-EC16 Aromatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>EC16-EC21 Aromatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>EC21-EC35 Aromatics	ug/l	No EQS	10	No GTV	6	0	0	-	0						
		>C35 - C44 Aromatics	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		Total aromatics C5-35	ug/l	No EQS	10	No GTV	2	0	0	-	0						
		Total aliphatics and aromatics	ug/l	No EQS	10	No GTV	2	0	0	-	0						
		Sum of TPH (C10-C40)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH (C35-C40)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH (C30-C35)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH (C21-C30)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH (C16-C21)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH (C12-C16)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH (C10-C12)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH > (C21 -C40)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH >(C10 -C21)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH >(C6 -C10)	ug/l	No EQS	10	No GTV	0	0	0	-	0						
		TPH > (C6 -C40)	ug/l	No EQS	10	No GTV	0	0	0	-	0						