Mobuoy Road Waste Site

Factual Report: Information on the type of waste and quantity of waste buried at the Mobuoy site

February 2025

1.0 Background Information

The Mobuoy Remediation Project site ('the site') is situated on the Mobuoy Road, Derry/Londonderry, BT47 3JG. The site consists of two distinct parcels of land identified as City Industrial Waste Limited (CIW) and Campsie Sand and Gravels Limited (CS&G).

The site is approximately 1.75km in length, between 100m and 500m wide, and occupies a surface area of approximately 46 hectares. The site is divided into two distinct parts by the Mobuoy Road –

- The City Industrial Waste (CIW) site is located to the east of the Mobuoy Road and occupies an area of approximately 14Ha.

- The Campsie Sand and Gravel (CSG) site is irregularly shaped elongated north to south and occupies an area of approximately 33Ha.

A range of waste types have been buried at the site, which include construction and demolition waste, domestic wastes, metallic wastes, tarry waste, and a mixture of all of these. Further information on the type of waste at the site is discussed in Sections 2.0 and 3.0 of this factual report.

Following the completion of preliminary ground investigation works in 2015, it was initially estimated that the 1.2 million cubic metres of waste was buried at the site. However, additional ground investigation works at the site since 2015 have provided additional information about the extent and depth of waste buried at the site to inform an updated and more accurate estimate of the quantity of waste buried at the site. **The current estimate of the volume of waste buried at the site is approximately 1.6 million cubic metres**. Information used to update the estimate of the volume of waste at the site is discussed in Section 4.0 of this factual report.

2.0 Type of waste present at the site

The predominant types of waste present at the site are construction and demolition waste, domestic wastes, metallic wastes, and a mixture of all of these. Numerous intrusive ground investigations have been carried out at the site. A summary of ground investigations carried out at the site is presented in Section 4.0 as Figure 4.1. In total, 95 trial pits have been excavated and 140 boreholes ('cores') have been completed at the site. Using a combination of waste information gained from observing the waste encountered during the excavation of trial pits/boreholes and laboratory testing of excavated material, the type of waste buried at the site has been determined.

An updated Detailed Quantitative Risk Assessment (DQRA) has been completed for the site. The DQRA report presents further detailed information on the ground investigation work carried out, including the location of exploratory locations, the waste encountered at exploratory locations, and the testing that was carried out on waste/soil samples and groundwater samples.

The results of ground investigation works carried out at the site have proven that the type of waste buried at the site is highly variable across the site. Due to this, different parts of the site pose different risks to groundwater and surface water quality.

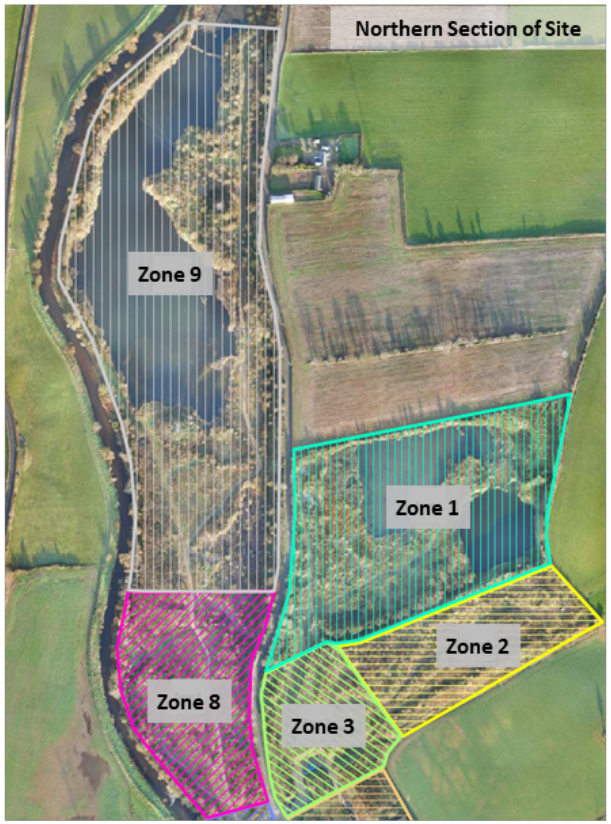
To assess the risks posed to groundwater and surface water quality by the waste buried at the site with greater accuracy, the DQRA site was sub-divided into 10 smaller 'micro sites' which are referred

to as ‘waste zones’. Each waste zone was designated based on the type of waste and type of contamination encountered during ground investigation works.

A description of the main type of waste identified, and the total quantity of waste estimated to be present within each of the ten waste zones, has been presented in the graphics overleaf (Figure 2.1 and Figure 2.2). For information, a summary of all of the waste types present and potential contaminants of concern have been extracted from the Remediation Options Appraisal Report and appended to this report as Appendix A.

Figure 2.1 – Distribution and Type of Waste Present (Northern Portion of the Mobuoy Site)

Mobuoy Remediation Project - Distribution and Type of Waste Present



Waste Zone	Waste Profile (Description of Waste) [i]	Estimated Waste Quantity (m^3) [iii]
Zone 1	*Domestic and mixed (domestic and Construction and Demolition)*	**358,907**
Zone 2	*Domestic and mixed (domestic and Construction and Demolition)*	**234,496**
Zone 3	*Predominantly domestic or municipal* [ii]	**229,415**
Zone 8	*Mixed organic, occasional domestic and C&D wastes*	**127,058**
Zone 9	*Construction & demolition wastes with occasional domestic/municipal waste.*	**229,139**

Notes :

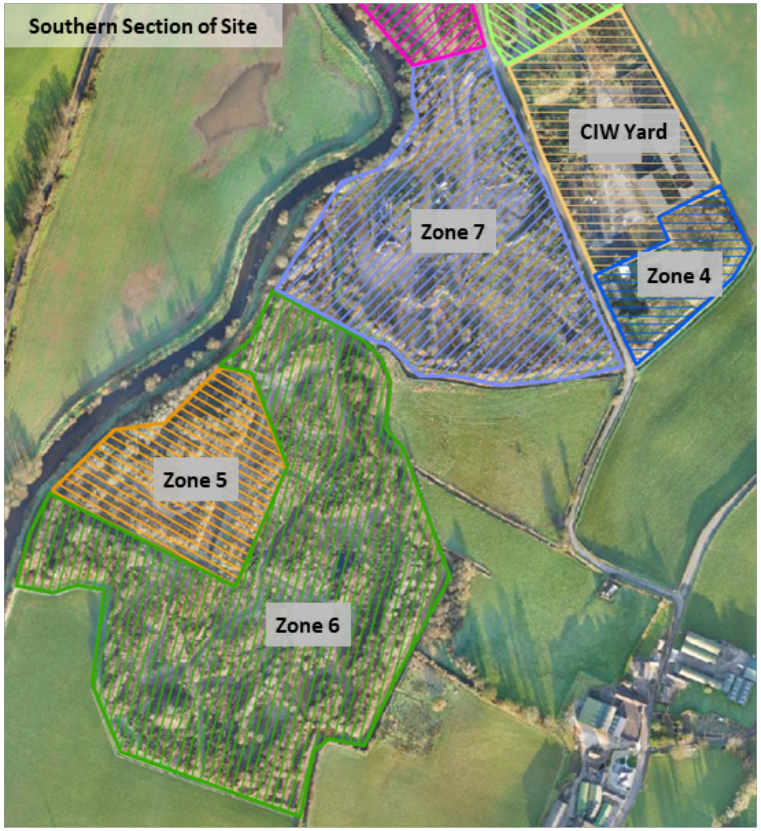
[i] Reference: Appendix B of the Remediation Options Appraisal Report, completed by Tetra Tech, which can be accessed on our website here.

[ii] Waste profile describes the main types of waste present. Tarry waste, or evidence of tarry waste, is a small proportion of the overall waste in this zone.

[iii] Using a conversion factor of 1:1, it is assumed that one cubic metre of waste is equal to one tonne

Figure 2.2– Distribution and Type of Waste Present (Southern Portion of the Mobuoy Site)

Mobuoy Remediation Project - Distribution and Type of Waste Present



Waste Zone	Waste Profile (Description of Waste) [i]	Estimated Waste Quantity (m^3) [iii]
CIW Yard	*Predominantly domestic or municipal*	45,616
Zone 4	*Mixed waste of domestic and construction & demolition*	42,854
Zone 5	*Construction and demolition waste, with some mixed domestic Waste* [ii]	30,619
Zone 6	*Mixed construction & demolition and domestic waste*	161,554
Zone 7	*Construction and demolition waste*	170,786
Total Waste Volume Estimate for the Site		**1,630,444**

Notes :

[i] Reference: Appendix B of the Remediation Options Appraisal Report, completed by Tetra Tech, which can be accessed on our website here.

[ii] Waste profile describes the main types of waste present. Tarry waste, or evidence of tarry waste, is a small proportion of the overall waste in this zone.

[iii] Using a conversion factor of 1:1, it is assumed that one cubic metre of waste is equal to one tonne of waste

Total Waste Quantity Estimate – 1,630,444m^3

3.0 Tarry Waste

3.1 Background Information

Tarry wastes are a by-product of an industrial process, of which there are several. The tarry wastes that have been buried at the Mobuoy site have been identified as a by-product from an industrial process that was used to manufacture acetylene.

In 1996, a very detailed survey and assessment was carried out on behalf of the Department of the Environment (now Department of Agriculture, Environment, and Rural Affairs) by an environmental consultancy group, ENTEC, on all known and potential tarry waste disposal sites. This comprised of 29 disposal sites in total and 2 of those disposal sites are located within the boundary of the Mobuoy site.

3.2 Description of Tarry Waste

Tarry waste was encountered during ground investigations at the site in 2022, and is discussed and assessed in detail in the Detailed Quantitative Risk Assessment (DQRA). When tarry waste was encountered during ground investigation works, it had a dark, thick, sticky consistency and had a strong 'creosote-like' and petroleum odour.

3.3 Chemicals in Tarry Waste

Tarry waste contains high concentrations of distinctive hazardous chemicals, including Aromatic Hydrocarbons, Aliphatic Hydrocarbons, BTEX (Benzene, Toluene, Ethylbenzene and Xylene) compounds, and PAHs (Polycyclic Aromatic Hydrocarbons). These chemicals are also present in varying concentrations in fuels derived from crude oil, such as petrol, diesel, and kerosene. Tarry waste indicator chemicals were detected in laboratory analysis of some soil and groundwater samples that have been collected during ground investigations at the Mobuoy site. The results of the laboratory testing of soil and groundwater are presented in the Detailed Quantitative Risk Assessment (DQRA). The risk to water quality posed by the contaminants/chemicals in tarry waste were a very important consideration for the DQRA and the cleanup of tarry waste is a significant component of the draft Remediation Strategy for the Mobuoy site.

3.2 Tarry waste location on the Mobuoy site

Tarry waste, or evidence of tarry waste residue, was identified at three locations on the Mobuoy site.

Historical documentary evidence presented in the ENTEC Report (referred to in Section 3.1), confirmed 2 of the 29 tarry waste disposal sites were located within the boundary of the Mobuoy site. ENTEC refer to these sites as –

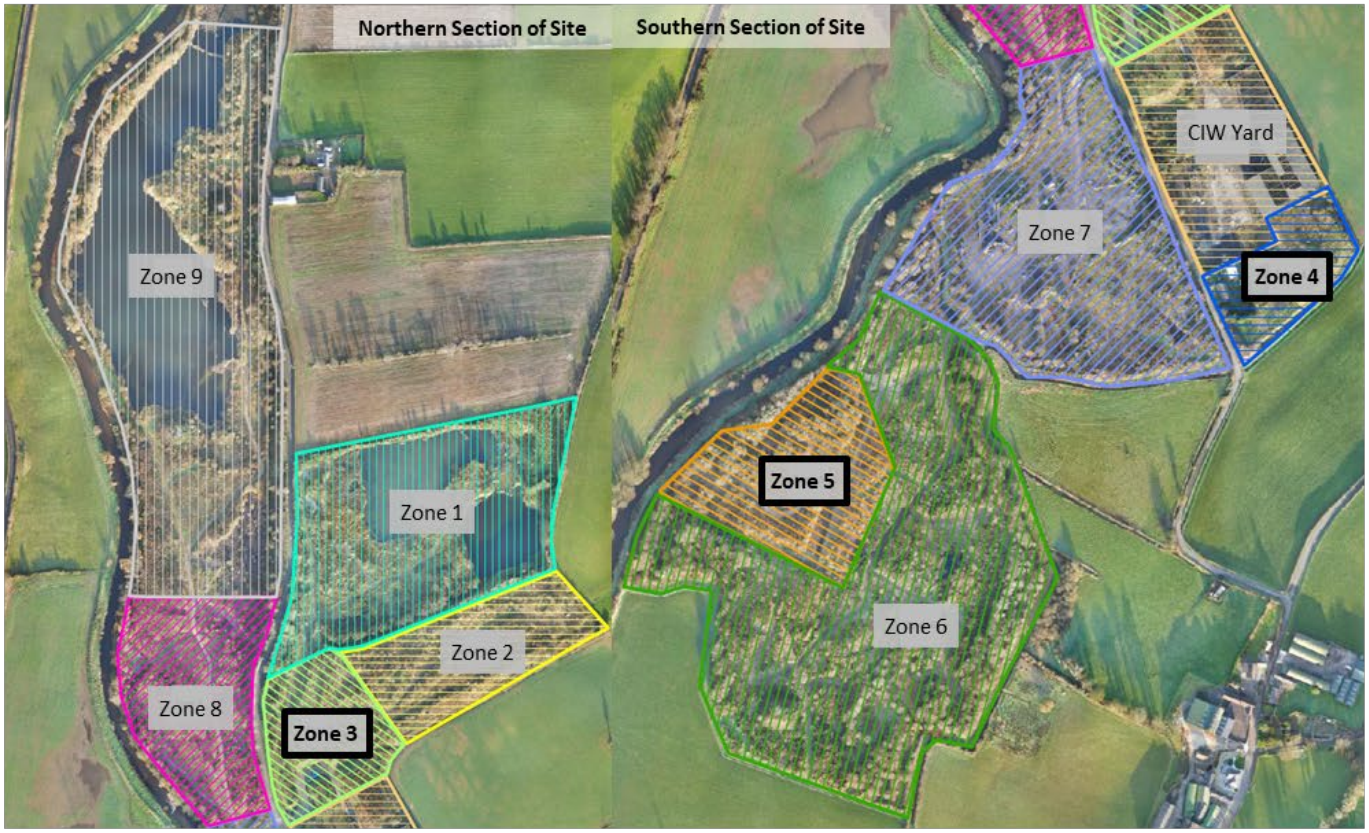
- 'Site 10 - Mobuoy Road (Waste Disposal Site)', and
- 'Site 4 - Mobuoy Road (Sand Pit)'.

During NIEA ground investigations, physical tarry waste was observed in Waste Zone 3 only. Where physical tarry waste was observed was consistent with the mapped location of ENTEC disposal Site 10. Physical tarry waste was not observed during ground investigations which targeted the mapped location of ENTEC disposal Site 4. However, low concentrations of chemicals that are indicators of the presence of tarry waste were detected in groundwater quality samples. This would indicate that the tarry waste that was originally disposed of at Site 4 has since been relocated from that disposal site, potentially during quarrying operations at the site.

In addition to the locations of the historical tarry waste disposal sites, low concentrations of chemical indicators of tarry waste were identified during soil and groundwater testing carried out as part of ground investigations at the site in Zone 4. No physical tarry waste was observed in this area. The location of tarry waste on the Mobuoy site is summarised and presented on Figure 3.1 overleaf.

Figure 3.1 – The location of tarry waste or tarry waste residue on the Mobuoy Site

Mobuoy Remediation Project – Locations of Tarry Waste or Evidence of Tarry Waste



Waste Zone	Evidence of Tarry Waste
Zone 3	*Location of Entec Tarry Waste Site 10 - Tarry waste observed during ground investigation, soil quality testing, and groundwater quality monitoring*
Zone 5	*Location of Entec Tarry Waste Site 4 - Tarry waste not observed during ground investigation, but low-level indicators of tarry waste detected in soil quality testing, and groundwater quality monitoring*
Zone 4	*Not a location of an Entec Tarry Waste Site and tarry waste not observed during ground investigation, but low-level indicators similar to that of tarry waste were detected in soil quality testing, and groundwater quality monitoring*

4.0 Volume of waste present at the site

4.1 Updated Waste Volume Estimate

Following a review of all ground investigation information now available for the Mobuoy site, incorporating both historical ground investigation information and recent additional ground investigation information, it is now estimated that the quantity of waste on the site is approximately **1,630,444 cubic metres**.

Using a conversion factor of one cubic metre of waste being equal to one tonne, it is estimated that **1,630,444 tonnes** of waste is present at the Mobuoy site, and this is the quantity of waste that requires remediation.

It is important to note that it is the estimate of the quantity that has changed and not the quantity of waste present at the site since it closed in 2013. The estimate of the quantity of waste has increased due to additional information becoming available through extensive additional ground investigation works. This has provided additional information on the extent and depth of waste across the site. The availability of this information has enabled a more accurate estimate to be calculated. It is not due to additional waste being buried at the Mobuoy site since the site was closed by NIEA in 2013. Details of all ground investigations carried out at the site is presented on the graphics below (figures 4.1 and 4.2).

4.2 Difficulties estimating water volume at engineered landfill sites

At an engineered and licensed landfill site, where the waste mass is typically buried within a landfill cell which confines the waste mass in a reasonably regular shape, retrospectively calculating the quantity of waste within a regular shape, such as an engineered cell, is a relatively simple calculation, for example, like calculating the quantity of material in a box.

In contrast, retrospectively calculating the quantity of waste at an un-engineered and illegal landfill site such as Mobuoy, is considerably more difficult. This is because waste deposited at illegal landfill sites is, typically, not confined by a regularly shaped engineered cell which then results in an irregularly shaped waste mass.

However, the increased number and density of ground investigation locations, combined with the assistance of digital modelling, has allowed NIEA to estimate the quantity of waste present at the site with greater accuracy.

Figure 4.1 – Details of ground investigations carried out at the site to inform an updated waste volume estimate

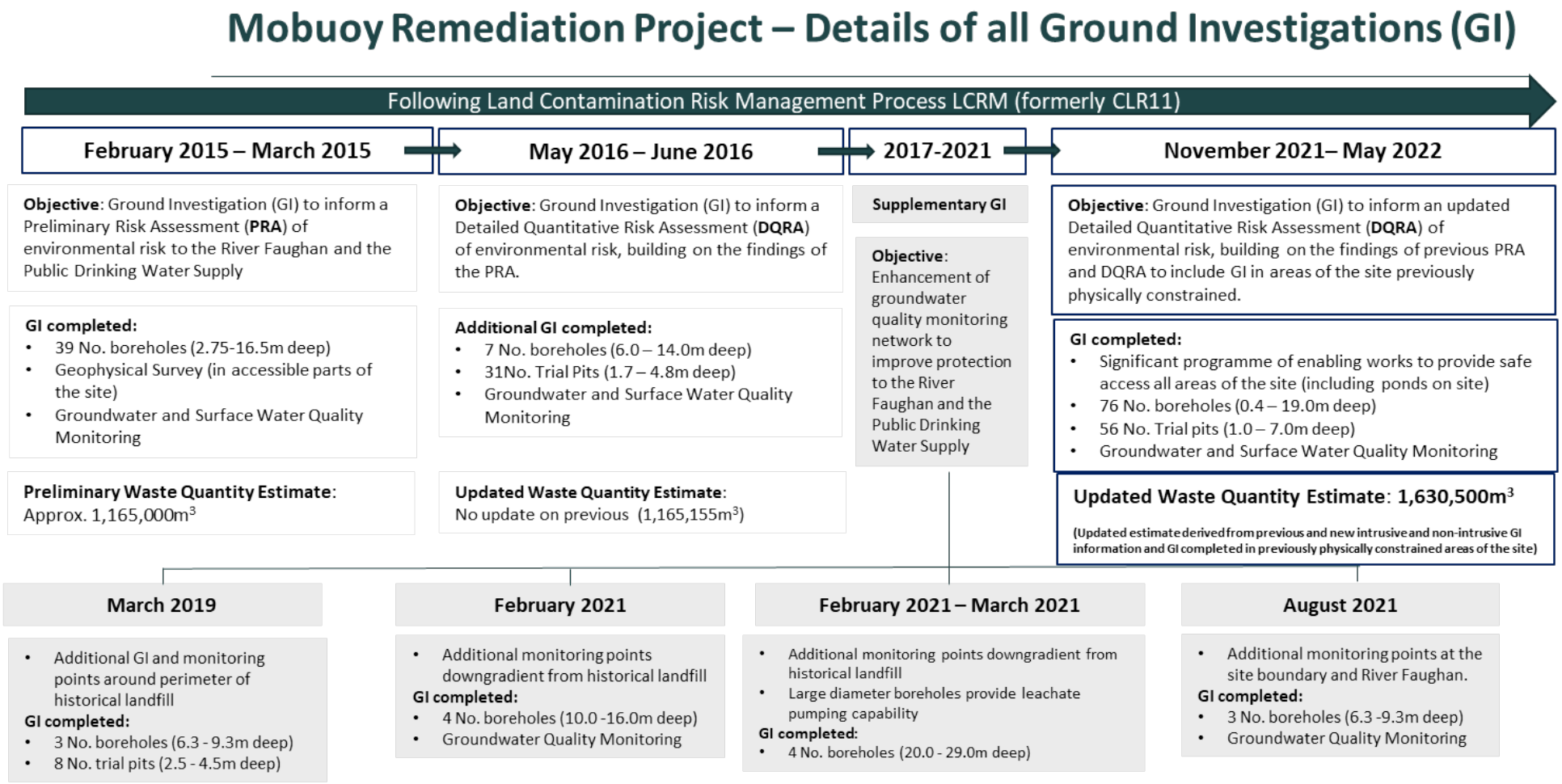


Figure 4.2 – Details of increased surface area coverage of site area to inform an updated waste volume estimate

Mobuoy Remediation Project – Additional Ground Investigation (GI) Area Coverage

2016 - Preliminary Risk Assessment (2016)

Preliminary Waste Quantity Estimate – 1,165,000m³

Additional Ground Investigation (GI) Work Completed which Informs Updated Waste Quantity Estimate

2023 – following Detailed Quantitative Risk Assessment (2022)

Updated Waste Quantity Estimate – 1,630,444m³



Preliminary GI Exploratory Locations (2015)

Whole Site Coverage of Exploratory Locations - A significant civil engineering works programme was implemented in advance of the detailed GI in 2021 to provide access to the whole site, including access and enabling works to deploy a barge to allow waste potentially present below ponds to be investigated.

Additional Exploratory Locations - The updated waste volume estimate has been further informed by GI from an additional 192 exploratory locations (over and above the 39 exploratory locations that partly informed the preliminary estimate.



All GI Exploratory Locations (2015-2021)

Annex A – Waste Profiles – Extract from Remediation Options Appraisal Report

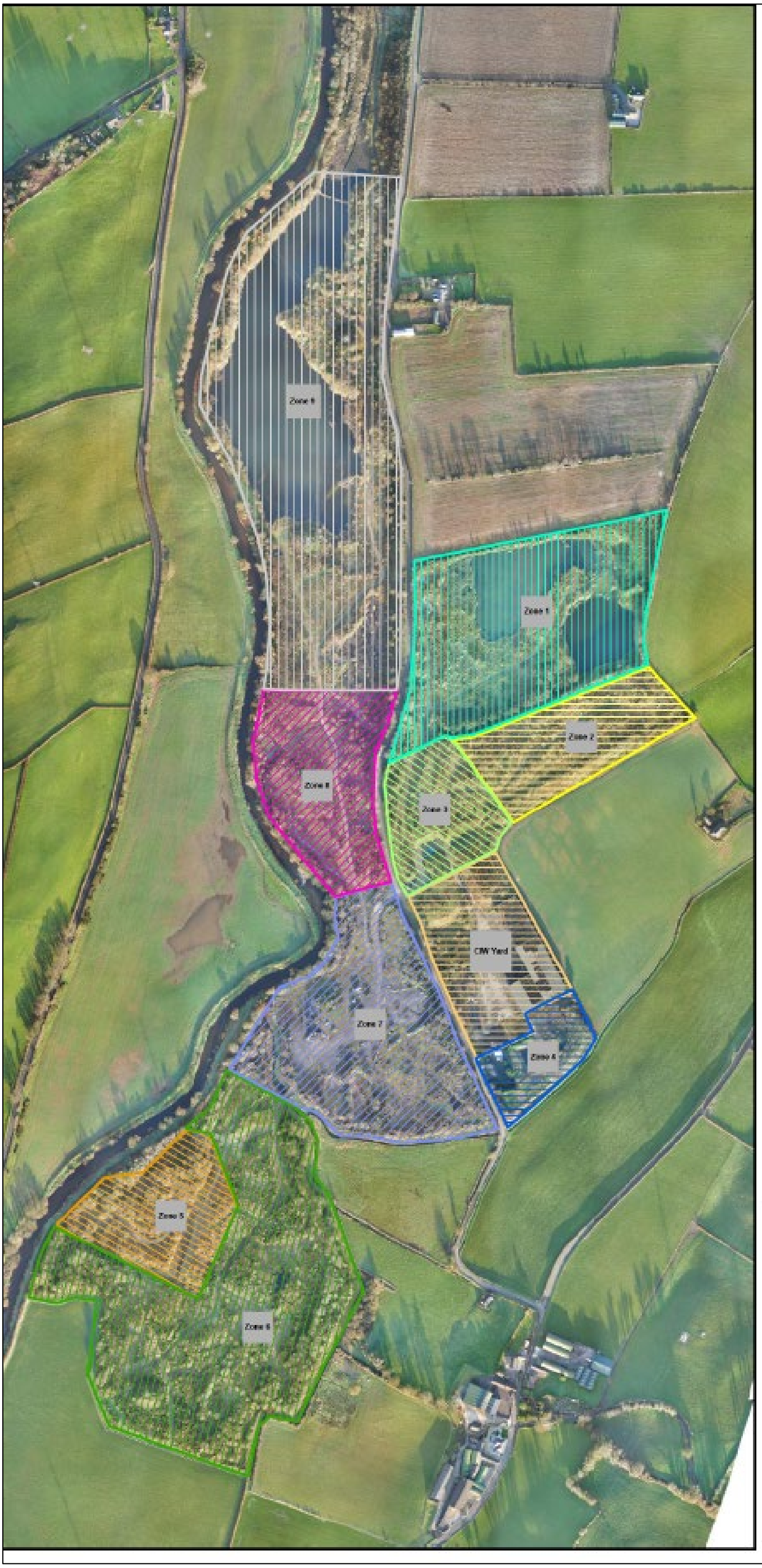


Figure 3. Site Zoning

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Legend

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 5
- Zone 6
- Zone 7
- Zone 8
- Zone 9
- CIW Yard

Note:

Drawn by:

Checked by:

Office: Belfast Revision: No.1

Client: NIEA Project: B030252 - Mobuoy Road Remediation

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Date: 05/08/2022

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	Zone 1	Zone 2	Zone 3 & CIW Yard	Zone 4	Zone 5
Description of zone	Area of unauthorized landfilling north of closed landfill on the City Industrial Waste area. Comprising mixed organic, domestic and construction and demolition type wastes, it contains two ponds.	Area of historic closed (formerly permitted) landfill, which contains mixed domestic and construction and demolition-type wastes. Thin bands of clay strata are present near the surface and forming horizontal bands within the waste.	Area to the southwest of the closed landfill. Entec 1993 suggested presence of tarry waste in this area.	Raised area of waste material deposited towards the south-eastern area of the City Industrial Waste site. Previous investigations indicated domestic and construction and demolition-type wastes in this area. Historical isolated incidence of suspected tarry wastes. Wastes deposited indicative of C&D and domestic, processed (trommel fines).	Area of former Campsie Sand and Gravel where historic documentary evidence suggested that tarry wastes may have been deposited. Waste has been used in this area to infill sand and gravel extractions meaning that it is sporadic across the site rather than present in a widespread layer like in other zones.
Waste profile	Domestic and mixed (domestic and C&D)	Domestic and mixed (domestic and C&D)	Predominantly domestic or municipal.	Mixed waste of domestic and construction & demolition	Construction and demolition waste, with some mixed domestic waste.
Waste thickness (m)	4.8 - 12.5m	11.5 - 16.5m	3 - 13m, Tarry waste: 2 - 11m	1.6 - 5.4	2.5 - 4 m
Underlying superficial deposits	Sand and gravel	Sand and gravel	Silty, fine to coarse sand.	Sand and some peat deposits present	Fine to coarse sand.
Water bodies present on- site	Yes – 2 ponds	No	No	1 small rectangular lagoon	None
Soil contamination	PAHs in soils (<1mbgl)	PAHs in soils (<1mbgl)	Tarry waste is described as: viscous black liquid. There is heavy staining of the underlying superficial deposits.	Low level TPH in soil samples of several trial pits	BTEX, PAHs, TPH
Leachate contamination	Heavy metals, ammonia, BTEX, TPHs	Heavy metals, ammonia, BTEX, TPHs	TPHs, PAHs, BTEX, ammonia in soils	Heavy metals	Heavy metals (Fe & Mn)
Groundwater contamination	Heavy metals, ammonia, BTEX, TPHs	Heavy metals, ammonia, BTEX, TPHs	Heavy metals, ammonia, BTEX, PAHs, TPHs in leachate and groundwater	Heavy metals (Manganese)	BTEX, PAHs, TPH, heavy metals
Receptor of concern	Shallow groundwater, River Faughan	Shallow groundwater, River Faughan	Shallow groundwater, River Faughan	Shallow groundwater, tributary, River Faughan	Shallow groundwater, River Faughan
Pathway linkages between source and receptor	Shallow aquifer in superficial deposits Leaching to shallow aquifer	Shallow aquifer in superficial deposits Leaching to shallow aquifer	Shallow aquifer in superficial deposits Leaching to shallow aquifer	Shallow aquifer in superficial deposits	Shallow aquifer in superficial deposits Leaching to shallow aquifer

	Zone 6	Zone 7	Zone 8	Zone 9
Description of zone	Area in the southern part of Campsie Sand and Gravel where previous investigations had identified low level hydrocarbons in groundwaters. Waste has been used in this area to infill sand and gravel extractions meaning that it is sporadic across the site rather than present in a widespread layer like in other zones.	This is the area of former processing area/yard for the Campsie Sand and Gravel. Some waste depositions to the south and southwest. Generally lower risk. Possible groundwater impacts associated with tarry wastes in CIW to northwest.	Elevated TPH in groundwater. Potentially significant issue. Waste generally C&D with occasional domestic waste to c.2-5m underlain by sands/gravels.	Lands to north of Campsie Sand and Gravel. Lagoon. Waste generally construction and demolition with occasional domestic waste to c.2-5m underlain by sands/gravels.
Waste profile	Mixed construction & demolition and domestic waste	Construction and demolition waste	Mixed organic, occasional domestic and C&D wastes.	Construction & demolition wastes with occasional domestic/municipal waste.
Waste thickness (m)	0.8 - 5 (deepest in the east of the site), no waste recorded in BHs in SW of site	3.5m	3 – 6 m	2 – 4m in northern, 5m in south and central area.
Underlying superficial deposits	Sand, gravelly sand and peat.	Sandy silts, gravel and sand.	Silty sands and gravel, occasional clay inclusions.	Silts, sands and gravel
Water bodies present on- site	None	None	No	Large lagoon
Soil contamination	PAHs, TPH	-	-	-
Leachate contamination	PAHs, TPH	-	BTEX, PAHs and TPHs	Heavy metals
Groundwater contamination	PAHs, heavy metals, ammonia	Heavy metals	Heavy metals, BTEX, PAHs, TPHs and low-level ammonia	Heavy metals, low-level TPHs and low-level ammonia
Receptor of concern	Shallow groundwater, River Faughan, tributary, future site users, constructions workers	Ground water, River Faughan and tributaries	Shallow groundwater, River Faughan	Ground water, River Faughan and lagoon
Pathway linkages between source and receptor	Shallow aquifer in superficial deposits Leaching to shallow aquifer	Shallow aquifer in superficial deposits	Groundwater in shallow aquifer	Shallow aquifer in superficial deposits