3FMProject

Bringing
Dublin Port
To 2040

Environmental Impact Assessment Report

# Appendix 8.3

Volume 3 Part 6

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

rps
A TETRA TECH COMPANY

Third & Final
Masterplan
Project

# 3FM – DUBLIN PORT

## Remedial Strategy Report

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## Approval for issue

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|---|---|
| Joseph McGrath | 28 June 2024 |

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# 1 INTRODUCTION

RPS was appointed by Dublin Port Company to prepare a Remedial Strategy in support of the proposed 3FM Project. The 3FM Project will include the development of particular areas of Dublin Port lands on the Poolbeg Peninsula providing additional port capacity, infrastructure and facilities including an overall road network to entirely remove port traffic from public roads in the vicinity of Dublin Port.

This report should be read in conjunction with the Contamination Assessment (Generic Quantitative Risk Assessment) Report prepared for the site:

- 3FM Dublin Port, Generic Quantitative Risk Assessment Report, RPS, dated June 2024.

## 1.1 Objectives

The purpose of the Remedial Strategy is to consider the risk assessment which was completed for the site and to mitigate against all identified unacceptable risks by breaking relevant pollutant linkages.

# 2 CONTAMINANT DISTRIBUTION

The following section summarises the contaminant distribution identified during an intrusive ground investigation undertaken in 2022, and further ground investigation works in 2024.

## 2.1 Soil Contamination

As part of the Generic Quantitative Risk Assessment, sub-soil samples were sent for laboratory analysis. Soil samples were screened against LQM/CIEH S4ULs for commercial end use and a public open space near residential end use.

**Roads / Transport Routes**

Asbestos

Chrysotile asbestos was identified within 2 no. samples obtained from locations proposed as roads / transport routes; BH112 at 1.50m bgl, BH116 at 0.50m bgl. Both of these samples were quantified and the asbestos in soil composition was found to be 0.004%. As these samples were obtained from areas of proposed road surfacing, there is no significant risk to future site users, however, there is an exposure risk associated with construction workers.

**Maritime Village**

No soil sources of contamination were identified.

**Area O**

Asbestos

Chrysotile asbestos was identified within five (5) soil samples within Area O obtained between 0.50m – 3.00m bgl, with quantifications between 0.002 – 0.004%. Five (5) samples were obtained from BH119, BH120, BH320, BH322 at 0.50m & BH322 at 3.00m. Amosite asbestos was identified within 1 no. soil sample obtained at 1.00m (BH119). Given the proposed hardstanding within the road network, Area O, it is anticipated that the risk to future site users from asbestos fibres is low. However, there is a potential risk to workers during construction from activities such as excavations, which may disturb and release asbestos fibres in soil.

**Area L**

Asbestos

One (1) soil sample obtained from Area L returned a positive asbestos identification. A sample obtained from BH305 at 2.00m bgl comprised chrysotile amosite asbestos fibres. Given the depth at which the asbestos was detected, and the proposed hardstanding, there is no significant risk posed to future site users. However, this asbestos may pose a risk to construction workers.

**Port Park**

Asbestos

One (1) soil sample obtained from Area Port Park returned a positive asbestos identification. A sample obtained from BH317 at 0.50m comprised chrysotile fibres. Given the shallow depth at which this asbestos was identified and the proposed soft landscaping in this area, asbestos in soils are considered a source of contamination at this location.

### 2.1.1 Asbestos in soils

Asbestos was identified at a number of locations as highlighted above. A drawing showing the location where asbestos was encountered is contained within Appendix A..

## 2.2 Groundwater

**Area O & Port Park**

Heavy Metals

Concentrations of cadmium (BH128), lead (BH128 & SW01), and nickel (BH120, BH121, BH123, BH125, BH128) exceeded the EU Environmental Objectives values for surface water receptors, however, notably, these issues did not appear to be significant within the surface water samples obtained during the investigation. The concentration of zinc in groundwater sampled from BH128 exceeded the EU Environmental Objectives for groundwater. The source of these metals is likely to be the made ground/waste material beneath the site.

Total Petroleum Hydrocarbons

The concentrations of total petroleum hydrocarbons in groundwater samples obtained from the 2023 boreholes in Area O were all found to be below the Groundwater Amendment Regulations 2016 threshold value of 7.5 mg/kg.

Groundwater samples obtained from subsequent boreholes put down across Area O and Port Park as part of the 2024 site investigation works showed elevated concentrations of total petroleum hydrocarbons above the Groundwater Amendment Regulations.

Polycyclic Aromatic Hydrocarbons

The concentrations of PAHs in groundwater samples obtained from the 2023 boreholes in Area O were all found to be below the EQS values. The samples obtained in 2024 all recorded exceedances for a number of PAHs including Anthracene, Benzo(a)pyrene, Fluoranthene and Napthalene.

The source of the elevated Hydrocarbons and PAHs is likely to be the made ground/waste material beneath the site.

**Area L**

Heavy Metals

Groundwater samples were obtained from Area L on two (2) occasions; 25th April and 8-9th May 2024. Concentrations of heavy metals within Area L were found to be in excess of the appropriate screening values. Notably, there is a decrease in the concentrations of particular heavy metals such as Barium, Cadmium, and Manganese during the second round of sampling. Other parameters such as Boron increase in concentration during the second round of sampling. Overall, the concentrations of metals are generally higher in samples obtained from the natural sands and slightly lower within the made ground.

Total Petroleum Hydrocarbons

Groundwater samples obtained from both monitoring rounds showed elevated concentrations of total petroleum hydrocarbons above the Groundwater Amendment Regulations. In particular, a highly elevated concentration of 56,000 ug/L was noted in the sample from BH308 on 9th May.

Polycyclic Aromatic Hydrocarbons

The samples obtained from both monitoring rounds recorded exceedances for a number of PAHs including Anthracene, Benzo(a)pyrene, Fluoranthene and Napthalene.

The source of the elevated Hydrocarbons and PAHs is likely to be the made ground/waste material beneath the site. With regard to the elevated Hydrocarbons at BH308, it is noted that this borehole is located within the Hammond Lane metal recycling facility. Is it likely that a spill or leak of fuel or oil has occurred within the vicinity of the borehole.

## 2.3 Ground Gases & Vapours

The monitoring results indicate that the gas regime is classified as a Characteristic Situation 4 for Area O and a Characteristic Situation 2 for Area L in accordance with CIRIA C665. The source of these elevated ground gases is the made ground and waste material encountered beneath Area O and L

## 2.4 Summary of Risk Assessment

### 2.4.1 Risk to Human Health

The risk to site end users from identified contamination will be minimal due to the emplacement of hard-standing and proposed building footprints across the majority of the site. A potential risk is present to construction workers with regards to asbestos fibres within Area O (BH119, BH120, BH317, BH320, BH322 at 0.50m & BH322 at 3.00m), proposed roads (BH112 and BH116) and Area L (BH305) where earthworks or breaking ground is required during the construction phase. Risks to construction workers within these areas should be mitigated using PPE & RPE and appropriate work methods.

Asbestos in shallow soils at BH317 within the proposed soft landscaping area of Port Park is considered to pose a risk to future site users who may over time be exposed to disturbed fibres within soils.

### 2.4.2 Risk to Shallow Groundwater

Shallow groundwater on site is not considered to be a controlled water and does not represent an exploitable source of groundwater.

### 2.4.3 Risk to Surface Water

Whilst the shallow groundwater has been impacted by heavy metals, PAHs and Hydrocarbons the surface water sampling and analysis appears to demonstrate that this is not impacting upon the quality of River Liffey. However, a source-pathway-receptor linkage is present from contaminated shallow groundwater to the River Liffey and a risk is present for this groundwater to impact upon the quality of the River Liffey.

### 2.4.4 Risk to Bedrock Aquifer

The deeper bedrock aquifer is very unlikely to be impacted by the site due to the presence of a significant thickness (c.10m) of firm to very stiff clay anticipated to prevent vertical migration of contaminants towards the bedrock aquifer.

### 2.4.5 Risk to buildings

Ground gas monitoring has recorded elevated ground gas levels meaning gas protection measures will be required within proposed buildings in Area O and L.

# 3 REMEDIAL OBJECTIVES

## 3.1 Performance Objectives

The remedial work at the site will be undertaken in order to manage the identified risks. This will be achieved by controlling or breaking the relevant pollutant linkages in order to mitigate identified unacceptable risks. In view of the proposed residential end use for the majority of the site, RPS considers the following performance statements appropriate for the remedial work at the site:

- Breaking of the relevant pollutant linkages to reduce the risk posed by contaminants to an acceptable level.

## 3.2 Objective Compliance

The remedial objectives will be considered met when one of the following criteria has been achieved:

- A revision of the risk assessment, justified by changes in the conceptual understanding of the site, indicates that contaminants do not present an unacceptable risk to environmental receptors and site end users.
- Relevant pollutant linkages can no longer be identified on site.

# 4 REMEDIAL OPTIONS

The following remedial options/methods have been considered, based upon the outcome of the risk assessment.

**Table 4.1 Remedial Options**

| | OPTION | COMMENTS |
|---|---|---|
| A | Pump and Treat of contaminated groundwater | Removal of contaminated shallow groundwater within the made ground and underlying sands and gravels strata. The location of the site within the wider context of Dublin Port and historic infilling in the area indicates that reduced quality groundwater may be migrating on site from adjacent land. As such, it is not considered practical or feasible to propose pump and treat remedial works as part of this planning application as it would not address any site wide groundwater quality. |
| B | In situ groundwater remediation | In situ treatment (bioremediation, in situ chemical oxidation) of contaminated shallow groundwater within the made ground strata. The location of the site within the wider context of Dublin Port and historic infilling in the area indicates that reduced quality groundwater may be migrating on site from adjacent land. As such, it is not considered practical or feasible to propose pump and treat remedial works as part of this planning application as it would not address any site wide groundwater quality. |
| C | Continued groundwater and surface water monitoring and sampling | This technique can be used to determine any trend in contaminant concentrations over time and assess any impact on baseline groundwater and surface water quality as a result of ground improvement works. |
| D | Continued ground gas monitoring | This technique can be used to determine any trend or change in gas flow and concentration over time as a result of ground improvement works within the historic landfill Area O. |
| E | Implementation of venting measures during construction | This technique can be used to allow a steady release of ground gas and prevent a build-up of ground gases within reduced soil pore to pore spaces as a result of ground improvement techniques. |

| | | |
|---|---|---|
| F | Ground gas protection measures for a CS4 site (Area O) and CS2 (Area L). | Ground gas protection measures will be required as part of the proposed development. |
| G | Dust suppression during earthworks at Port Park | This technique can be used to damped soils and dust during earthworks and therefore reduce the release of asbestos fibres into the air. |
| H | Clean cover barrier in soft landscaped areas of Port Park | A clean cover barrier of at least 600mm of clean soil will act as a barrier to asbestos exposure in underlying soils |

Based on the above options in association with the overall development proposals for the site, it is considered that a combination of the following options are most suitable;

- Option C groundwater and surface water sampling of the River Liffey as part of the groundwater monitoring programme;
- Option D continued ground gas monitoring;
- Option E implementation of venting techniques;
- Option F implementation of ground gas protection within the proposed buildings;
- Option G implementation of dust suppression during earthworks at Port Park.
- Option H clean cover barrier in soft landscaped areas of Port Park

The details of the proposed remedial measures are discussed further within Section 5, 6 and 7.

# 5 REMEDIAL STRATEGY – GROUNDWATER

## 5.1 Groundwater & Surface Water Monitoring and Sampling

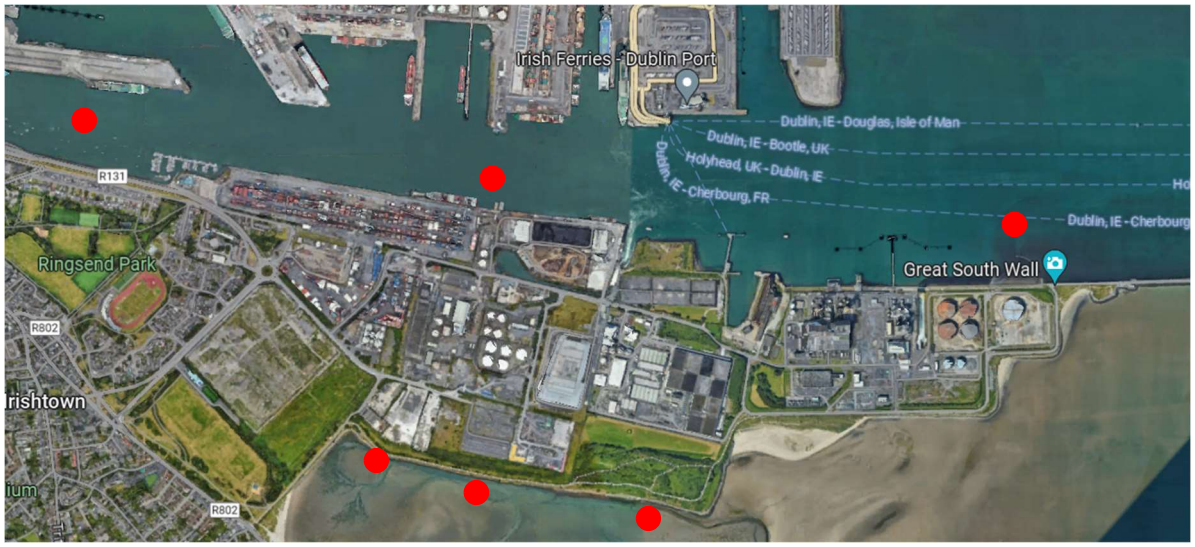
It is recommended that groundwater monitoring and sampling of boreholes at the site is undertaken. This strategy aims to monitor the concentrations of contaminants of concern in groundwater and surface water, and determine any trend in concentrations before, during, and after ground improvement works at Plot O.

Monitoring and sampling should be undertaken prior to any works commencing on Area O and then on a weekly basis during the ground improvement works to determine any change in contaminant concentrations as a result of works. It is advised that a monitoring round should be undertaken following the completion of all ground improvement and earth works, and again once all construction works are completed at Area O.

## 5.2 Monitoring Locations

Groundwater samples should be collected from the shallow groundwater and the underlying deeper groundwater in the sands and gravel strata in Area O. Three (3) surface water samples should be collected from the River Liffey. In addition, a further three (3) samples should be taken from Dublin Bay immediately south of Area O and the Irishtown Nature Reserve. The proposed locations are outlined in Figure 5.1.

**Figure 5.1 Proposed Surface Water Sampling Locations**



## 5.3 Laboratory Analysis

Laboratory analysis will be undertaken by a UKAS and MCERTS accredited laboratory for the following suites of analysis:-

- Speciated PAHs
- Speciated TPH (TPH-CWG)
- Metals

## 5.4 Monitoring Report

After completion of each monitoring round, a monitoring report will be produced which will document the following;

- Scope of the monitoring work covered by the report;
- Schedule of regular monitoring activities carried out since the previous report;
- Report on visual inspection, monitoring and test results, including exceptional results/deviations recorded since the previous report;
- Report on any actions taken in response to exceptional results;
- Recommendations for any future monitoring and any variations to the agreed monitoring programme;
- Supporting information, including sampling, analytical and quality assurance procedures used, type of equipment, calibration records, location and construction of monitoring points.

# 6 REMEDIAL STRATEGY – SOIL BORNE GAS & VAPOURS

## 6.1 Gas Protection Measures in Buildings

Area O

To achieve the appropriate level of protection, consideration has been given to BS8485:2015+A1:2019 'Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings'. The building type has therefore been classified as a Type C building. This indicates, for a Characteristic 4, Type C building, the gas protection measures should provide a solution score total of 4.5.

Reference has then been made to BS8485:2015 which provides all of the protection elements/systems. A combination of elements have to be chosen and combined to achieve the required level of gas protection for all areas of the site. For the proposed development, the following is considered to be a potential solution:

Total Solution Score Required- **4.5**

Table 5 (BS8485) – Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations – solution score of 1.5

Table 6 (BS8485) – Passive sub floor dispersal layer: good performance – solution score of 1.5

Table 7 (BS8485) – Gas resistant membrane – solution score of 2

**Total Solution Score – 4.5**

Area L

To achieve the appropriate level of protection, consideration has been given to BS8485:2015+A1:2019 'Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings'. The building type has therefore been classified as a Type C building. This indicates, for a Characteristic 2, Type C building, the gas protection measures should provide a solution score total of 2.5.

Reference has then been made to BS8485:2015 which provides all of the protection elements/systems. A combination of elements have to be chosen and combined to achieve the required level of gas protection for all areas of the site. For the proposed development, the following is considered to be a potential solution:

Total Solution Score Required- **2.5**

Table 5 (BS8485) – Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations – solution score of 1.5

Table 7 (BS8485) – Gas resistant membrane – solution score of 2

**Total Solution Score – 3.5**

## 6.2 Ground Gas Monitoring

Continuous ground gas monitoring will be undertaken within all borehole in Plot O before, during and after the ground improvement works. The ground gas monitoring loggers will record concentrations of Methane, Carbon Dioxide, Hydrogen Sulphide, Carbon Monoxide, Oxygen and atmospheric pressure on an hourly basis. The continuous monitoring will facilitate the ability to assess if the ground improvement works are causing any change to the baseline ground gas conditions.

## 6.3 Venting Measures

A venting trench will be constructed around the perimeter of Area O to facilitate venting of any ground gases during the ground improvement works.

# 7 REMEDIAL STRATEGY – ASBESTOS IN SOILS

## 7.1 Construction Workers

The potential risk to construction workers from soil contaminants during the earthworks is low, with the exception of identified asbestos fibres at BH112, BH116, BH119, BH120, BH317, BH320, BH322 at 0.50m, BH305 at 2.00m and BH322 at 3.00m. The risk to construction workers via the inhalation of asbestos fibres during earth works / ground disturbance can be mitigated through the appropriate use of PPE / RPE. The use of dust suppression throughout earthworks / ground disturbance will mitigate the risk of asbestos fibre release impacting construction workers and the general public.

## 7.2 Port Park

With regards to soft landscaping in Port Park & Wildflower Meadow, implementation of a clean cover barrier system of at least 600mm of clean imported soils will be required. All soft landscaping areas will incorporate the following mitigation measures;

- Installation of a clean cover barrier comprising clean, imported soil. In order to comply with required site levels, it will likely be required to remove the existing soils/hardstanding and replace with the 600mm of imported soil.
- The imported soil must be suitable for use i.e. public open space near residential housing. Validation samples of the imported soil will be collected and analysed for metals, TPH-CWG, speciated PAHs, asbestos, VOCs, SVOCs and PCBs and the results will be screened against the LQM/CIEH S4Uls for a public open space near residential end use.
- The Contractor will be made aware of the presence of asbestos and will enact appropriate health and safety measures when removing the existing soil.
- The removed soil material will be disposed to an appropriately licensed facility.

# 8 VERIFICATION

## 8.1 Verification Report

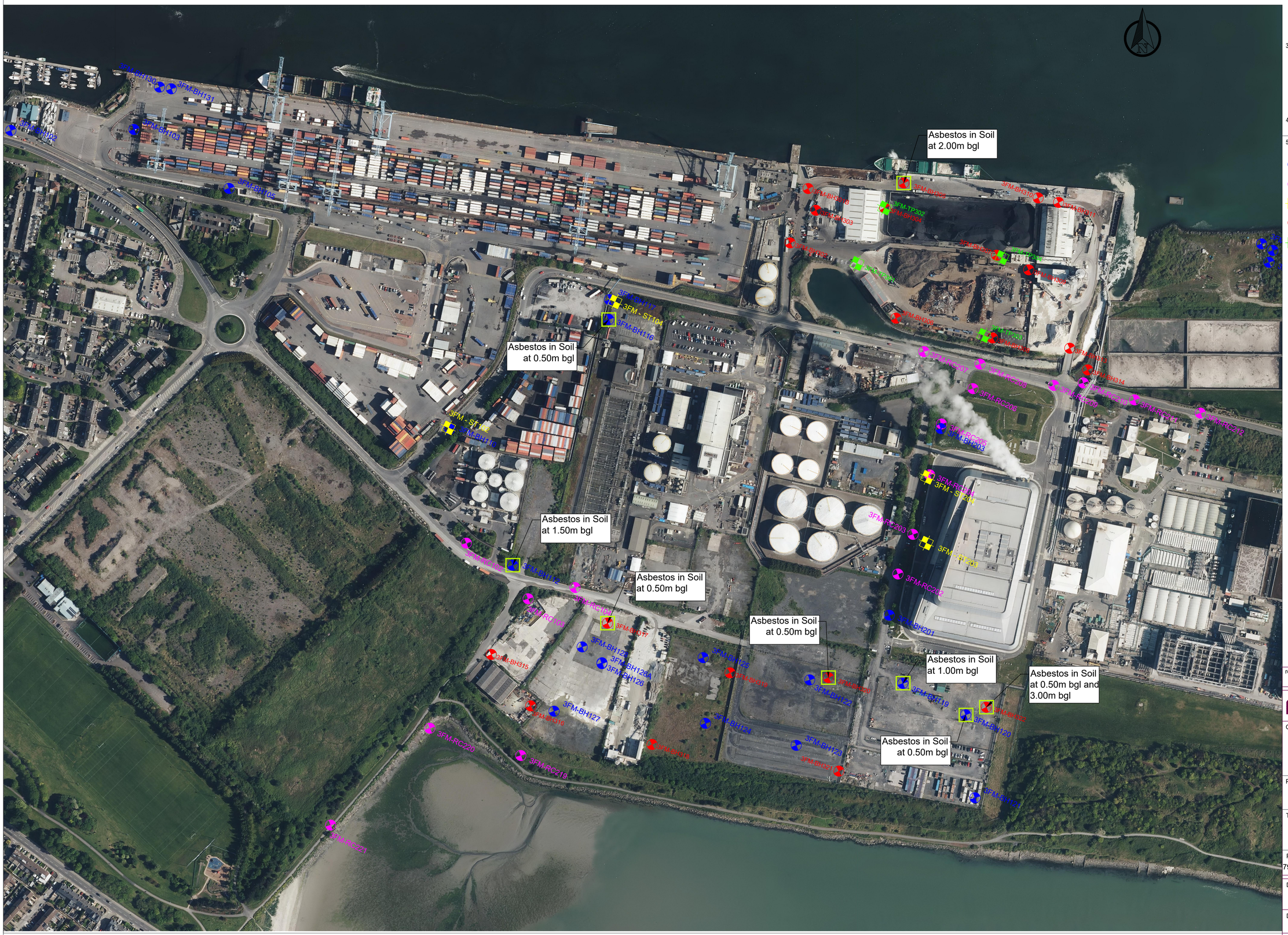
A verification report will be prepared which document all of the remedial activities undertaken, verify that the remedial objectives have been achieved and that relevant pollutant linkages can no longer be identified.

The Remediation Verification Report will demonstrate that the following were met during the works:

- Any soils exhibiting visual evidence of asbestos containing materials and/or visual and olfactory evidence of chemical contamination not previously identified, were subject to inspection and analysis.
- Any laboratory analysis of soil, groundwater and surface water samples were undertaken using a UKAS accredited laboratory methodology and in the case of soil analysis, MCERTS accreditation was also adopted.
- Waste soils determined to be unsuitable for reuse were disposed of to a suitably licensed landfill with the appropriate chain of custody and waste disposal records.
- Any additional contamination encountered where not previously identified, was appropriately assessed and any additional remedial work required was fully documented.
- Records of volumes of waste removed, the disposal facility name and copies of waste transfer notes.
- Independent construction quality assurance was undertaken for the installation of the gas protection measures as detailed within CIRIA C735 ‘Good Practice on the Testing and Verification of Protection Systems for Buildings against Hazardous Ground Gases’.

The overall format and contents of the Verification Report shall be compiled using guidance provided in the UK Environment Agency’s Verification of Remediation of Land Contamination, which is accepted by the EPA (in the absence of Ireland Government guidance).

# Appendix A Asbestos in Soils Location




## NOTES

1. Verifying Dimensions.
   The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. Existing Services.
   Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
3. Issue of Drawings.
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5. Key.

| | |
|---|---|
| 3FM-BH24 | Borehole (2023) |
| 3FM-RC03 | Road Cores (2023) |
| 3FM - ST02 | Slit Trench (2023) |
| 3FM - BH24 | Borehole (2024) |
| 3FM - TP03 | Trialpits (2024) |

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