SECTION F CONTROL & MONITORING

F.1: Treatment, Abatement and Control Systems

Describe the proposed technology and other techniques for preventing or, where this is not possible, reducing emissions from the installation/facility. Details of treatment/abatement systems (air and effluent emissions) should be included, together with appropriately scaled schematics (≤A3) as appropriate.

For each Emission Point identified complete Table F.1 of the Annex and include detailed descriptions and appropriately scaled schematics (≤A3) of all abatement systems.

Attachment F.1 should contain any supporting information.

Please see Attachment F.1 and Table F.1 in Annex 1 Standard Forms.

Attachment F.1 Treatment, Abatement and Control Systems

To Atmosphere

The following mitigation measures are proposed for the Construction Stage of the proposed development.

Dust Deposition

A dust minimisation plan will be prepared as part of the Construction Environmental Management Plan (CEMP, refer **Chapter 6** (Construction Activities). The dust minimisation plan will be based upon the industry guidelines in the Building Research Establishment document entitled "*Control of Dust from Construction and Demolition Activities*". Implementation of a dust minimisation plan during the construction phase of the project will include measures such as:-

- Site roads shall be regularly cleaned and maintained as appropriate. Un-surfaced roads shall be restricted to essential site traffic only.
- Site traffic will be restricted to 20km/hr to minimise dust re-suspension.
- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential).
- All vehicles exiting the site shall make use of a wheel wash facility, as required, prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads.
- Public roads outside the site shall be regularly inspected for cleanliness, and cleaned as necessary.
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind including the limitation of the height of stockpiles.
- During periods of high winds (>10m/s) potentially dusty operations (materials handling, crushing, etc. will cease.

- All material handling will be carried out to minimise drop heights from plant to plant or from plant to stockpile.

- Water misting shall be used as required on the crusher and screener while operational during dry and/or windy periods. Use of the crusher/screener without water misting is strictly prohibited with the exception of days of heavy rain (>5mm at Cork Airport).

- Water bowsers will be used across the site as required on roads, stockpiles and material handling systems.

- All vehicles which present a risk of spillage of materials, while either delivering or removing materials, will be loaded in such a way as to prevent spillage on to the public road.

- The contractor will be required to ensure that all vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum.

The level of mitigation (water misting, use of bowsers, etc.) will be dictated by the results of the monitoring strategy, in particular the real time analyser located at the North Western boundary of the site (AA1, refer to Drawing DG1012a).

Asbestos Risk

An Asbestos Construction Management Plan (ACMP) has been prepared for the construction phase of the project and includes a series of mitigation measures for the management, training, monitoring and mitigation of asbestos throughout the construction period. The measures are detailed in Chapter 9 (Air Quality and Climate) of the EIS and summarised below:-

- All site operatives will be asbestos awareness trained by a certified instructor prior to working at the site.

- All site workers will attend regular asbestos awareness briefings with support arranged from a specialist asbestos contractor on a call-out basis.

- The contractor will provide workers with the appropriate PPE (including asbestos fitted masks, overalls, gloves, monitor) and suitable welfare facilities as stated within the Health Risk Assessment report for Haulbowline Island East Tip. Overalls, gloves and mask filters will be disposed of at the end of each working day as asbestos waste.

- Any suspected asbestos containing materials visually identified by construction/ground workers during the development will be collected by designated handlers, double bagged and disposed of off-site in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006 and the Safety, Health and Welfare at Work (Exposure to Asbestos)(Amendment) Regulations 2010.

- Any hotspots of visually identified asbestos containing materials will be logged and mapped within the ACMP. The likely source of these materials will be investigated and requirements for any additional mitigation measures assessed. The effectiveness of additional mitigation measures will be monitored with these measures modified where required.

- A number of working practices will be implemented during the development in order to minimise the potential for asbestos fibres within the material to become airborne upon disturbance. These are to include:-

    - Dampen soils using misting spray heads prior to excavation ;

- Cease material movement during dry windy days;
- Limit stockpile height for asbestos contaminated soils
- Minimise drop height of material being transferred / processed; and
- Reduce speed for vehicles operating at the site.

- Waste material that is to be crushed and re-used on site will undergo mechanical screening to separate out fines and oversized material. The various material streams will also be subject to visual inspection and handpicking, in order to remove any visually evident Asbestos Containing Materials and render it suitable for reprocessing. There will be a residual risk that asbestos contamination remains in the fill and the crushing process will require careful management, with misting sprays to knock out any airborne fibres and decontamination of the crushing equipment.

- Service corridors or development features that penetrate the proposed capping layer should be over excavated and a marker layer installed. This is to protect future ground workers from inhaling any residual asbestos fibres within the re-processed capping layer. The location of service corridors should be recorded within the on site health and safety file.

Odour

The CEMP will also include an odour management plan (OMP) to mitigate the potential for odours from the importation of topsoil. The OMP will follow the guidance presented in the Environment Agency of England and Wales "*Odour Management Guidance*" (H4 Guidance, 2011). The odour monitoring and investigation aspects of the OMP will follow the EPA "*Odour Impact Assessment Guidance for EPA Licensed Sites*" (Guidance Note AG5, 2010). The OMP will be designed to:-

- Employ appropriate methods, including monitoring and contingencies, to control and minimise odour pollution;
- Prevent unacceptable odour pollution at all times; and
- Reduce the risk of odour releasing incidents or accidents by anticipating them and planning accordingly.

Greenhouse Gas Emissions

Mitigation measures to minimise CO_2 emissions include the following:-

- Implementation of the Traffic Management Plan.
- Provide an efficient material handling plan that minimises the waiting time for loads and unloads.
- Turning off engines when not in use for more than five minutes.
- Regular maintenance of plant and equipment.
- Reuse of materials
- Implement an Energy Management System

Construction Traffic

The air quality impacts associated with construction traffic can be mitigated using the following measures:-

- Regular maintenance of plant and equipment.
- Implementation of the Traffic Management Plan to minimise congestion.

- Where possible haul roads within the temporary working area will be used to minimise traffic on the local road network.

End Use, Maintenance and Aftercare Phase

There are no predicted impacts to atmosphere through the End use, Aftercare and Maintenance stages of the proposed development.

Please refer to Chapter 9 (Air Quality and Climate) for further details.

To Surface Water and Groundwater

Section E of this application details the potential activities that may cause emissions to surface water and groundwater during the Construction and End use, Maintenance and Aftercare phase of the project. The waste body is the source of potential emissions to both media.

Section D.1.K of this application, Chapter 5 (Project Description), Chapter 6 (Construction Activity) and Chapter 13 (Soils, Geology and Hydrogeology) of the EIS details surface water and groundwater management/mitigation measures proposed during the Construction and End use, Maintenance and Aftercare phases of the project.

The following section summarises construction stage mitigation measures.

- **Dewatering of the area of ponding in the North central part of the site prior to re-profiling and installation of the capping system.**

Ponding in the northern part of the site is a result of water surcharge during high tides. It is recommended that dewatering in this area is not undertaken until such time as the PES has been installed around the perimeter of the site and when water levels in the area are low. This should reduce surcharge and as such the quantity of water to be removed should be substantially less.

The appointed contractor will be required to prepare a surface water management plan which will be incorporated into the Construction Environmental Management Plan prior to commencement of construction works on site.

During reprofiling of the site and construction of the PES, it is proposed to allow infiltration of surface water into the waste body. It is also proposed tocollect, recirculate and infiltrate marine water seepages into the waste body.

Several infiltration areas will be used to spread the recirculation. These infiltration areas may have to be supplemented by settlement tanks or ponds provided by the contractor to ensure that there is no localised head build up or wash out.

The Contractor will be required to address this issued as part of his surface water management plan as part of the CEMP. Contaminated water from ‘hot spots’ uncovered during excavation may have to be tanked off site for further treatment.

Further detail is provided in Section 13.4 of Chapter 13 (Soils, Geology and Hydrogeology) of the EIS.

It should be noted as detailed in Section I of this application, the existing baseline marine water analysis showsthat the site in its current state is not having any measurable impact on the marine environment when compared to the wider background chemical composition of the marine water in Cork Harbour. It is therefore deemed an appropriate measure to re-circulate

collected surface water back into the waste body in a controlled matter for the purposes of discharge to Cork Harbour.

It will also be a requirement of the Contractor to develop a Surface Water Management Plan as part of the CEMP.

- **Stripping of the top-soil and sub-soil from the Navy pitch**

A phased approach shall be undertaken to remove the top-soil and sub-soil from the Navy pitch area. Cut–off drains shall be installed where necessary to divert any surface water flow away from the exposed areas and collect surface water run-off from the exposed areas. Surface water collected from exposed areas will be recirculated back into the waste via a number of infiltration trenches/ pits which shall be located at various intervals around the site.

- **Stockpile Management**

Stockpiles will be stored in designated stockpile areas and will be managed to limit the potential for surface water ingress and erosion. In order to achieve this, stockpiles will be limited to a maximum height and side slopes depending on the nature of the material being stockpiled. The limits on height and side slope will be agreed in advance of any stockpiling activity. In addition to this stockpiles will be covered and a cut off drain or other system proposed by the Contractor installed around the perimeter of the stockpile area to collect surface water run-off from the area.Surface water collected will discharge to Cork Harbour area via a number of infiltration trenches/ pits which will be located at various intervals around the site. Where appropriate the Contractor will also employ the use of silt curtains or other approved techniques to limit the potential for the release of sediments from the stockpile areas.

- **Placement of the Regulation Layer, Subsoil Layer and Topsoil Layer**

The regulation layer, top-soil and sub soil will be placed in a phased manner in order to reduce the area that is exposed at any one time. The layers will be appropriately compacted in order to reduce the potential for erosion of the surface after placement. The Contractor will also use silt curtains and cut-off drains or other approved techniques where necessary to limit the potential for the release of sediments from newly laid areas of sub-soil and top-soil.

- **Sediment Re-suspension Management**

Areas of construction within the foreshore will be protected from sediment re-suspension by the use of geotextile tubes,sheet pilling or other alternatives (see Chapter 5 Project Description of the EIS). Additional mitigation such as sediment screens will be considered in areas where there is a risk of re-suspension during sheet piling, protective berms or geotextile tube placement. In the event that turbidity is observed during works outside the containment, works will cease, the source will be investigated and additional screens or appropriate measures taken prior to recommencement of works.

- **Surface Water Management Plan**

Prior to construction, the contractor will be required to put in place provisions to ensure that wash out does not occur and any sediment generated during the works does not reach Cork Harbour.

The objective of the surface water management plan will be to:-

- Provide overall surface water management principles and guidelines for the construction phase of the remediation solution;
- Include provisions to reduce run-off from the site and to prevent excess silt or other materials entering the surrounding water bodies;
- Reduce/minimise any cross contamination between clean surface water and leachate within the waste;
- Address erosion, sedimentation, attenuation and water quality issues; and

- Ensure measures are in place for managing the drainage from the site.

The surface water management plan will have to address the following main activities:

- Installation of the PES;
- Dewatering of the area of ponding in the North central part of the site prior to re-profiling and installation of the capping system;
- Stripping of the top-soil and sub-soil from the Navy pitch;
- Stockpile management;
- Placement of the regulation layer, subsoil layer and topsoil layer;
- Monitoring and control; and
- General requirements.

End use, Maintenance and Aftercare phase

A substantial portion of the waste body at the East Tip is located beneath sea water level in the surrounding harbour. The majority of the waste body is therefore saturated. Construction of the PES with a permeability of 1 x 10^{-5} m/s will reduce groundwater/surface water tidal flux into and out of the site and reduce emissions to surface waters.

Construction of the capping and the two surface water drainage layers (sub surface drainage layer and 'top of cap' drainage layer as described in Section D.4 of this application and Chapter 5 (Project Description) of the EIS) will reduce rainwater and surface water infiltration to the unsaturated solid phase during the End use, Maintenance and Aftercare phase. Both of these measures will assist in the abatement of emissions to surface water and groundwater.

Please refer to Drawing Dg1009d-e for details of the proposed surface water management system during the End use,Maintenance and Aftercare phase.

To Sewer

During the construction phase of works, the Contractor will be required to manage the wastewater generated from the site welfare facilities. It will be a requirement that all wastewater generated on site is disposed of appropriately in a waste water treatment facility.

The waste water treatment plant at the Irish Navy Service (INS) site is currently operating at capacity and at time of preparing this Waste Licence Application the Navy had plans of installing a new wastewater plant. If this new waste treatment plant is in place when the works commence and suitable capacity is available, the option of disposing of wastewater to this plant for the duration of the construction period may be explored at the detailed design stage. If the treatment plant is not in place or this option is not deemed suitable, wastewater will be taken to the mainland for disposal as per Contractor responsibility. Wastewater arising intermittently from the proposed wheelwash facility will be disposed of appropriately to a wastewater facility as required.

It is not proposed to discharge any trade effluent or waste water from the site post construction.

F.2- F. 9. Monitoring and Sampling Points

Programmes for environmental monitoring should be submitted as part of the application. These programmes should be provided as **Attachments F.2 to F.6** and meet the advice published by the Agency in the relevant BAT Note. For landfills the additional **Attachments F.7 to F.8** should be completed. Furthermore for a landfill application the applicant must refer to the Agency *Landfill Monitoring Manual (2003)* for further details on monitoring requirements for proposed facilities.

Include details of monitoring/sampling locations and methods.

F.2 Air
- to include Dust, Odour

Monitoring Arrangements specified	**yes** ☒	**no** ☐	**not applicable** ☐
Monitoring points identified, (plus 12-figure grid references)	**yes** ☒	**no** ☐	**not applicable** ☐
Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment F.2 Air

Construction Stage

In terms of monitoring air quality the following monitoring regimes are proposed throughout the construction stage:-

- The construction contractor will be required to monitor monthly dust deposition levels for comparison with the guideline of 350mg/m^2/day. It is proposed to carry out such monitoring at:
    - AA1-North Western boundary of East Tip
    - AA2- Church
    - AA3- Cobh centre
    - AA4- Cobh West
    - AA5- Ringaskiddy Village

Where dust levels are measured to be above this guideline the mitigation measures in the area must be reviewed as part of the dust minimisation plan.

- It is proposed to carry out daily fine particulate (PM_{10}) monitoring at the following three existing locations:
    - AA1-North Western boundary of East Tip
    - AA2-Church
    - AA3- Cobh centre

The results of the monitoring should be compared against the statutory limits presented in S.I. 180 of 2011. During days of dry weather (i.e. <0.2mm rainfall – on average 55% of days at Cork Airport) in months 1 to 9 (mobilisation and construction phases), the PM_{10} filters will be analysed for metal content. Where particulate levels are measured to be above this guideline the mitigation measures in the area must be reviewed as part of the dust minimisation plan.

- It is proposed to locate a real time analyser for fine particulates and metals at monitoring point :

    - AA1- North Western boundary of East Tip

This location will be used as an indicator location for dispersion off site. Ambient metals monitors (such as the Pall Xact 620) can provide real time concentrations for fine particles and metals that can be recorded at a central control area. Such systems may be equipped with level alarms at key trigger points (e.g. 60% of the limit value) that can be used to alert site management of elevated levels of particulates/metals and allow for increased intensity of mitigation or cessation of the activity as part of the dust minimisation plan. The trigger levels and limits/guidelines will be clearly recorded in the dust minimisation plan.

The proposed monitoring locations are presented on Drawing DG1012aand summarised inTable F.2.1 below (Table 9.20 of the EIS). The numbering system is in line with the EPA Waste Licensing requirements for ambient air monitoring. All data will be reported to Cork County Council on a monthly basis and will be publically available to local residents.

Table F.2.1: Monitoring Locations for the Construction Phase

Parameter	AA1	AA2	AA3	AA4	AA5
	North Western Boundary of East Tip	Naval Base Church	Cobh Centre	Cobh West	Ringaskiddy Village
Monthly Dust Deposition	√	√	√	√	√
Daily PM_{10}	√	√	√		
PM_{10} (real time)	√				
Metals (Daily) Note1	√	√	√		
Metals (real time)	√				

Note: 1. During days of dry weather (i.e. <0.2mm rainfall recorded at Cork Airport) during months 1 to 9 of the construction programme.

Asbestos

Environmental air monitoring will be carried out by a specialist contractor in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006 and the Safety, Health and Welfare at Work (Exposure to Asbestos) (Amendment) Regulations 2010 as follows:-

- Reassurance air tests shall be run at four monitoring points to be located within 20m of the working area.

- Monitoring locations are dependent on excavation activity locations on site and will move depending on such. It is therefore not possible to map these locations.

- Testing should be undertaken daily during the project. At the beginning of the proposed works, should there be any significant change in the weather (i.e. any significant wind change/the initial air testing was conducted during wet weather), or if the contractor's method statement changes during the works, then the testing will be repeated. Increased sampling frequency may also be required (i.e. if a different form of asbestos is detected during the works which may be more friable, thus increasing the potential for fibre release). All static reassurance air tests will be run for a period no

less than one hour, and no more than four hours, with a minimum of 480 litres of air sampled; and

- Personal asbestos monitor air tests will be run for a period of at least one hour and no more than two hours, with a minimum of 480 litres of air sampled.

For the purpose of measuring asbestos in the air, only fibres with a length of more than 5 micrometres and a breadth of less than 3 micrometres and a length/breadth ratio greater than 3:1 shall be taken into consideration.

All monitoring results will be logged by the specialist contractor with any significant detection of asbestos fibres (i.e. above the 0.1 f/cm^3 level of quantification) flagged immediately. The locations of these detections will be mapped and likely source investigated. Works within the identified source area will be stopped immediately and only continue upon sufficient removal of the asbestos source (through hand-picking) or once abatement measures outlined above have been modified to such an extent that the level of quantification is no longer exceeded. Monitoring results, identified source areas and follow-up actions will be relayed to site operatives during the regular asbestos awareness briefings.

Odour

Odour monitoring is not deemed necessary.

End use, Maintenance and Aftercare Phase

The impacts to air quality associated with the End use, Maintenance and Aftercare phase of the development are predicted to be negligible. It is therefore not proposed to carry out air quality monitoring post construction.

F.3 Surface Water

Monitoring of surface water shall be carried out at not less than two points, one upstream from the waste facility and one downstream.

Monitoring Arrangements specified	**yes** ☒	**no** ☐	**not applicable** ☐
Monitoring points identified, (plus 12-figure grid references)	**yes** ☒	**no** ☐	**not applicable** ☐
Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment F.3 Surface Water

Construction Stage

Surface water quality monitoring is recommended during the construction stage primarily in the receiving water to ensure that potential negative impacts are not occurring. It is proposed that such monitoring be undertaken at the 6 baseline monitoring locations (1 up river of the site, 3 in close proximity to the site and 2 in the outer harbour).

Surface water seepage from the excavation and construction of the perimeter structure will be captured, re-circulated and infiltrated back into the waste body. Unless collected surface water is from 'hot spots' of unknown material of concern it is not considered necessary to monitor surface water emanating from the waste body during the construction stage.

Drawing DG1012a illustrates the proposed construction stage surface water monitoring locations.

Tables F.3.1, F.3.2 and F.3.3 detail proposed surface water monitoring frequency, locations and parameters. Based on the extensive amount of water and leachate monitoring information available for the East Tip, it is proposed to monitor surface waters for targeted parameters as opposed to monitoring a large extensive suite of parameters typically associated with landfills.

Table F.3.1 Recommended Surface Water Monitoring Construction Stage (Table 13.24 of the EIS)

Water Body	Frequency /Timing	Recommended Locations	Parameters	Rationale
Marine	Water - Once every two months for the duration of the construction stage Sediments - Once every 6 months.	As per baseline locations Figure 12 DQRA (Shown on Drawing DG1012a)	Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's, petroleum hydrocarbons,	High frequency (Bi-monthly) due to sensitivity of water body and direct proximity to the construction works Sediment sampling to be undertaken once every 6 months. Visual inspection of all sediment screens during construction works.

End use, Maintenance and Aftercare Phase

Surface water quality monitoring is recommended during the End use, Maintenance and Aftercare phase at both the surfacewater discharge points and within the receiving water to ensure that potential negative impacts are not occurring.The following Table details the recommended monitoring frequency, locations and parameters.

Table F.3.2 Recommended Surface Water Run-off Monitoring Locations – End use, Maontenance& Aftercare Phase (see DG1012b for locations)

Water Body	Frequency/Timing	Recommended Locations	Parameters	Rationale
Marine	Quarterly	SW7 SW8	Suspended Solids	To monitor surface water run-off from the site

Table F.3.3 Recommended Surface Water Monitoring End use, Maintenance and Aftercare Phase (Table 13.25 of the EIS)

Water Body	Frequency/Timing	Recommended Locations	Parameters	Rationale
Marine	Quarterly – for 1 year followed by annually for 2 years.	As per baseline locations Figure 12 of DQRA (Shown on Drawing DG1012b)	Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's	More frequent initial monitoring with review following first year. If all monitoring results are favourable, the frequency should be reduced to annual for a further two years with review at the completion to assess whether further monitoring is required.

Please refer to Drawing DG1012b for proposed monitoring locations and Chapter 13 (Soils, Geology and Hydrogeology) of the EIS for further details.

F.4 Sewer Discharge

Monitoring of sewer discharge shall be carried out at the point specified by the local authority/Agency.

Monitoring Arrangements specified	**yes** ☐	**no** ☐	**not applicable** ☒
Monitoring points identified, (plus 12-figure grid references)	**yes** ☐	**no** ☐	**not applicable** ☒
Attachment included	**yes** ☐	**no** ☐	**not applicable** ☒

Not Applicable

F.5 Groundwater

Groundwater monitoring is required at all landfill facilities; and certain other waste facilities depending on waste activities and the underlying aquifer vulnerability.

Monitoring Arrangements specified	**yes** ☒	**no** ☐	**not applicable** ☐
Monitoring points identified, (plus 12-figure grid references)	**yes** ☒	**no** ☐	**not applicable** ☐
Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment F.5 Groundwater

Construction Phase

The construction stage is anticipated to last 18 months (see Chapter 5 of EIS). It is therefore recommended that groundwater monitoring is conducted at key representative locations in the waste and natural geological strata twice during the construction phase. Table F.5.1 (Table

13.23 of the EIS) details the proposed monitoring locations, parameters and frequency for groundwater monitoring during construction.

As with the surface water monitoring, based on the extensive amount of monitoring previously conducted at the site, it is proposed to monitor targeted groundwater parameters (contaminants of concern) during Construction and during the End use, Maintenance and Aftercare phase at selected locations.

Table F.5.1 Recommended Groundwater Monitoring Construction Stage

Water Body	Frequency /Timing	Recommended Locations	Parameters	Rationale
Groundwater - Waste	Twice / Months 6 & 12	BH301, BH306A, BH310A, BH312A, BH311	Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's, petroleum hydrocarbons, pH, Eh, DO, EC	Low frequency to monitor impacts of recirculated infiltration and general construction activity on groundwater quality.
Groundwater - Silt/Alluvium	Twice / Months 6 & 12	BH306D, BH310B, BH312B, BH304	Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's, petroleum hydrocarbons, pH, Eh, DO, EC	Low frequency to monitor impacts of recirculated infiltration and general construction activity on groundwater quality.
Groundwater - Gravel & Limestone	Twice / Months 6 & 12	BH125R, BH117R, BH313, BH306C, BH312C, BH310C	Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's, petroleum hydrocarbons, pH, Eh, DO, EC	Low frequency to monitor impacts of recirculated infiltration and general construction activity on groundwater quality.

Please refer to Dg1012a for proposed monitoring locations. Boreholes have been selected to provide representative conditions in and around the periphery of the waste.

End Use, Maintenance and Aftercare Phase

The remedial solution is intended to be a passive system that will not require proactive management of leachate or groundwater within the waste body, therefore a short phase of post construction monitoring is recommended during the End use, Maintenance and Aftercare phase to ensure that the remedial solution has achieved its objectives. Table F.5.2 details the recommended groundwater/ leachate monitoring locations, the proposed parameters for monitoring and the monitoring frequency.

Table F.5.2: Recommended End Use, Maintenance and Aftercare Groundwater Monitoring

Water Body	Frequency/ Timing	Recommended Locations	Parameters	Rationale
Groundwater - Waste	Bi-Annual (twice per year) for 1 year followed by Annually for a further 2 years.	BH301, BH306A, BH310A, BH312A, BH311	Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's, pH, Eh, DO, EC	More frequent initial monitoring with review following first year. If all monitoring results are favourable, the frequency should be reduced to annual for a further two years with review at the completion to assess whether further monitoring is required.
Groundwater - Silt/Alluvium	Bi-Annual (twice per year) for 1 year followed by Annually for a further 2 years.	BH306D, BH310B, BH312B, BH304	Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's, pH, Eh, DO, EC	More frequent initial monitoring with review following first year. If all monitoring results are favourable, the frequency should be reduced to annual for a further two years with review at the completion to assess whether further monitoring is required.
Groundwater - Gravel & Limestone	Bi-Annual (twice per year) for 1 year followed by Annually for a further 2 years.	BH125R, BH117R, BH313, BH306C, BH312C, BH310C	Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's, pH, Eh, DO, EC	More frequent initial monitoring with review following first year. If all monitoring results are favourable, the frequency should be reduced to annual for a further two years with review at the completion to assess whether further monitoring is required.

Please refer to Drawing DG0012b for borehole monitoring locations. Locations have been selected to provide representative conditions in and around the periphery of the waste.

F.6 Noise

Monitoring Arrangements specified	**yes** ☒	**no** ☐	**not applicable** ☐
Monitoring points identified, (plus 12-figure grid references)	**yes** ☒	**no** ☐	**not applicable** ☐
Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment F.6 Noise

Construction Phase

It is proposed to carry out noise monitoring at the following noise monitoring locations (Please refer to Drawing DG1012a) during construction works to ensure the nearest noise sensitive properties are not subject to unacceptable noise levels. Noise level limits set down by relevant statutory authorities will be adhered to.

N1 – Naval Base
N2A – Maritime College Location 2
N2B – Maritime College
N3 – Ring House
N4 – Whitepoint Drive House
N5 – Waters Edge Hotel

Note: N2A and N2B are the same receptor- the Maritime College. As the surveyor was not able to access the exact same location during the day- time survey and night-time survey (site was closed and secured) separate labels are used.

Specific Mitigation Measures for Construction Phase

The naval base is the nearest noise sensitive receptor and will be subject to the greatest noise impact from the proposed construction activities. It is recommended that a robust temporary noise barrier (2-3m in height) is placed along the western boundary of the proposed development site for the duration of the construction works so as to achieve a reduction in noise levels at the Naval Base. Such a barrier will achieve an approximate 10dB(A) reduction in noise levels emitted from the proposed site in the direction of the Naval Base. For the construction of the swale and capping system along the western boundary of the site, the temporary barrier will have to be dismantled. However, these works can be completed in stages so that sections of the temporary noise barrier can remain intact to minimise noise impacts from other construction activitesot the site. Aligned with the measures included in the Noise Management Plan for the proposed construction works (discussed below), noise levels from the proposed development will be reduced to below 55dB(A) for the duration of the works.

The worst-case noise predictions also indicated that there was potential for noise impacts at some of the other nearest sensitive receptors. Landscaping proposals for the site will involve the creation of elevated ridges of land to the north and south of the East Tip site. Creating these features at the start of the earthworks stage could act as a large noise barrier providing attenuation of up to 10dB(A) on noise emissions to the noise sensitive receptors. If these features are not appropriately placed so as to provide a complete visual screen in the direction of the nearest noise sensitive properties, temporary noise bunds should be created to screen construction activities at the proposed site. With the Noise Management Plan also in place, noise levels from the proposed development site will be well below 55dB(A) at all of the nearest noise sensitive receptors.

A detailed Noise Management Plan should be included in the overall Construction Environmental Management Plan and will include a range of measures aimed at reducing the potential construction noise impact on the nearest receptors to the proposed development site. This plan should address the mode and timing of construction activity in close proximity

to the site boundary with the nearest noise sensitive receptors, aiming to reduce the noisiest activities in the vicinity of the boundary of the proposed site. This plan should also address the issues relating to collaboration with the local residents in order to reduce as much as possible the potential impact from construction noise.

It is proposed to construct a robust temporary noise barrier between the proposed works and these workshops to reduce noise levels. Likewise, a similar temporary barrier should be placed between the footpath construction works and the National Maritime Museum building that is adjacent to these works.

A range of measures should be taken to ensure that the quietest machinery is used or is used in such a manner as to be sensitive to the residents at the nearest properties. This should be detailed in the Construction Environmental Management Plan.

British Standard *BS5228:2009 – Noise and vibration control on construction and open sites* outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These measures should be applied by the contractor where appropriate during the construction phase of the proposed development.

End use, Maintenance and Aftercare Phase

The End use, Maintenance and Aftercare phase of the proposed development will not involve any significant noise generating activities. It is therefore not proposed to carry out noise monitoring during this phase.

Please refer to Chapter 10 (Noise and Vibration) of the EIS for further details.

F.7 Meteorological Data

Monitoring Arrangements specified	**yes** ☒	**no** ☐	**not applicable** ☐
Monitoring points identified, (plus 12-figure grid references)	**yes** ☐	**no** ☐	**not applicable** ☒
Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

An application for landfill requires the additional Attachments F.7 to F.8, to be completed:

F.7 Meteorological Data

Daily visual inspection of weather conditions will be carried out to ensure that weather conditions will not increase the potential for nuisance such as fugitive dust emissions. Wind speed, wind direction and rainfall will be recorded daily. Meteorological data will be obtained from the meteorological station at Cork Airport approximately 13km west of the siteas this station has modelling data which is more conducive to the modelling data provider than the station at Roches Point, which is closer to the site. .

F.8 Leachate

Monitoring Arrangements specified	**yes** ☒	**no** ☐	**not applicable** ☐
Monitoring points identified, (plus 12-figure grid references)	**yes** ☒	**no** ☐	**not applicable** ☐
Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment F.8 Leachate

Leachate may be generated within the waste body as a result of groundwater/marine water flux into and out of the waste body. Proposals for monitoring potential leachate generation and migration essentially consist of proposed surface water and groundwater monitoring measures detailed in Section F.3 and Section F.5 of this application.

In summary it is proposed to carry out monitoring at 5 groundwater wells screened within the waste body, 4 groundwater wells screened within the alluvium layer and at 6 groundwater wells screened within the bedrock.

It is also proposed to carry out surface water monitoring at 6 locations (upstream, downstream and adjacent to the site) within Cork harbour.

Such monitoring will be carried out during the Construction and End use,Maintenance and Aftercare phases. This will allow for the detection of leachate generation within the waste body and for the detection of leachate migration to the surrounding controlled waters during and after construction.

Groundwater and surface water monitoring locations are detailed on drawing DG1012a and DG1012b.

F.9 Landfill Gas

Complete each of the following tables to show whether information has been included on aspects of landfill gas monitoring. **Attachment F.9** should also contain information to show whether the data given in Tables F.9.(a) and F.9(b) below represents actual or anticipated data. Complete Table F.9 as follows:

Table F.9 (a) Landfill Gas Monitoring for existing landfill gas flares / utilisation plants

Parameter	Concentration (mg/Nm^3)	Proposed Frequency of Analysis	Information Included Y/N	Method of Analysis	Information Included Y/N
Inlet	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Methane (CH_4) % v/v					
Carbon dioxide (CO_2) %v/v					
Oxygen (O_2) % v/v					
Outlet	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Volumetric Flow Rate					
SO_2					
Nox					
CO					
Particulates					
TA Luft Class I, II, III organics					
Hydrochloric acid					
Hydrogen Fluoride					

Table F.9(b) Landfill Gas Monitoring

Parameter	**Proposed Frequency of Analysis**		**Information Included Y/N**	**Method of Analysis**	**Information Included Y/N**
	Construction Phase				
Methane (CH_4) % v/v	Dependant on results of Risk Assessment		Y – refer to attachment F9		
Carbon Dioxide (CO_2) % v/v	Dependant on results of Risk Assessment		Y – refer to attachment F9		
Oxygen (O_2) % v/v	Dependant on results of Risk Assessment		Y – refer to attachment F9		
Atmospheric Pressure					
Temperature					

Table F.9 (c) Landfill Gas Infrastructure

Equipment	**Monitoring Frequency**	**Information Included Y/N**	**Monitoring Action**	**Information Included Y/N**
Gas Collection System	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Gas Control System	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Monitoring Arrangements specified	**yes** ☐	**no** ☐	**not applicable** ☒
Monitoring points identified, (plus 12-figure grid references)	**yes** ☐	**no** ☐	**not applicable** ☒
Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment F.9 Landfill Gas

The ground gas assessment in Appendix N of the DQRA identified that the waste material is typically not generating any ground gas. However boreholes installed into the underlying alluvium have shown elevated concentrations of ground gas. The source of the ground gas was considered to be the underlying natural organic alluvium as opposed to waste. During the enduse, maintenance and aftercare phase any gas generated on site in the underlying alluvium will vent passively through the permeable Perimeter Engineered Structure (PES). Therefore on this basis no active gas management is proposed for the East Tip and no gas monitoring wells are deemed necessary.

The DQRA has recommended that, as a precaution, further monitoring and assessment and/or gas protection measures will be required for any buildings constructed on site as a result of the elevated ground gas concentration identified in the alluvium. It should be noted that there are no buildings planned for the East Tip as part of the parkland amenity end-use option. The Contractor executing the remediation works will be required to undertake the appropriate risk assessment for any building proposed on site as part of the works. Any gas monitoring requirement for site offices/ buildings will be informed by the risk assessment.

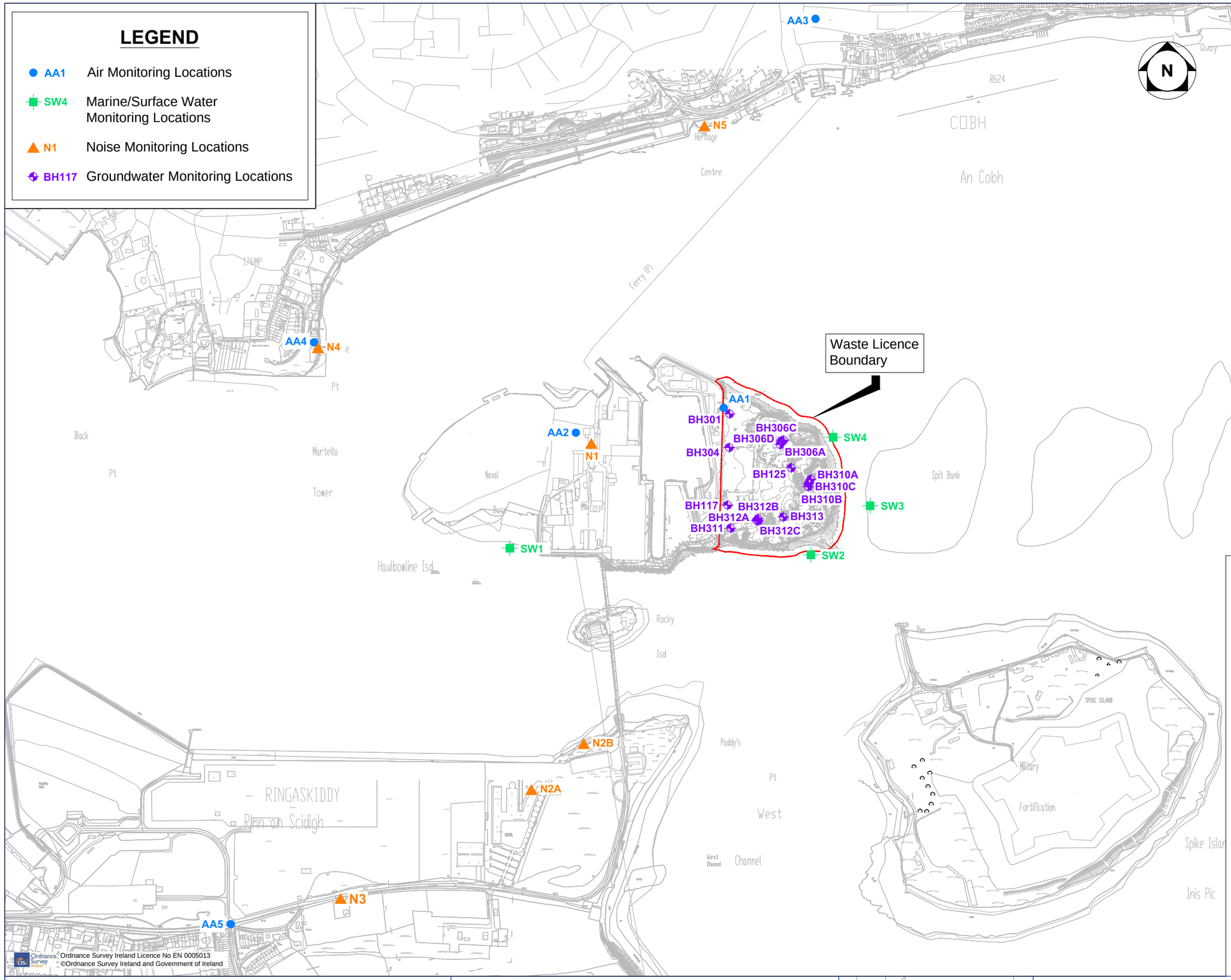
ATTACHMENT F
Drawings

DG1012a – Construction Phase Monitoring and Sampling Points

DG1012b – Enduse, Maintenance and Aftercare Phase Monitoring and Sampling Points

LEGEND

- AA1 — Air Monitoring Locations
- SW4 — Marine/Surface Water Monitoring Locations
- N1 — Noise Monitoring Locations
- BH117 — Groundwater Monitoring Locations



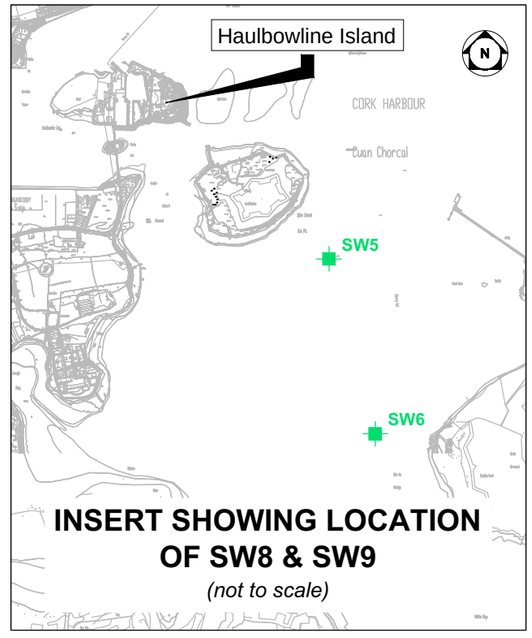
CONSTRUCTION PHASE MONITORING AND SAMPLING POINTS

Air Monitoring Location	X co-ordinate	Y co-ordinate
AA1	179553.307	65556.005
AA2	179173.145	65492.436
AA3	179789.274	66555.671
AA4	178500.003	65724.485
AA5	178285.808	64229.963

Marine/Surface Water Monitoring Location	X co-ordinate	Y co-ordinate
SW1	179003.500	65195.500
SW2	179777.500	65178.577
SW3	179930.000	65304.771
SW4	179834.500	65480.771
SW5	180999.000	64081.000
SW6	181375.500	62655.000

Noise Monitoring Location	X co-ordinate	Y co-ordinate
N1	179213.036	65464.472
N2A	179058.949	64575.162
N2B	179193.331	64693.495
N3	178568.304	64295.591
N4	178510.013	65709.789
N5	179503.840	66280.174

Groundwater Monitoring Location	X co-ordinate	Y co-ordinate
BH117	179563.518	65306.311
BH125	179726.838	65401.992
BH301	179568.497	65540.711
BH304	179567.661	65454.073
BH306A	179698.493	65461.701
BH306C	179707.481	65473.360
BH306D	179701.672	65470.902
BH310A	179777.715	65372.772
BH310B	179770.561	65353.637
BH310C	179771.319	65361.869
BH311	179571.152	65247.073
BH312A	179637.881	65266.455
BH312B	179641.862	65271.261
BH312C	179642.796	65265.675
BH313	179706.402	65275.986



INSERT SHOWING LOCATION OF SW8 & SW9
(not to scale)

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No.	Date	Drn. / Chk.	Amendment / Issue	App
F01	07.11.13	RH / ER	FINAL ISSUE	ER
A01	24.04.13	RH / ER	ISSUE FOR APPROVAL	ER
D01	Apr.'13	RH / ER	DRAFT ISSUE	ER

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Drawn	RH
Checked	ER
Approved	ER
Date	March 2013
Scale	NTS @ A1 1:10,000 @ A3
Job No.	MCE0734

Project
EAST TIP REMEDIATION PROJECT

Title
CONSTRUCTION PHASE MONITORING AND SAMPLING POINTS PLAN

File Ref.	Drg. No.	Rev.
MCE0734DG1012aF01.dwg	DG1012a	F01

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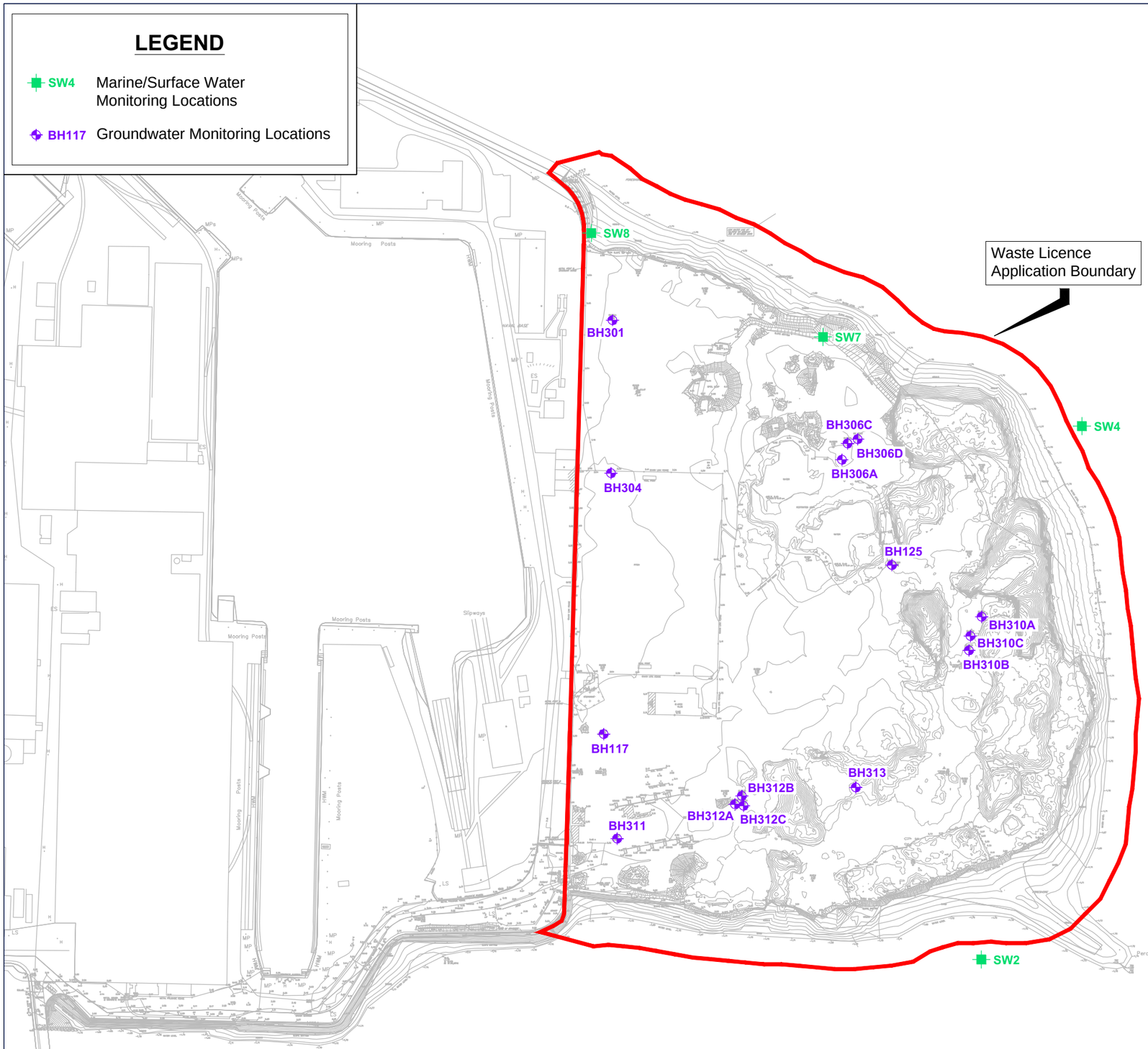
LEGEND

- SW4 — Marine/Surface Water Monitoring Locations
- BH117 — Groundwater Monitoring Locations



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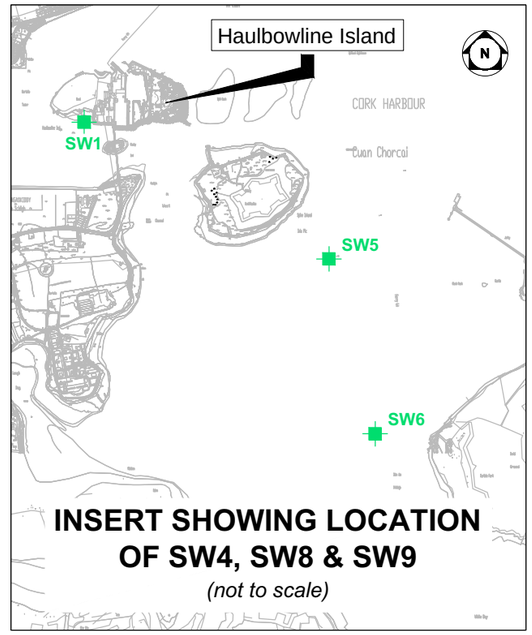
OPERATIONAL/END USE PHASE MONITORING AND SAMPLING POINTS

Marine/Surface Water Monitoring Location	X co-ordinate	Y co-ordinate
SW1	179003.500	65195.500
SW2	179777.500	65178.577
SW3	179930.000	65304.771
SW4	179834.500	65480.771
SW5	180999.000	64081.000
SW6	181375.500	62655.000
SW7	179687.785	65531.286
SW8	179556.464	65590.149

Groundwater Monitoring Location	X co-ordinate	Y co-ordinate
BH117	179563.518	65306.311
BH125	179726.838	65401.992
BH301	179568.497	65540.711
BH304	179567.661	65454.073
BH306A	179698.493	65461.701
BH306C	179707.481	65473.360
BH306D	179701.672	65470.902
BH310A	179777.715	65372.772
BH310B	179770.561	65353.637
BH310C	179771.319	65361.869
BH311	179571.152	65247.073
BH312A	179637.881	65266.455
BH312B	179641.862	65271.261
BH312C	179642.796	65265.675
BH313	179706.402	65275.986



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D01	Apr.'13	RH / ER	DRAFT ISSUE	ER

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Drawn	RH
Checked	ER
Approved	ER
Date	March 2013
Scale	NTS @ A1 1:10,000 @ A3
Job No.	MCE0734

Project: **EAST TIP REMEDIATION PROJECT**

Title: END USE, AFTERCARE & MAINTENANCE PHASE MONITORING & SAMPLING POINTS PLAN

File Ref.	Drg. No.	Rev.
MCE0734DG1012bF01.dwg	DG1012b	F01

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SECTION G RESOURCES USE & ENERGY EFFICIENCY

G.1 Raw Materials, Substances, Preparations and Energy

Attachment G.1 should contain a list of all raw, product and ancillary materials, substances, preparations, fuels and energy which will be utilised in or produced by the activity. Information on any insecticides, herbicides or rat poisons, etc., should also be provided with their respective data and safety sheets. The Standard Forms, provided in Annex 1, should be used in the description of these materials, substances, etc., where relevant. Additional advice on completing this section is provided in the *Guidance Note*.

Attachment included	**yes** ☒ **no** ☐ **not applicable** ☐

Attachment G.1Raw Materials, Substances, Preparations and Energy

Construction Stage

At this stage of the project, the sources for raw materials are unknown. Specific raw material and estimated quantities required to carry out remediation of the East Tip will be determined during detailed design stage of the project. The Contractor will be required to ensure that all materials are sourced in accordance with the proposed Environmental Management Plan for the works (see Chapter 6 'Construction Activities' of the EIS).

Please refer to Table G.1 in Annex 1 Standard Forms for 'estimated' raw material requirements during the construction stage of the project.

Raw materials will be imported to the East Tip for the following during the construction stage:-

- The engineered capping system, which will be required to cover approximately 9 hectares of waste and associated surface water drainage works and anchor trenches.
- The PES, which will extend around the coastal perimeter of the site for approximately 900m.
- The PES at western boundary of the site – approx 350m long.
- Landscaping works.
- Road and pathway improvements.
- Powering machinery
- Dust suppression
- Washing, cleaning and decontamination shower facilities

A marine transport route with docking and unloading at the former steelworks site may also be considered for transportation of materials to site in order to reduce traffic movements in the local roads. It is anticipated that any materials brought to Haulbowline by sea would be unloaded and transported directly to the East Tip, thereby avoiding storage of materials outside the East Tip. Again, the sources of material are currently unknown and (similar to the road transport options), departure ports at the time of making this application and preparing the EIS are unknown. However, in the event that sea transport is a feasible option, then the importation of material by sea will be undertaken in accordance with recommendations of the

proposed Environmental Management Plan (See Chapter 6 (Construction Activities) of the EIS) and proposed Traffic Management Plan (see Chapter 8 (Traffic and Transport) of the EIS).

It is also proposed to reuse slag and C&D material to provide fill material for construction of the PES and for use as part of the drainage system. This will reduce the quantity of engineering fill requiring importation to the site. The reuse of slag material will be subject to the material meeting the required testing and grading requirements.

Water will be required during construction to serve the on-site welfare facilities (i.e. washing, cleaning and decontamination showers) as well being used as a dust suppressant. This can be supplied by the existing supply system in place at the site. This is thought to be a domestic supply which has sufficient capacity to serve the welfare facilities. It will be the contractors responsibility to ensure there is an adequate water supply to site for welfare facilities.

End use, Maintenance and Aftercare Phase

No raw materials or fuels will be required during the End use, Maintenance and Aftercare phase other than nominal amounts of fuel required for continuous maintenance such as grass cutting and landscaping etc.

Please refer to Chapters 5 (Project Description) and Chapter 6 (Construction Activities) for further details.

G.2 Energy Efficiency

A description of the energy used in or generated by the activity must be provided in **Attachment G.2**.

Attachment included	**yes** ☒ **no** ☐ **not applicable** ☐

Attachment G.2Energy Efficiency

Construction Phase

Electrical Supply

During construction, power will be required for crushing operations and site lighting. This will be provided by a connection to 10Kv electrical line located at the site entrance.

Lighting

Existing lighting occurs on the access road to the site however no lighting exists on the East Tip site where the remediation works are proposed. During construction, lighting of temporary working areas and site compounds during periods of darkness maybe required. This will be minimised where possible. Portable lighting units will be used and positioned in such a way as to minimise glare and potential to impact on the local community in particular sensitive visual receptors and ecology of the area.

Fuel

Diesel generators will provide power on site. Storage of diesel will be carefully managed and bunded where required so that the risk of spillage is minimised.

Water

The use of water during the construction process will be controlled and minimised, where possible.

End use, Maintenance and Aftercare Phase

Electricity supply

There will be no permanently installed buildings or facilities that will require electricity within the East Tip site.

Telecommunication

There is an existing telecommunication connection at the site entrance which will be maintained and can be connected to during the End use, Maintenance and Aftercare phase, if required.

Water Supply

No welfare facilities, toilet blocks or cafes are proposed for the end use of the site therefore water supply will not be required for these purposes.

Water supply will be required for landscaping, however it is proposed to maintain the existing water supply to the site which currently serves the existing site foreman's building.

Lighting

There will be no permanently installed lighting within the East Tip site.The existing lighting on the access road and bridge will be maintained.

Playing pitches will be primarily used during the daytime therefore no lighting is required in this regard.

SECTION H MATERIALS HANDLING

H.1 Waste Types and Quantities – Existing & Proposed

Provide an estimation of the quantity of waste likely to be handled in relation to each class of activity applied for. This information should be included in Table H.1(a).

TABLE H.1(A). QUANTITIES OF WASTE IN RELATION TO EACH CLASS OF ACTIVITY APPLIED FOR

Waste Management Act 1996, as amended. 3rd Schedule (Disposal) Operations			Waste Management Act 1996, as amended. 4th Schedule (Recovery) Operations		
Class of Activity Applied For		Quantity (tpa)	Class of Activity Applied For		Quantity (tpa)
Class D 1		1.3-1.7 million tonnes[Note1,2]	Class R 1		
Class D 2			Class R 2		
Class D 3			Class R 3		
Class D 4			Class R 4		10,000 tonnes
Class D 5			Class R 5		216,600 tonnes
Class D 6			Class R 6		
Class D 7			Class R 7		
Class D 8			Class R 8		
Class D 9			Class R 9		
Class D 10			Class R 10		
Class D 11			Class R 11		
Class D 12			Class R 12		226,600 tonnes
Class D 13		1.3-1.7m tonnes	Class R 13		226,600 tonnes
Class D 14					
Class D 15		1.3-1.7m tonnes			

Note 1: Estimate of existing quantity of waste present at East Tip is based on the average bulk density of material specified in the Addendum to the DQRA (2 tonnes/m3) and typical bulk density conversion factor specified in the Facility (Permit and Registration) Regulation Guidelines and calculated density for slag(3t/m3) and scrap metal (5t/m3).
Note 2: The total quantity of material deposited within the licensed site will be class D1-(class R4+class R5)

Attachment H.1 Additional Information

Table H.1(A) applies to waste quantities 'handled' on site during the construction phase of the project. It is not proposed to accept any waste on site for disposal during the Construction or End use,Maintenance and Aftercare phases.

Waste currently deposited at East Tip consists of slag, millscale, refractories, flue dust, scrap metal, construction and demolition waste, sludge and potentially some refuse (please refer to Chapter 1 of the EIS for further details). The quantity of waste within the East Tip site is estimated to be in the range of 1.3 – 1.7 million tonnes. Assuming the maximum quantity of waste on site(1.7 million tonnes), approximately 9% of this is classified as hazardous(flue dust and sludge) and the remaining 91% is classified as non hazardous.

The quantity of scrap metal on site is estimated to be approximately 43,225 tonnes. Of this it is proposed to recover approximately 10,000 tonnesfrom the site by initially removing scrap metal from the surface of the site and subsequently removing scrap metal from the surface of the re-profiled site. All scrap metal recovered will be sent off site for further recovery/recycling at an authorised facility.

Of the slag material present (estimated 1.2 million tonnes/ 412,880 m^3) it is proposed to potentially recover approximately 216,000 tonnes (72,000m^3) for reuse in the PESand drainage layer. Any such re-use would be subject to the contractor being able to demonstrate that the material meets the requirements of the remediation project. .

Furthermore, it is proposed to potentially recover a stockpile of millscale material (600 tonnes/400m^3), subject to suitable reuse/recovery options being available, market value and demand at the time of the proposed works.

In Table H. 1 (B) provide the annual amount of waste handled/to be handled at the facility. Additional information should be included in **Attachment H.1.** The tonnage per annum should be given of that expected for the life of the licence, with at least the next five years tonnages provided. For landfill licence review applications provide an estimate of the quantity of waste already deposited in (i) lined cells; (ii) unlined cells.

TABLE H.1(B) ANNUAL QUANTITIES AND NATURE OF WASTE

Year	Non-hazardous waste (tonnes per annum)	Hazardous waste (tonnes per annum)	Total annual quantity of waste (tonnes per annum)
2014/2015 Note 1	1,586,553 tonnes	155,415 tonnes Note 2	1,741,968 tonnes Note 3
N/A			
N/A			

Note 1: It is assumed that all construction activity hence the requirement for waste handling will be complete within 18 months.
Note 2: Includes furnace dust and sludge.
Note 3: Assumes a worst case scenario of 1.7million tonnes of waste present.

A detailed inventory of the types and quantities of wastes currently handled at the site and proposed to be handled should be submitted as Table H.1 (C).

TABLE H.1 (C) WASTE TYPES AND QUANTITIES

WASTE TYPE	TONNES PER ANNUM (existing)[Note 1]	TONNES PER ANNUM (proposed)	TOTAL (over life of site) tonnes
Household	65 tonnes[Note 2]		65 tonnes
Commercial	Not Applicable		Not Applicable
Sewage Sludge	Not Applicable		Not Applicable
Construction and Demolition	[3]		584.5 tonnes
Industrial Non-Hazardous Sludges	Not Applicable		Not Applicable
Industrial Non-Hazardous Solids	1,585,903.0 tonnes Note 4		1,585,903.0 tonnes Note 4
Hazardous ***(Specify detail in Table H 1.2)**	155,415 tonnes[Note 5]		155,415 tonnes[Note 5]
Inert Waste imported for restoration purposes			

Note 3: Includes topsoil
Note 4: Includes all waste accept flue dust and sludge
Note 5: Includes flue dust and sludge
Note 1: Based on a worst case scenario of 1.7 million tonnes of material present on site.
Note 2: Source WYG 2008-see Attachment H.4

While there is an estimated 1.3-1.7 million tonnes of waste material currently deposited at the site, none of this is being 'handled' at present. It is 'proposed' to handle/managethis waste within the 18 months construction period.

It is proposed to recover approximately 10,000 tonnes of scrap metal for onward off site recovery and recover approximately 216,000 tonnes of slag material onsite for reuse within the PES and surface water drainage layers. Recovery and reuse of this material will be subject to laboratory testing and statutory approval.

Only material that meets the necessary standards for the remediation, End use, Maintenance and Aftercare will be imported onto the site. Table G.1 attached details the quantities of various inert materials required for remediation/ construction purposes.

Please refer to Chapter 5 (Project Description) and Chapter 6 (Construction) of the EIS for further details.

*** TABLE H.1.2 HAZARDOUS WASTE TYPES AND QUANTITIES**

HAZARDOUS WASTE	DETAILED DESCRIPTION	Tonnes Per Annum (Existing)	(Tonnes Per Annum Proposed)
Waste Oil	Not Applicable	Not Applicable	Not Applicable
Oil filters	Not Applicable	Not Applicable	Not Applicable
Asbestos	Not Applicable	Not Applicable	Not Applicable
Paint and Ink	Not Applicable	Not Applicable	Not Applicable
Batteries	Not Applicable	Not Applicable	Not Applicable
Fluorescent Light Bulbs	Not Applicable	Not Applicable	Not Applicable
Contaminated Soils	Not Applicable	Not Applicable	Not Applicable
OTHER HAZARDOUS WASTE (APPLICANT TO SPECIFY)			
flue dust,, sludge,	155,415 tonnes		155,415 tonnes

Attachment H.1 should contain any relevant additional information.

It should be noted that an applicant may be issued with a licence which restricts the type of wastes which may be accepted.

H.2 Waste Acceptance Procedures

Procedures for checking waste loads as they arrive at the facility must be included. These should follow the requirements of the Agency's Waste Acceptance Manual and, for landfills, Council Decision 2003/33/EC. A copy of these procedures and other associated documentation should be included as **Attachment H.2.**

Attachment H.2 Waste Acceptance Procedures

The East Tip will never function as an operational landfill in the future therefore this is not relevant.

H.3 Waste Handling

Waste handling and the operating procedures used at the facility including waste treatment processes should be described in **Attachment H.3**. Included in the attachment should be information on the plant used on site and on the methods and processes for handling waste on-site. Special requirements hold for contaminated soil facilities, see *Guidance Note*.

Attachment H.3 Waste Handling

Waste Handling and Operating Procedures

As detailed in Section C.2 of this application, the contractor will be required to prepare a detailed CEMP prior to construction. The CEMP will include information on the plant proposed for use on site and the methods, processes, procedures and mitigation measures proposed for handling waste on site.

Section C.3 of this application, Section D.1 of this application and Chapter 6 of the EIS details the works proposed during the construction phase, the phases of works and the equipment required to carry out such works. It is estimated that construction works will take approximately 18 months to complete and in summary waste handling activities will consist of the following:

Demolition

It is proposed to demolish all existing buildings and structures (see Drawing DG1003 Site Location). Every effort will be made to ensure that such works are carried out in a sustainable manner to ensure materials can be removed for recovery and reuse where possible.

Recovery of Scrap Metal

Metals account for approximately 7% of the waste material on site. It is proposed to collect and recover approximately 10,000 tonnes of scrap metal from the site. Scrap metal shall be picked from the surface of the site using an excavator and grab. Metals will be extracted from the lower levels using a magnet which will also be used to remove scrap metal from processed material following the crushing process. The collection of scrap will be dependent on market value at the time of construction and the grade of the scrap. Scrap metal will be removed off site for final recovery. It will be a requirement of the appointed contractor to ensure this material is sent to an appropriately authorised facility for recovery/recycling.

Recovery of slag material

Subject to testing and approval, it is proposed to recover slag material for use in the Perimeter Engineered Structure (PES) and in the drainage layer. This material accounts for approximately 64% of the material on site. It is proposed to recover this material by excavation, crushing, screening, washing (or other process) of existing material on site to achieve the required engineering grade. Therefore such plant will be required on site.

A detailed plan for reuse of slag will be prepared as part of the detailed design stage and a protocol will be established to ensure the material is appropriate for reuse. As a minimum this protocol will require a full suite of tests to be conducted on representative samples taken typically from every 500m3 of processed material to ensure it meets the necessary chemical and geotechnical requirements. Processed material will be stockpiled in a designated area, in separate stockpiles and clearly labelled according to its class.

In the event that slag material is not deemed suitable for reuse, then this material will be placed back in East Tip and will be reprofiled to achieve the required levels for capping.

Removal of millscale off site (potentially)

Options for the removal and recovery of millscale will also be explored. It is estimated that approximately 400m^3 (600 tonnes) of stockpiled material on site is millscale. Recovery will be dependant on market value and demand at the time of the proposed works.

If recovery is deemed feasible, then this material will be stored in a designated area, pending necessary testing and removal off site by a suitable contractor to an appropriately authorised facility.

Reprofiling

In order to achieve the required profile levels to facilitate theinstallation of the capping system, it will be necessary to excavate the raised areas of waste and infill the lower areas of the site. Excavation will involve breaking out areas of slag which are currently fused using rock breakers and toothed buckets and dump trucks.

Excavation and Scrape back of waste material along the foreshore

It is proposed to scrape back waste material in the foreshore and regrade the existing slopes of the East Tip around Cork Harbour in order to install the Perimeter Engineered Structure (PES). This may require the use of a rock breaker and excavators. Temporary structures such as geotubes, permeable and semi-permeable control berms, sheet piling or other suitable alternatives as detailed in Chapter 6 (Project Construction) and Section D of this application,will also be required to facilitate surface water management measures.

In order to construct the PES along the western boundary of the site, waste material will be excavated 10metres from the top of the existing sea wall using trench boxing or other support system to protect the excavation and facilitate surface water and groundwater management measures.

Hotspots

In the event that during construction works, waste material of particular concern is uncovered, the contractor shall be required to implement procedures set down in the Construction Environmental Management Plan for management of such wastes. The contractor will be required to develop these procedures prior to construction works, in line with the recommendations set out in Chapter 6 (Project Construction) of the EIS for further details.

Contaminated soils

As detailed in Section H.1 of this application, the East Tip site contains both hazardous and non-hazardous waste. Chapter 13 (Soils, Geology and Hydrogeology) of the EIS and The Detailed Quantitative Risk Assessment (DQRA) contained in Appendix A of the EIS assesses the risks associated with the site to human health and the surrounding environment through the identification of source-pathway-receptor pollutant linkages, illustrated through the use of Conceptual Site Models. The DQRA recommends a remediation solution in order to sever the pathway between source and receptor, thereby reducing the risks associated with the site.

Section I of this application details the source pathway receptor linkages and risks associated with the East Tip site in its current state (baseline condition).

An outline design of the remediation option has been developed and is described in Chapters 5 (Project Description) and Chapter 6 (Project Construction) of the EIS and Section D of this Application.Section F of this application details the proposed monitoring programme for the East Tip site during and after construction.

In addition, an application for a Landfill requires Section H.3.a to be completed:

H.3a Waste Handling at the Landfill Facility

State the manner in which it will be verified or assured that waste will be subject to treatment prior to landfilling in accordance with the requirements of article 6 of the Landfill Directive.

Provide information on the quantity of biodegradable municipal waste to be accepted and how the targets of article 5 of the Landfill Directive (1999/31/EC), as they have been adopted in Ireland, are to be achieved. In particular describe how operation of the landfill will contribute to:

(a) a reduction by 16/07/2010 to 75% by weight of the total amount of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available;

(b) a reduction by 16/07/2013 to 50% by weight of the total amount of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available;

(c) a reduction by 16/07/2016 to 35% by weight of the total amount of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available.

Evidence should be provided to show that energy will be used efficiently.

Attachment H.3a Waste Handling at the Landfill Facility

The East Tip will not function as an operational landfill therefore this is not relevant.

H.4 Waste Arisings

Waste Arisings should be considered for all contaminated soil applications. Details of all waste materials generated on the site including, name, description and nature as well as the source(s) should be identified. The quantities of each type of waste generated on an annual/monthly basis should be calculated and stated in Tables H.4(i) and H.4(ii) of the application form. Applicants should also provide conversion factors used to relate volume (m^3) and tonnage (t) for their waste stream.

Attachment H.4 Waste Arisings

The East Tip is an area of land (approximately 9 hectares) reclaimed from the sea by infilling with *approximately* 650,000 m^3(1.3-1.7 million tonnes)processing waste from a former steelworks site on Haulbowline Island in Co. Cork.

It is thought that the deposition of steel making waste on the East Tip of Haulbowline Island has been taking place since the 1960's (KTC, 1995) but intensified in the late 1970's (EA, 2002) and continued until 2001.

Site investigations (WYG, 2005& 2012 Kevin T. Cullen & Co (KTC), 1995 & 1998 and RPS 2012 &2013 (slag classification, sediment sampling and foreshore area SI)), interviews with former key personnel of Irish Ispat (EA, 2002) and review of key documents (EA, 2002) have contributed to determining the types of waste that have been deposited at the site.

In 2008, WYG estimated the approximate percentage composition of the East Tip waste material. Applying both the average bulk density for material in East Tip specified in the DQRA Addendum (Appendix A of the EIS) and conversion factors specified in the Waste Facility Permit and Registration Regulations Guidance Manual 2012 coupled withcalculated conversion factors for scrap metal (5 t/m^3) and slag (3t/m^3), it is estimated that there is between 13. – 1.7 milliontonnes of waste deposited at the East Tip (based on approximate estimate of 650,000m^3 deposited at the site).For the purposes of this application the worst case/maximum extent of waste present is assumed (1.7 million tonnes). It should also be noted that while the presence of refuse waste was suspected on site, the presence of such material was not confirmed. Therefore the estimated quantity of refuse material present is included as a worst case scenario.

Table H.4.1 Estimated Waste Quantities

Waste Type	Estimated percentage (m^3) Note 1	m3	Conversion factor Note 2	Tonnes
Refractories	15.28%	99320	1.5	148,980
Slag	63.52%	412880	3 Note 3	1238640
Topsoil	0.01%	65	1.5	97.5
Refuse	0.05%	325	0.2	65
C&D waste	0.05%	325	1.5	488
Furnace dust	0.05%	325	1.5	488
Sludge	0.99%	6435	1	6435
Scrap metal	6.65%	43225	5 Note4	216125
Millscale	13.40%	87100	1.5	130650
	100.00%	**650000**		**1,741,968**

Note 1: Source WYG, 2008
Note 2: Source Waste Facility Permit and Registration Regulation Guidelines, EPA 2012
Note 3: conversion factor based onrelative density at specific gravity calculation
Note 4: conversion factor based onaverage densities received from contractors

In 2013 Cork County Council commissioned RPS to investigate the extent of waste at East Tip in the foreshore zone. The anticipated extent of wastes and deposited materials at the East Tip arising from these investigations is outlined in Drawing DG1006. These site investigations have identified waste in the foreshore of the East Tip which, in some locations, extends to the mean low water mark (MLWM). Please refer to Chapter 5 'Project Description' for further detail and Figure 1.2of the EIS.

Tables H.4(i) and H.4(ii) of Annex 1 Standard Form, detail the waste types present on site and the source of this material. As this is a remediation project and it is not proposed to accept waste at the East Tip site for disposal, the waste quantities refer to the quantities of waste to be recovered for further processing off site and waste to remain on site and remediated.

H.5 Waste Recycling and Recovery

Applicants should describe in **Attachment H.5** how waste activities will contribute to the requirements of regulation 31(1) and (2) of the European Communities (Waste Directive) Regulations 2011.

Applicants should also describe how they intend complying with the requirements of regulation 29(2A) of the Regulations regarding waste recovery.

Attachment H.5 Waste Recycling and Recovery

The remediation strategy proposed was developed on the basis of a DQRA completed to determine risks posed by the site and to determine measures necessary to deliver the best environmental outcome.

Please refer to Section G and Section I of this application which details how waste activities will contribute to the requirements of the Waste Framework Directive including the waste hierarchy.

The design option found to deliver the best environmental outcome was one involving the use of a capping/ cover system across the top of the site and installation of a perimeter engineered structure.

In order to further implement the requirements of the Waste Hierarchy, it is proposed to recover and recycle approximately 216,000 tonnes of slag material onsite for reuse within the PES and drainage layers of the capping system subject to testing and statutory approval. It is also proposed to recover approximately 10,000 tonnes of scrap metal for onward off site recovery/recycling at an authorised treatment facility and potentially recover 600 tonnes of millscale subject to feasibility and market demand.

SECTION I EXISTING ENVIRONMENT & IMPACT OF THE FACILITY

Detailed information is required to enable the Agency to assess the existing environment. This section requires the provision of information on the ambient environmental conditions at the site prior to the commencement of waste management activities or prior to the receipt of a review application.

Where development is proposed to be carried out, being development which is of a class for the time being specified under Article 24 (First Schedule) of the Environmental Impact Assessment Regulations, the information on the state of the existing environment should be addressed in the EIS. **In such cases, it will suffice for the purposes of this section to provide adequate cross-references to the relevant sections in the EIS.**

I.1.Assessment of atmospheric emissions

Describe the existing environment in terms of air quality with particular reference to ambient air quality standards.

Provide a statement whether or not emissions of main polluting substances (as defined in the Schedule of S.I. 394 of 2004) to the atmosphere are likely to impair the environment.

Give summary details and an assessment of the impacts of any existing or proposed emissions on the environment, including environmental media other than those into which the emissions are to be made.

Attachment I.1 should also contain full details of any dispersion modelling of atmospheric emissions from the activity, where required.

Attachment I.1 Assessment of atmospheric emissions

The East Tip, in its current derelict condition, poses a slight adverse potential impact to air quality in the long term.

During Construction, the main potential impacts arise from the following:

- Dispersion of construction dust/pollutants during the proposed works from excavation, reprofiling, crushing, soil importation, demolition etc;
- Potential risk from asbestos during the works;
- Greenhouse gas emissions from construction operations; and
- Potential odours during construction stage.

In addition to the above there is also the potential impact of emissions to the atmosphere from construction traffic on the haul routes through Ringaskiddy and Shanbally.

Further information on potential emissions to atmosphere are detailed in Section E of this application and Chapter 9 (Air Quality and Climate) of the EIS.

Dust emissions during the construction phase have been predicted using the air dispersion modelling assessment (AERMOD). Once construction starts, it is predicted that the impacts to

air quality will increase from an existing *slight adverse*impact to a *moderate adverse* impact during the mobilisation, construction and capping phases. Potential impacts during the construction phase will be mitigated through a detailed series of specified mitigation measures to be adopted by the Contractor during construction as detailed in Section F of this application and Chapter 9 of the EIS.

However once construction is complete, the net impact of the remediation will be a *long-term positive moderate impact* by severing the pathway between the waste body and surrounding environment.

Asbestos is known to be present in the material on the East Tip following a series of detailed analyses undertaken in 2012/2013. The risk of asbestos exposure has been carried out by means of a qualitative risk assessment. With the implementation of a specified series of mitigation measures, the asbestos risk to human health on site (and therefore off-site) will be minimised. The impact during construction is considered to be a *slight adverse* impact during excavation works, however construction workers on site will be protected through use of appropriate PPE and ongoing monitoring.

Odour impacts during this phase are considered negligible with the implementation of a series of mitigation measures during the temporary capping phase as detailed in Section F and Chapter 9 of the EIS.

Construction traffic can impact on local air quality, in particular, the proposed haul routes used for deliveries and any sensitive receptors that line these routes may experience the impacts to local air quality. The proposed haul route is along the N28 through the villages of Ringaskiddy and Shanbally from the greater Cork City area. Local air quality impacts to receptors along the N28 from construction traffic will experience negligible impact during the short term remediation stage

Emissions with the potential to cause climate change will arise from embodied carbon dioxide in site materials as well as vehicles delivering this material to the East Tip site. These emissions have been quantified using an industry standard carbon calculator for construction sites. A series of mitigation measures to offset the predicted greenhouse gas emissions are provided including the implementation of a Traffic Management Plan to minimise congestion, reducing idle times on site, ensuring regular maintenance of plant and equipment and incorporating, where possible, use of materials with a reduced environmental impact into the works.

No emissions to atmosphere are predicted during the End use, Maintenance and Aftercare phase. While a small car park (circa 54 spaces) is proposed for the end-use option, the impact to air quality associated with such a car park is considered negligible therefore emissions to atmosphere are not likely to impair the environment.

The long term net impact of the remediation will be a *long-term positive moderate* impact to air quality.

Please refer to Chapter 9 (Air Quality and Climate) of the EIS for further details.

I.2. Assessment of Impact on Receiving Surface Water

Describe the existing environment in terms of water quality with particular reference to environmental quality standards or other legislative standards. Table I.2(i) should be completed

Provide a statement whether or not emissions of main polluting substances (as defined in the Schedule of S.I. 394 of 2004) to water are likely to impair the environment.

Give summary details and an assessment of the impacts of any existing or proposed emissions on the environment, including environmental media other than those into which the emissions are to be made.

The requirements of and environmental quality standards contained in the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009) should be considered. Information should be provided on the manner in which these Regulations were taken into account in the assessment of the impact of emissions to surface waters.

Full details of the assessment and any other relevant information on the receiving environment should be submitted as **Attachment I.2.**

Attachment I.2 Impacts on Receiving Surface Water

Currently emissions to surface water are in effect uncontrolled. The purpose of this remediation project is to gain control within a risk based framework.

The East Tip is located on an island with a substantial portion of the waste body located beneath sea water in the surrounding harbour. The majority of the waste body is therefore saturated with saline water.

Currently emissions (sediment and contaminants) to surface water can occur by three means:

- Underlying seawater/groundwater flux in and out of the waste body
- Direct erosion of the waste body/sediment by the marine water along the perimeter of the site
- Surfacewater runoff from the site into the nearby marine shores

The DQRA (WYG 2013a) *predicts* that the site is currently having a *theoreticalminor measurable impact* on near shore marine.However this is considered to be a conservative assessment due to a number of factors, in particular the use of high permeability values which may over estimate the permeability of waste used to estimate groundwater flow and contaminant transport flux from the waste. In reality actual surface water collected during low tide in June and November 2012, did not identify parameter concentrations in excess of Water Quality Standards (WQS). For all samples tested, none of the COC (Contaminants of Concern) concentrations exceeded relevant WQS, including those taken in close proximity to the East Tip site.

Please refer to Appendix L' Water Analysis' of the DQRA(WYG 2013a) (Appendix A of the EIS) for baseline surface water quality information.

During Construction, potential impacts to surface water/marine waters may occur as a result of the following activities and emissions:

- the excavation and scraping back of material along the foreshore (suspended sediments)
- the excavation of a trench along the western boundary of the sea wall (mobilise contaminants)
- theemplacement of waste below the mean water table in the centre of the site(mobile contaminants)
- the reprofiling of waste and rainwater infiltration (generation of leachate)
- The use of diesel fuelled plant and equipment (spill)

The impact of each of the above potential emissions will be managed by the contractor through the implementation of mitigation measures detailed in Section F of this application and Chapter 13 of the EIS. It should be noted that as the construction phase is temporary, potential impacts will also be temporary in nature during this phase of the project. .

Potential impacts after construction will be *positive*compared to the baseline. The reduced flux of contamination from the site following the installation of PES and emplacement of the low permeability cap will have a positive (beneficial) impact on the receiving marine waters in Cork Harbour. The residual waste in the foreshore area is not predicted to have a detrimental impact on water quality in Cork Harbour 9WYG 2013c).

The conservative assessment carried out predicts contaminant concentrations in surface ater within 10m of the East Tip will be below the Water Quality Stanadards (WQS) used in the risk assessments.

Emissions of main polluting substances (as defined in the Schedule of S.I. 394 of 2004) to the surrounding Cork Harbour water following remediation are not likely to impair the environment and are predicted to meet the requirements of the surface water regulation 2009 (SI No. 272 of 2009).

Please refer to Section E of this application for further details on surface water emissions.

This Section of the application should be read in conjunction with the DQRA and Chapter 13 (Soils Geology and Hydrogeology) and Chapter 14 (Ecology) of the EIS.

Section I.7 of this application details the ecological aspects of the site and surrounding area including the marine environment. Please refer to this section for details on designations, sensitive areas and sensitive species.

I.3. Assessment of Impact of Sewage Discharge.

Give summary details and an assessment of the impacts of any existing or proposed emissions on the environment, including environmental media other than those into which the emissions are to be made.

Full details of the assessment and any other supporting information should form **Attachment I.3.**

Attachment I.3 Impact of Sewage Discharge

It is not proposed to discharge sewage sludge from the site during the construction phase or End use,Maintenance and Aftercare phase, therefore there will be no impact.

I.4 Assessment of impact of ground/groundwater emissions

The scope and detail of this assessment will depend to a large extent on the extent and type of ground emissions at any site, which in turn are related to the risk. Details should be included in **Attachment I.4**. Comprehensive guidelines are contained in the *Application Guidance Note* and include particular requirements for landfill and brownfield facilities.

Describe the existing groundwater quality. Tables I.4(i) should be completed.

The requirements of the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010) should be considered. Information should be provided on the manner in which these Regulations were taken into account in the assessment of the impact of the activity on groundwater.

Attachment I.4 Assessment of impact of ground/groundwater emissions

Currently emissions to groundwater are in effect uncontrolled. The purpose of this remediation project is to gain control within a risk based framework. Haulbowline and the East Tip are situated over Waulsortian Limestone which is classified as a Locally Important Karst Aquifer (Lk) by GSI.However this aquifer is of limited value due to the saline water quality present. Groundwater is therefore not considered to be a potential receptor due to its saline nature but is considered a 'pathway' for potential contaminants to impact the adjacent seawater of Cork Harbour.

Comprehensive site investigations and a Detailed Quantitative Risk Assessment (DQRA) have been carried out in order to determine the distribution, chemical composition and hydraulic properties of the wastes on the East Tip and that of the underlying and surrounding natural geological formations. Please refer to Chapter 13 (Soils, Geology and Hydrogeology) and Appendix A of the EIS.

The DQRA provides details on the distribution of contaminants in the natural strata beneath the East Tip. It was established that there is a consistent decrease in contaminant concentrations between the waste and the underlying geological strata.

In addition, groundwater monitoring within and below the East Tip and the degree of tidal interaction with the surrounding marine water has been conducted.

Drawing DG0013 attached details the baseline waste, soils and groundwater monitoring and sampling locations.

Groundwater monitoring data was collected from the following layers of the site.

- Waste layer
- Alluvium layer
- Sands and Gravel layer
- Limestone layer

Details on the existing groundwater quality is provided in Appendix L 'Water Analysis' of the DQRA (Appendix A of the EIS).

Groundwater data collected during the monitoring period (July – August 2012) was within the tidal range (i.e. between MHWS 1.53mAOD and MLWS -2.17mOD) and the average sea level is close to zero mAOD. Furthermore, a consistent twice-daily 'tidal' pressure signal was recorded within all strata types (including saturated waste material) monitored beneath the site. These observations indicate that there is no 'perched' groundwater table on the site, or a 'water table' in the traditional sense of land based assessments. Instead, the data shows all groundwater present within the East Tip waste body and underlying natural geological formations is essentially sea water and is influenced by the tidal rise and fall of water in Cork Harbour. As a result there is no definitive (or continuous) direction of groundwater flow.

This is of significance as although classified as a locally important Karst Aquifer, the aquifer beneath Haulbowline Island is of limited value due to the saline water quality observed. As a result the site is deemed to be having a *negligible* impact on groundwater in the underlying Aquifer.

Localised exceedences of the WQS in the Limestone layer have been concluded to be the result of naturally occurring metals and possible impacts from the former steelworks, rather than the East Tip.

Some of the metals (Ni, Hg & Cd) observed in the baseline exceed the Groundwater Threshold Values listed in Schedule 5 of the Groundwater Regulations, however they may not exceed these levels when averaged as required to do so when assessing Groundwater Bodies (the focus of the Regulations). This scenario is unlikely to significantly change from that of the baseline condition during the construction stage or during the end use stage. Groundwater does not meet the Groundwater Threshold Values (electrical conductivity 800-1875 uS/cm) as listed in Schedule 5 of the Regulations due to saline intrusion (groundwater in limestone had EC of 38,000 – 43,000 uS/cm). Saline intrusion is a natural process due to the location of the limestone aquifer beneath the marine water of the harbour.

In summary, groundwater in the Limestone bedrock currently does not meet the Groundwater Regulations (2010) and will not change post remediation, but this is due to the saline intrusion of marine water into the limestone aquifer, rather than contamination from the East Tip or a failure of the remedial solution.

During construction, impacts on water quality in the limestone aquifer are considered to be *imperceptible* as seepages collected and recirculated for infiltration into the waste body are unlikely to significantly impact vertical head gradients on the site due to the permeability of the waste and degree of tidal influence on water levels. If temporary vertical gradients develop in the infiltration area, the Alluvium's lower permeability and attenuating capacity will limit potential migration of contamination to the deeper Limestone Aquifer. Furthermore this groundwater is saline and not potable.

During the End use,Maintenance and Aftercare phase, impacts to the groundwater quality in the Limestone Aquifer are considered to be negligible to minor beneficial in so far ascapping

the waste body will limit the potential rainfall infiltration into the waste body and thereby reduce the potential for vertical migration of dissolved phase contaminants.

Please refer to Chapter 13 (Soils, Geology and Hydrogeology) of the EIS for further details.

I.5 Ground and/or groundwater contamination

Summary details of known ground and/or groundwater contamination, historical or current, on or under the site must be given.

Full details including all relevant investigative studies, assessments, or reports, monitoring results, location and design of monitoring installations, appropriately scaled plans/drawings (≤A3), documentation, including containment engineering, remedial works and any other supporting information should be included in **Attachment I.5**.

The requirements of the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010) should be considered. Information should be provided on the manner in which these Regulations were taken into account in the assessment of groundwater contamination and any remedial works carried out or proposed.

Attachment I.5 Ground and/or groundwater contamination

A significant body of soil, geological and hydrogeological information has been collected at the Haulbowline site over several years. Furthermore extensive characterisation of the waste has been conducted as described in the Detailed Quantitative Risk Assessment (DQRA carried out by WYG 2013) which should be read in conjunction with Chapter 13 (Soils, Geology and Hydrogeology) of the EIS. These studies conclude that groundwater is not considered to be a potential receptor due to its saline nature but is considered a 'pathway' for potential contaminants to impact the adjacent seawater of Cork Harbour.

The DQRA for the East Tip was completed in accordance with best practice guidance documents including a 'Framework Approach for the Management of Contaminated Land and Groundwater at EPA Licensed Facilities'(EPA, 2012), 'The Code of Practice: Environmental Risk Assessment for Unregulated Disposal Sites' (EPA, 2007) and 'The Model Procedures for the Management of Land Contamination – Contaminated Land Report' (EA, 2004) and is contained in Appendix A of the EIS.

Chapter 1 (Introduction) of the EIS and Section H of this application detail the waste types present on site. Section 2 of the DQRA provides details on the potential contaminants of concern within the waste body.

An initial Conceptual Site Model (CSM) was developed as part of the DQRA, which represents the characteristics of the site and shows the relationship between source of contamination, pathways and receptors (refer to Section 1.5 of the DQRA –Appendix A of the EIS). This initial CSM identified potential pollutant linkages between the waste body and both controlled waters and human health.

The CSM was subsequently updated to take consideration of human health screening/assessment criteria for future parkland use. A full description of the contaminants and relevance within a Source – Pathway – Receptor framework is presented within Section 4 of the DQRA. Following the identification of source-pathway-receptor pollutant linkages, the

likelihood of occurrence (the magnitude of the impact) and significant of the impact were considered, the outcomes of which are summarised in Chapter 13 of the EIS (and illustrated in Figure 13 of the DQRA) (reproduced as Drawing Dg1015).

Potential impacts to controlled waters have already been discussed in Section I.2 and Section I.4 of this application. The following section summarises potential impacts to human health.

In relation to on-site users, contaminant concentrations in the waste material are currently exposed at surface and shallow depth thereby having a potential impact on end users of the site through direct contact exposure. As a result the site is currently sterilised from potential future use for public amenity.

Currently, impacts to human health through direct contact with exposed contamination on the East Tip are considered *negligible* due to restricted access measures in place at the East Tip which prevents direct contact with contamination by third parties. Furthermore, Health & Safety procedures are in place to minimise exposure to contamination by personnel who need to access the site (e.g. employees, contractors). However, this prevents the site being used for beneficial purposes.

In relation to human health off-site, there may be a *slight risk* through windblown dust containing contamination from the East Tip. The impacts on human receptors are presented in summary format in Section 9.3.4 of the EIS. While general dust and fine particulate levels are low, some elevated levels of pollutants over short timeframes (arsenic, barium, calcium, lead andnickel) were identified in the area.

Section D.2-D.6 of this application details proposed remedial measures to mitigate potential impacts of the site during the End use,Maintenance and Aftercare phase.

Section D.1 of this application details construction works necessary to deliver the preferred remedial option. Section F of the application details mitigation measures proposed to reduce/eliminate risks.

During Construction, the potential impacts to human health through direct contact to contaminated material are considered to be *imperceptible* due to Health & Safety mitigation measures in place for all construction workers and visitors to the site. Impacts to human health through windblown dust containing contamination from the East Tip are discussed previously and in Chapter 9 of the EIS.

During the End use,Maintenance and Aftercare phase, the significance of impacts to human health are considered to be *very positive* given the removal of the pathway between the contaminated material via the capping layer and human beings. The site will have a beneficial end use for the community. Furthermore, the impacts to human health through wind blown dust during the End use, Maintenance and Aftercare phase will be *very positive* given the pathway for contaminants to become airborne will be severed.

DG1016 illustrates the CSM developed for the site to illustrate the pollutant linkages between the receptor-pathway and receptors post remediation workduring the End use, Maintenanceand Aftercare phase.

It can be seen that post remediation that the capping system will break the pathway associated with risks to human health by preventing direct contact with the identified lead, arsenic and asbestos for future site users, and secondly it will reduce infiltration of rainwater and therefore contaminant leaching to groundwater and migration to the Cork Harbour.

Please refer to Chapter 13 (Soils, Geology and Hydrogeology) and Appendix A of the EIS for further details.

I.6 Noise Impact.

Give details and an assessment of the impacts of any existing or proposed emissions on the environment, including environmental media other than those into which the emissions are to be made.

Ambient noise measurements

Complete Table I.6 (i) in relation to the information required below:

(i) State the maximum Sound Pressure Levels which will be experienced at typical points on the boundary of the operation. (State sampling interval and duration)

(ii) State the maximum Sound Pressure Levels which will be experienced at typical noise sensitive locations, outside the boundary of the operation.

(iii) Give details of the background (or residual) noise levels experienced at the site in the absence of noise from this operation.

Prediction models, maps (no larger than A3), diagrams and supporting documents, including details of noise attenuation and noise proposed control measures to be employed, should form**Attachment Nº I.6.**

Attachment I.6 Noise Impacts

Noise emissions may arise within the waste licence boundary as a result of construction activities and off site as a result of construction traffic, road construction works and footpath improvement works.

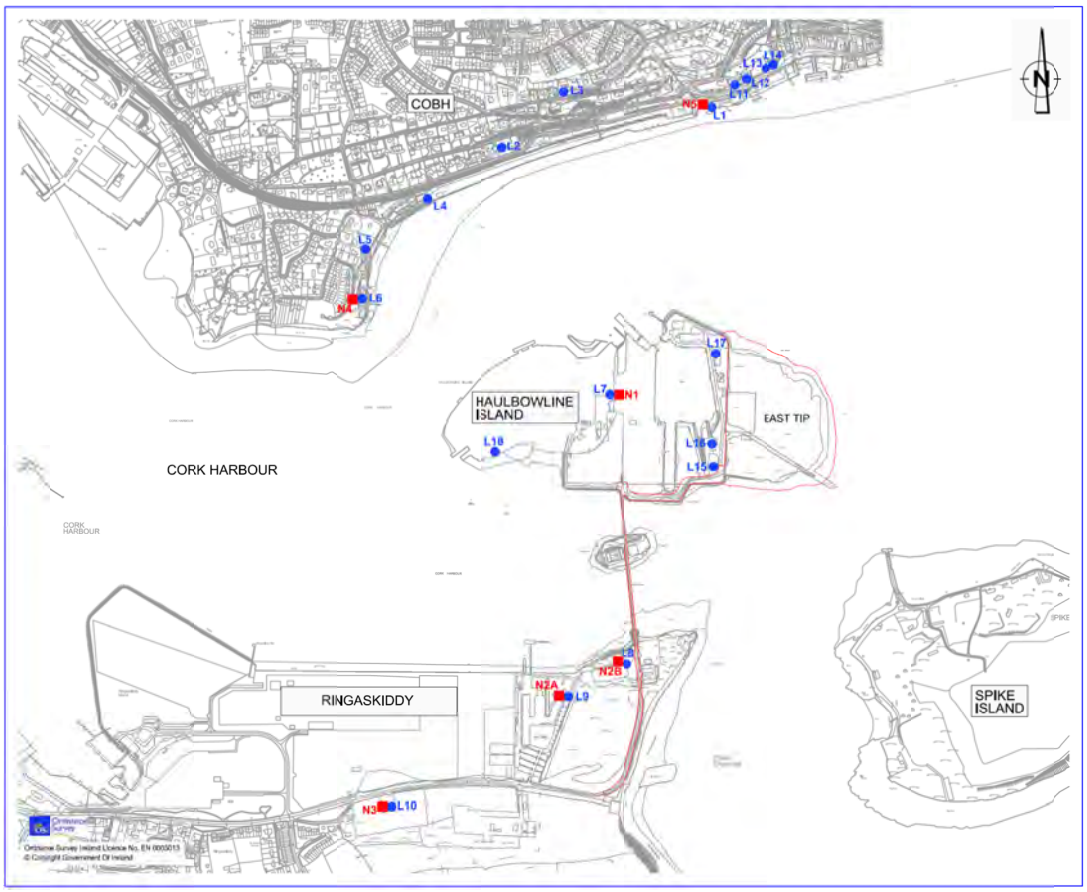
The nearest noise sensitive receptors are illustrated on Figure 10.1 of the EIS (reproduced as Figure I.1 below). There are no baseline activities in the area off-site which are significant sources of noise.

In order to complete a worst-case noise impact assessment of construction works, it was assumed that all items of plant/equipment are active at the same time and assume that all items of plant/equipment are active at the nearest boundary of the proposed development site to the relevant noise sensitive receptor. Furthermore, the distance attenuation has been predicted on the basis of hard ground attenuation between the source and receiver (i.e. it assumes ground surface reflects noise and no absorption takes place).

The assessment illustrates that there is potential for elevated noise levels at the nearest noise sensitive receptors to the proposed development.

Of the 18 nearest noise sensitive receptors considered, the predicted worst-case noise levels are above the general daytime noise criterion of 55dB as specified in the EPA Guidance document *Guidance Note for Noise: Licence Applications, Surveys and Assessments (NG4)* at 14 of these locations. However, this criterion generally applies to fixed permanent industrial sites that are subject to EPA licences, which does not strictly apply to the temporary activities (albeit the works associated with the proposed development will last approximately 18 months).

Figure I.1: Nearest Noise Sensitive Receptors



The predicted worst-case noise levels are also above the WHO noise threshold level of 55dB(A) for serious annoyance. In addition to this, the worst-case predicted noise levels are sufficiently above the background noise levels (L_{A90}) in many of the nearest noise sensitive receptors so as to constitute a significant likelihood of complaint in relation to the methodology described in BS4142:1997.

The most significant noise impact is likely to be on the dockyard workshops that are located in close proximity to the proposed site. However all Naval Base personnel will be working within these buildings (not outside) and hence availing of the significant noise attenuation offered by the building shells.

It must be kept in mind that this is a worst-case scenario. In reality the majority of the items of plant will operate sporadically and at various different locations throughout the site (and not all at once). On this basis, the worst-case predicted noise level is a significant overestimation of the likely noise impact.

In order to reduce noise emission levels from the construction activity, it is proposed to implement mitigation measures detailed in Section F of this application and Chapter 10 (Noise and Vibration) of the EIS.

The potential for vibration impacts from construction works and particularly from any possible piling activities will be considered further at the detailed design stage when more precise details about the exact nature and locations of construction activities such as piling are known. The Construction Environmental Management Plan will include a range of mitigation measures based on the detailed design proposals to ensure that there are no significant vibration impacts resulting from the proposed development.

Table 1.6 of Annex 1 Standard Forms details information in relation to ambient noise measurements.

The proposed development site will not present a significant noise impact on noise sensitive receptors in the study area during the End use, Maintenance and Aftercare phase.

I.7 Assessment of Ecological Impacts & Mitigation Measures

The ecology of the site and the surrounding area should be assessed in the vicinity of the largescale waste facilities such as landfill or incinerator developments. An assessment of the ecology should form**Attachment I.7.** Comprehensive guidelines are contained in the *Application Guidance Note*

Attachment 1.7 Ecological Impacts and Mitigation Measures

Chapter I4 (Ecology) of the EIS examines the potential for impacts on designated nature conservation sites (Natura 2000 sites and Natural Heritage Areas); flora, fauna and habitats, resulting from construction and end-use of the East Tip site. An Appropriate Assessment Screening Report, Article 12 Screening Assessment (RPS, 2012) and a Natura Impact Statement (NIS) (RPS, 2013) have also been prepared for the site as separate documents and are included as Volume 4 of the EIS.

Drawing DG1016 and DG1017 details the locations of existing designated sites, sensitive sites and habitats.

The following section summarises the existing ecological environment and potential impacts resulting from the Construction phase and End use,Maintenance and Aftercare phase of the project.

Construction Phase

Habitats and Flora

No non-marine habitats of significant ecological value are located within the proposed works site at the East Tip and no flora species of conservation concern are considered to occur. Hence, no direct impacts on non-marine habitats or flora species of significant ecological value are considered possible as a result of the proposed works at the East Tip.

There may be a minor loss of improved grassland associated with the access road edge required to facilitate the post construction footpath improvement work.

Fauna

The proposed construction works will have no negative effect on bat populations, significant or otherwise. The end use landscaping of the site, which includes extensive vegetation planting and the establishment of a periodically wet grassland area, are likely to have a positive effect on the overall biodiversity of the site and local bat populations (see Appendix O of the EIS: Ecology Supporting Information: Bat Report (Appendix O.2) and Section 14.5.2 of the EIS).

The proposed works will not have any detrimental effect on either individual otters or on wider otter populations in the vicinity. Remediation of the site includes the establishment of a wet grassland area which will, on occasion support standing fresh water which may encourage otters to use the area more frequently (see Section 14.6.2 of the EIS).

The south eastern promontory of the site has been screened from the remainder of the site and sections of the rock armouring along the shoreline will be modified, to increase its attractiveness as a roosting location for waterbirds. Whilst the success or otherwise of this measure is difficult to anticipate, and will be monitored (see Section 14.5.2 of the EIS), any increase in the number of waterbirds using the shoreline of the site as a high tide roost should be considered as a positive impact.

There are residual temporary avoidable potential effects from noise, physical presence and suspended sediments to mobile marine species. These are of short duration and do not form a barrier to species movement. No areas or species of particular conservation interest have been identified as being affected beyond a negligible level and these effects individually or in combination will not form a barrier to species movement.

There will be a residual loss of foreshore habitat as a result of construction. This will be replaced with rock armour or sheet piles. The area lost is negligible in comparison to the range of habitat in the local area, and the habitat present at the site at East Tip is highly degraded with waste and rubbish in the foreshore. As a result this residual impact is deemed to be negligible.

While these residual impacts are predicted to be *negligible,* as a precautionary measure it is proposed to implement mitigation measures such as the use of 'soft start piling' methods(if piling is necessary) to minimise potential noise impacts on fish species; conducting piling in accordance with *the NPWS (2012) Draft Guidance on the Minimisation of Man Made Noise*; use sheet piling/geotubes/screens etc to protect against sediment re-suspension; employ a suitably qualified ecologist to develop a monitoring programme.

Sites of International Importance

Natura 2000 sites are outside the zone of influence of the proposed works and there will be no potential for cumulative impacts arising in combination with any other plans or proposals. Therefore with the implementation of best practice and the recommended mitigation measures detailed in Chapter 14 of the EIS; it is considered that the proposed East Tip Remediation Project will not adversely affect the integrity of Cork Harbour SPA and Great Island ChannelcSAC.

Sites of National Importance

A total of ten proposed Natural Heritage Areas (pNHAs) are designated within Cork Harbour and are located within 1.4 and 10.1km of the East Tip. Most of these correspond to the Natura 2000 designations as discussed above. Similarly all of these sites are outside the zone of influence of the proposed works and therefore will not be impacted by the development.

End-Use, Maintenance and Aftercare Phase

There will be no indirect negative ecological impacts during the End use, Maintenance and Aftercare phase of the project.

Following construction, the site will be landscaped for use as a public amenity. Landscape proposals are detailed in Section K of this application and Chapter 14 (Ecology) of the EIS. Such proposals include a number of features designed to enhance biodiversity such as an area for bird roosting , soil cover area and wet grassland area.As a result it is anticipated that there will be a *residual positive effect* to surrounding sediment and faunal communities due to the removal of the pathways of site material to the East Tip foreshore areas by erosion and distribution of waste material.

Please refer to Section K of this application and Chapter 14 (Ecology) of the EIS for further details.

ATTACHMENT I

DG1013 – Ground Investigation Location Plan
DG1014–Pre Construction CSM
DG1015 –Enduse Phase CSM
DG1016 –Natura 2000 Sites
DG1017 –Sensitive Sites

ID	X COORDINATE	Y COORDINATE
BOREHOLES 2005		
BH116	179622.899	65458.496
BH117	179563.518	65306.311
BH118	179603.151	65223.925
BH118X	179586.946	65225.210
BH119	179583.073	65566.107
BH120	179582.716	65500.580
BH121	179635.348	65384.801
BH122	179632.193	65271.256
BH123	179641.527	65215.756
BH124	179703.654	65501.571
BH125	179726.838	65401.992
BH126	179728.116	65316.907
BH127	179738.730	65232.198
BH128	179777.640	65455.918
BH129	179823.490	65343.673
BH130	179821.721	65311.541
BH131	179813.432	65272.005
BH131X	179789.621	65244.752
BH131Y	179795.920	65244.932
BH131Z	179797.096	65245.250
TRIAL PITS 2005		
TP 121	179584.966	65329.604
TP 123	179631.820	65319.846
TP 124	179583.540	65265.208
TP 125	179631.658	65532.113
TP 126	179680.978	65441.579
TP 127	179711.348	65318.378
TP 128	179722.950	65265.506
TP 129	179762.307	65401.473
TP 130	179760.693	65315.328
TP 131	179781.665	65290.196
BOREHOLES 2012		
BH301	179568.497	65540.711
BH301A	179569.500	65541.620
BH302	179620.823	65555.829
BH303	179630.654	65524.794
BH304	179567.661	65454.073
BH305	179626.682	65421.264
BH306A	179698.493	65461.701
BH306B	179693.723	65468.856
BH306C	179701.672	65470.902
BH306D	179707.481	65473.360
BH307	179770.563	65407.039
BH308	179562.890	65342.332
BH309	179650.383	65340.157
BH310A	179777.715	65372.772
BH310B	179770.561	65353.637
BH310C	179771.319	65361.869
BH311	179571.152	65247.073
BH312A	179637.881	65266.455
BH312B	179641.862	65271.261
BH312C	179642.796	65265.675
BH313	179706.402	65275.986
BH314	179681.860	65223.120
BH315	179768.099	65278.236
BH316	179680.935	65404.715
BH317	179770.623	65407.023
OP SERIES TRIAL PITS		
OP 1	179643.858	65393.242
OP 2	179645.000	65318.000
OP 3	179690.000	65319.000
OP 4	179723.000	65317.000
OP 5	179750.000	65317.000
OP 6	179739.000	65394.000
OP 7	179725.000	65419.000
OP 8	179718.000	65390.000
OP 9	179623.000	65549.000
OP 10	179592.339	65529.556
OP 11	179568.000	65467.000
OP 12	179613.000	65474.000
OP 13	179676.781	65396.536
OP 14	179650.152	65406.314
TRENCHES		
TP 01	179601.398	65483.773
TP 02	179589.549	65465.952
SURFACE WATER SAMPLE LOCATIONS		
SP 01	179745.033	65510.960
SP 02	179822.012	65438.083
SP 03	179805.057	65224.960
SW 01	179669.022	65451.059
SW 02	179693.005	65406.006

ID	X COORDINATE	Y COORDINATE
FORESHORE TRIAL PIT LOCATIONS		
H1	179559.238	65607.404
H2	179596.475	65588.098
H3	179641.325	65571.343
H4	179669.990	65550.570
H5	179693.192	65550.065
H6	179717.206	65535.648
H7	179736.202	65515.743
H8	179783.991	65506.202
H9	179795.366	65493.230
H10	179805.765	65470.500
H11	179768.234	65509.293
H12	179757.361	65209.342
H13	179726.648	65198.471
H14	179666.544	65196.013
H15	179590.280	65203.296
H16	179563.859	65209.245
H17	179628.027	65194.732
H18	179697.542	65189.171
H19	179842.979	65306.630
H20	179838.300	65273.779
H21	179831.129	65244.241
H21b	179835.555	65243.881
H22	179824.168	65427.490
H23	179825.926	65396.644
H23b	179830.090	65397.129
H24	179840.188	65355.697
H25	179835.669	65372.679
H26	179845.188	65329.122
H27	179718.916	65535.914
H28	179834.953	65253.024
H29	179746.615	65202.761

LEGEND

- 2005 Trial Pits
- 2005 Boreholes
- 2012 Boreholes
- OP Series Trial Pits
- Trenches
- Surface Water Sample Locations
- Foreshore Trial Pits

Waste Licence Application Boundary

Client

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F01	07.11.13	RH / ER	FINAL ISSUE	ER
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Approved	ER
Date	March 2013
Scale	NTS @ A1 1:2500 @ A3

Project: **EAST TIP REMEDIATION PROJECT**

Title: GROUND INVESTIGATION PLAN

Job No.	File Ref.	Drg. No.	Rev.
MCE0734	MCE0734DG1013F01.dwg	DG1013	F01

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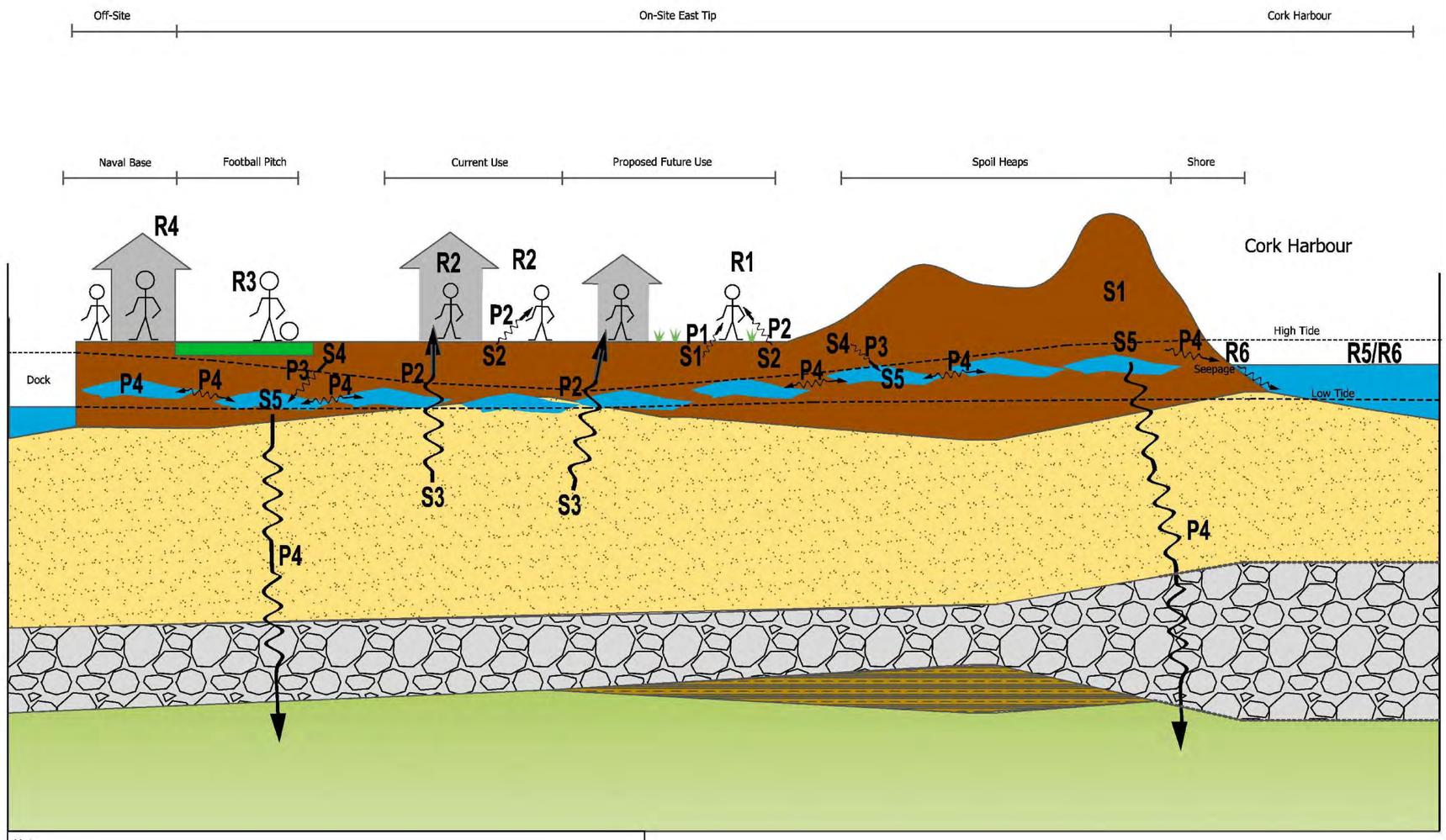

SOURCES:

- S1 Arsenic & lead contamination (waste) Hotspots of contamination BH312B, BH314 & OP10
- S2 Asbestos (Waste)
- S3 Ground Gas (methane) in alluvium
- S4 Leachable chromium, chromium VI, copper, lead, cadmium, zinc & PAHs
- S5 Groundwater contaminants in waste:- Arsenic, chromium VI, chromium, copper, zinc, lead, manganese, nickel, mercury, benzo(a)pyrene, benzo(k)fluoranthene, fluoranthene

PATHWAYS:

- P1 Dermal contact ingestion & inhalation
- P2 Inhalation of dusts & vapours
- P3 Solid phase leaching to groundwater
- P4 Contaminant migration in groundwater

RECEPTORS:

- R1 Future park users
- R2 Commercial site users / construction workers
- R3 Current navy football pitch users
- R4 Adjacent navy base
- R5 Cork Harbour
- R6 Ecology - flora & fauna

Note:
Drawing not to scale and is for illustrative purposes only to provide pictorial presentation of a conceptual site model. The significance of various contamination sources, pathways and receptors, as shown, are yet to be fully quantified and as a result this diagram should not be used to conclude that actual significant risks due to the presence of contamination in the East Tip are present.
Note1:
The conceptual model presented is pre-remediation and does not include future proposed remediation.

KEY:

WASTE · CLAY · MARINE ALLUVIUM · LIMESTONE · SANDS & GRAVELS · GROUNDWATER · PATHWAYS

Client

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File Ref.	MCE0734DG1014F01.dwg
Drg. No.	DG1014
Rev.	F01

Project
EAST TIP REMEDIATION PROJECT

Title
PRE-CONSTRUCTION CONCEPTUAL SITE MODEL

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SOURCES

S1 Arsenic & lead contamination (waste). Hotspots of contamination.

S2 Asbestos (waste).

S3 Ground Gas (methane) in alluvium.

S4 Leachable chromium, chromium VI, copper, lead, cadmium, zinc & PAHs.

S5 Groundwater contaminants in waste: Arsenic, chromium VI, chromium, copper, zinc, lead, manganese, nickel, mercury, benzo(a)pyrene, benzo(k)fluoranthene, fluoranthene.

PATHWAYS

P1 Dermal contact ingestion & inhalation - eliminated by Remediation Solution.

P2 Inhalation of dusts & vapours - eliminated by Remediation Solution.

P3 Solid phase leaching to groundwater - significantly reduced by Remediation Solution.

P4 Contaminant migration in groundwater - significantly reduced by Remediation Solution.

P5 Migration of ground gas - passively vented via PES.

P6 Tidal Interaction and leaching from residual waste in foreshore

RECEPTORS

R1 Future Park users.

R2 Commercial site users/construction workers.

R3 Naval football pitch users.

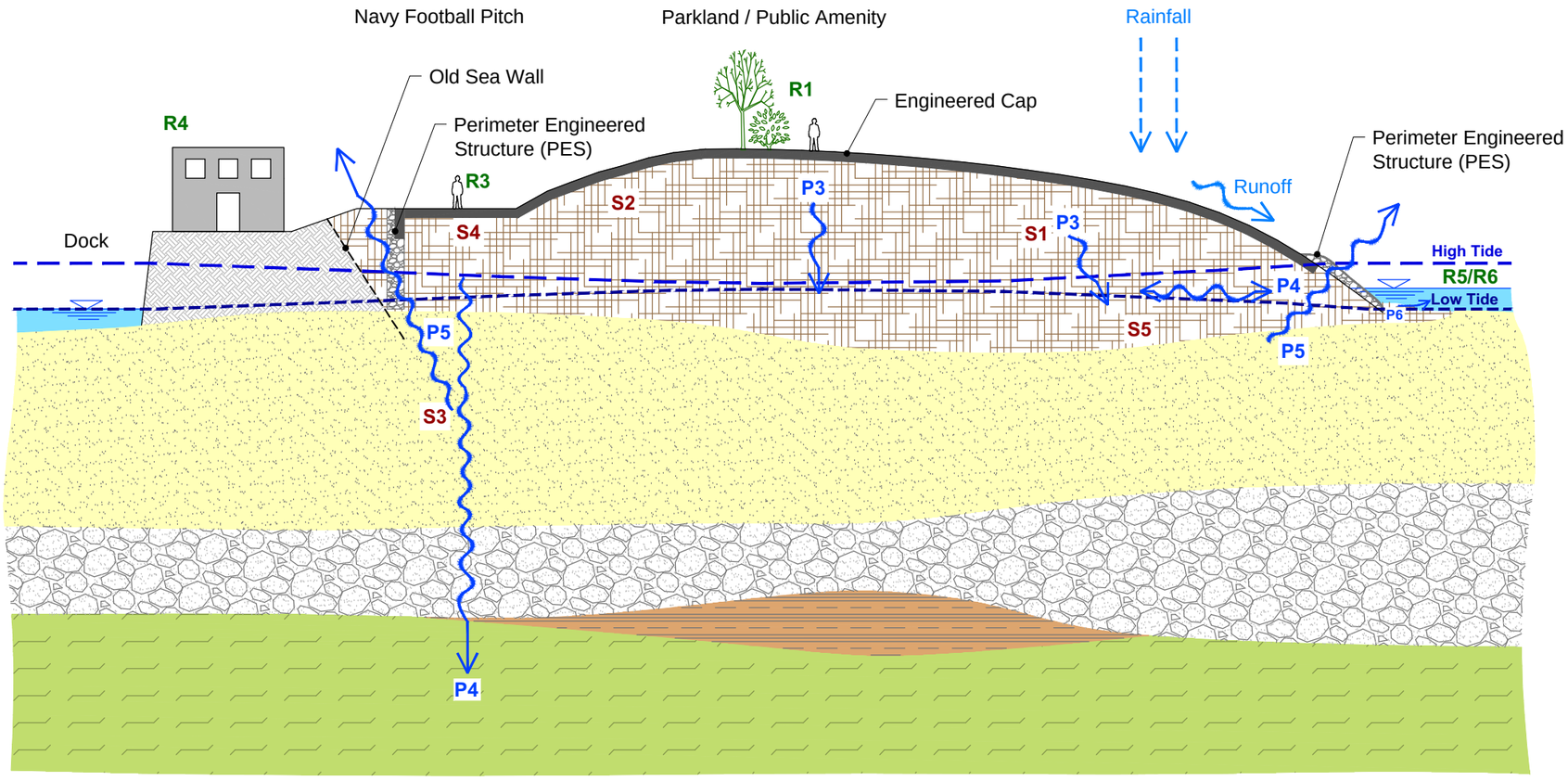
R4 Adjacent Navy Base.

R5 Cork Harbour.

R6 Ecology - Flora & Fauna.

LEGEND

- Engineered Cap
- General Fill
- Waste
- Marine Alluvium
- Sands and Gravels
- Clay
- Limestone
- High Tide
- Low Tide



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File Ref.	MCE0734DG1015F01.dwg
Drg. No.	DG1015
Rev.	F01

Project

EAST TIP REMEDIATION PROJECT

Title

END USE, AFTERCARE & MAINTENANCE PHASE CONCEPTUAL SITE MODEL

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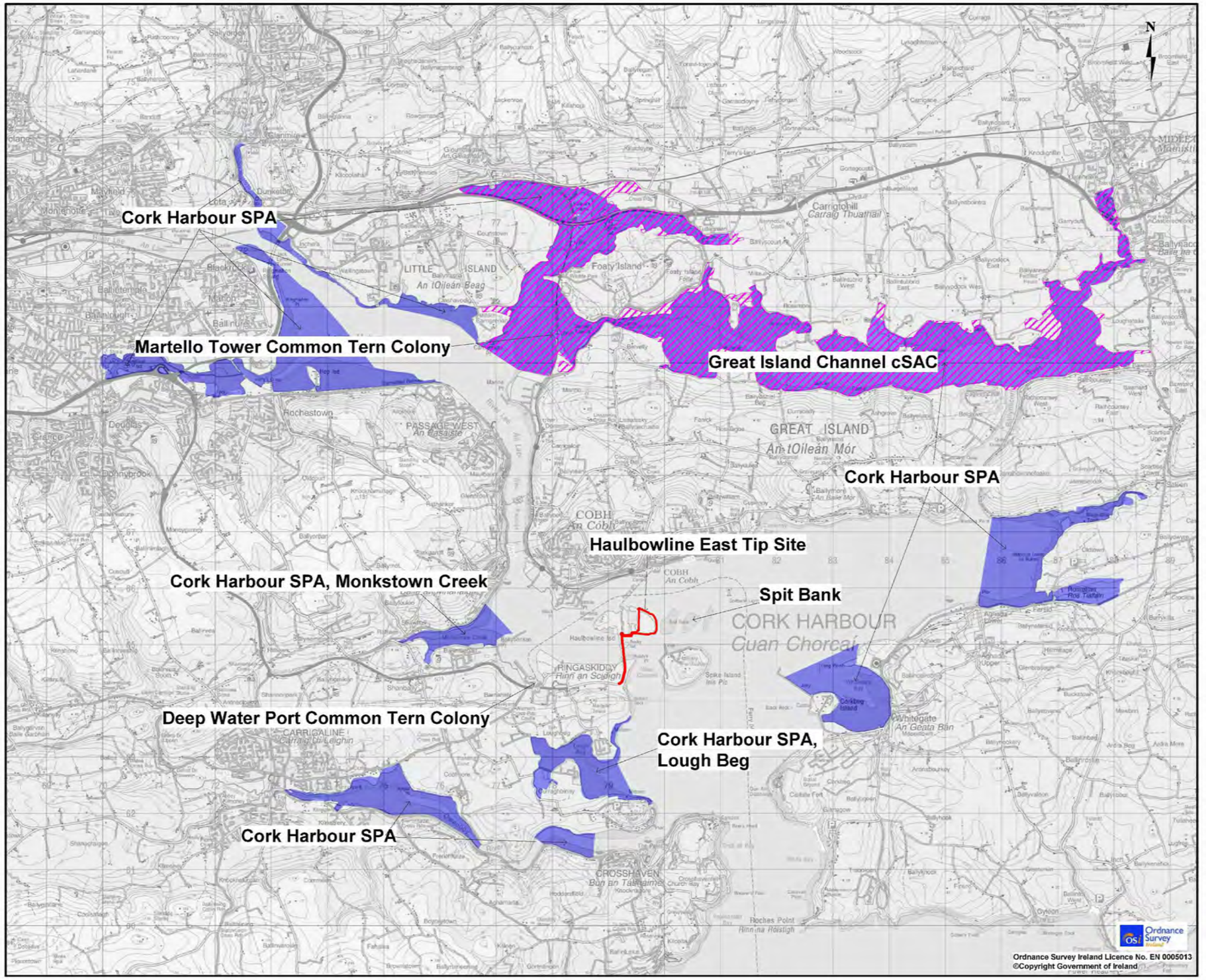

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File Ref.	MCE0734DG1016F01.dwg
Drg. No.	DG1016
Rev.	F01

Project
EAST TIP REMEDIATION PROJECT

Title
LOCATION OF NATURA 2000 SITES AND OTHER FEATURES

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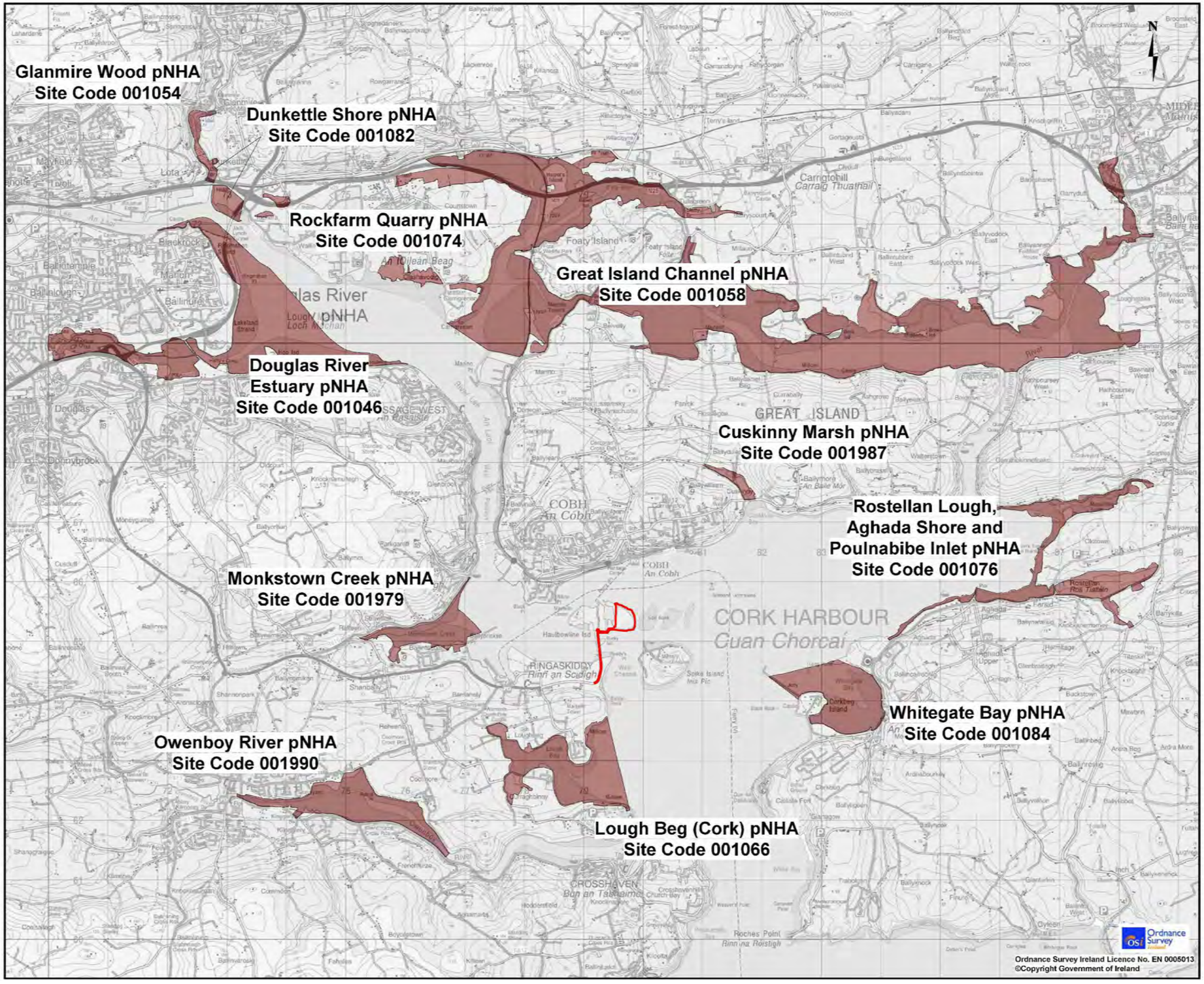

Legend

- proposed Natural Heritage Areas (pNHAs)
- Study Area Boundary / Extent of works

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Scale	NTS @ A1 NTS @ A3
Job No.	MCE0734

Project
EAST TIP REMEDIATION PROJECT

Title
LOCATION OF PROPOSED NATURAL HERITAGE AREAS

File Ref.	Drg. No.	Rev.
MCE0734DG1017F01.dwg	DG1017	F01

SECTION J ACCIDENT PREVENTION & EMERGENCY RESPONSE

Describe the existing or proposed measures, including emergency procedures, to minimise the impact on the environment of an accidental emission or spillage.

Also outline what provisions have been made for response to emergency situations outside of normal working hours, i.e. during night-time, weekends and holiday periods.

Describe the arrangements for abnormal operating conditions including start-up, leaks, malfunctions or momentary stoppages.

Supporting information should form **Attachment J.**

Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment J Accident Prevention & Emergency Response

The contractor will be required to develop an Accident Prevention and Emergency Response plan as part of the Construction Environmental Management Plan (CEMP) which will detail procedures to prevent accidents and to respond to incidents should they occur. As a minimum Standard Operating Procedures (SOPs) will be developed and put in place for all site activities. These will identify safe operating techniques and procedures to minimise the risk of environmental incidents.

A written site emergency plan will be prepared detailing descriptions of the emergency response measures to be taken by site staff in the event of an emergency such as a fire, flooding, drowning incident etc.

The CEMP will be completed prior to construction activities and will be subject to review and approval by Cork County Council.

SECTION K REMEDIATION, DECOMMISSIONING, RESTORATION AND AFTERCARE

Describe the existing or proposed measures to minimise the impact on the environment after the activity or part of the activity ceases operation, including provision for post-closure care of any potentially polluting residuals.

For Landfill Applications, capping proposals are required, and reference should be made to the *Landfill Manual on 'Restoration and Aftercare'* published by the Agency, when completing this section.

Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment K Remediation, decommissioning, restoration and aftercare

Section D of this application and Chapter 5 of the EIS details proposals for the remediation and restoration of site.

Once remediated the site will not be an active operational facility but rather it will be recreational park which will include a car park, playing pitch and wetland area.

Given the nature of the waste deposited at East Tip minimal settlement is expected to occur. Therefore the final settlement profile will be the same as the final capping profile.

In terms of aftercare, it will be necessary to ensure the landscape planting and grassed areas are properly established and maintained to achieve the desired effect of attractive parkland.

Maintenance of the landscape works will be required to be an integral part of theon-going site management. This will include a defects liability period as part of the construction contract during which any defective plant material is to be replaced.

Litter picking and weed control shall be carefully monitored during the early growing seasons of landscape maintenance contract.

Please refer to Chapter 11 (Landscape and Visual) of the EIS for further details.

Monitoring details are provided in Section F of this application.

SECTION L STATUTORY REQUIREMENTS

L.1 Section 40(4) WMA

Indicate how all the requirements of Section 40(4)[(a) to (j)] of the Waste Management Act 1996, as amended, will be met.

Undertake a screening for Appropriate Assessment and state whether the activity, individually or in combination with other plans or projects, is likely to have a significant effect on a European Site(s), in view of best scientific knowledge and the conservation objectives of the site(s).

Where it cannot be excluded on the basis of objective scientific information, following screening for Appropriate Assessment, that an activity, either individually or in combination with other plans or projects, will have a significant effect on a European Site, provide a Natura Impact Statement, as defined in Regulation 2(1) of the European Communities (Birds and Natural Habitats) Regulations (S.I. No. 477 of 2011).

Where, based on screening, it is considered that an Appropriate Assessment is not required, provide a reasoned response.

The screening report and Natura Impact Statement, where applicable, shall be provided in **Attachment L.1.**

Applicants should also describe how the proposed facility will comply with the requirements of BAT. In particular reference should be made to the considerations referred to in Annex IV of Council Directive 96/61/EC concerning integrated pollution prevention and control.

Attachment L.1 should contain the documentation requested above, along with any relevant additional information.

Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment L.1 Section 40(4) WMA

The following section details how the requirements of Section 40(4)(a) to Section 40(4)(j) of the Waste Management Acts 1996 as amended will be met.

Section 40(4)(a) requires that emissions from the activity will not result in a contravention of the relevant standard. As stated in previous sections of this application a DQRA has been prepared for the East Tip. The overall aim of the DQA was to identify and assess the significance of the risks to human health and to the environment. This allowed for the identification of necessary mitigation measures to reduce/eliminate such risks. Emissions from the site during the Construction phase and End use, Maintenance and Aftercare phase were compared and assessed against relevant Generic Assessment Criteria (GACs) as follows.

Emissions to Atmosphere: Air emissions during the Construction and Enduse, Maintenance and Aftercare phases have been compared to the Air Quality Standards Regulation 2011 (SI 180 of 2011) and the *WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005, Summary of risk assessment*". The Regulations specify limit values in ambient air for sulphur dioxide (SO_2),

lead, benzene, particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide (NO_2) and oxides of nitrogen (NO_x). These limits are mainly for the protection of human health and are largely based on review of epidemiological studies on the health impacts of these pollutants. In addition, limits apply to the protection of the wider environment (ecosystems and vegetation). The WHO Guidelines in some instances cite stricter guidelines than those in the Regulations for certain parameters.

Potential emissions were also compared to ambient air quality target values for certain metal and hydrocarbon compounds as defined in the "*Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009*" (S.I. 58 of 2009).

Reference was also made to the following:

- Danish C-values (as a 99th%ile) outlined in Danish EPA Environmental Guidelines No. 1, 2002 "*Guidelines for Air Emission Regulation Limitation of air pollution from installations*".

- TA Luft from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2002, "*Technical Instructions on Air Quality Control*".

- Environmental Assessment Levels (EAL) which are ambient air quality guidelines based on the Health & Safety Authority occupational exposure limits for the workplace. The EAL have been derived using the approach outlined in Appendix D of UK Environment Agency "*IPPC H1 - IPPC Environmental Assessment for BAT*". The occupational exposure limits employed to generate EALs are those listed by the Health and Safety Authority (HSA) in the 2011 "*Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619 of 2001)".*

Emissions were assessed on a phased basis. Phase 1 refers to the absence of construction activities at the site (i.e. the baseline condition). In short, the East Tip is modelled as a single stockpile of 9 hectares. This operation has been simulated using the dispersion model and the AP-42 emission factors to assess the impact on sensitive receptors in the area. Trace metal constituents have been modelled based on the average contents identified in the DQRA (Appendix A).

For Phase I, all results show compliance with the statutory limits and guidelines for the protection of human health. As such, the impact of the dormant East Tip on sensitive ecosystems or vegetation in the area is negligible. The predicted impact to air quality during the existing dormant phase is considered to be 'a *slight adverse impact'* over the long term (greater than 15 years).

For Phase 2 and 3(mobilisation and construction), the model indicates that in the absence of mitigation there is a high risk of potential breaches of the limits guidelines both in the short term (1-hour) and long term (annual) for certain pollutants. In addition, several other parameters are noted to pose a moderate risk of potential breach given the predicted level against the guideline. The majority of pollutants listed indicate very low levels both on the short term and annual levels and these are considered to pose a low risk to human health. Given the risks posed by the Phase 2 and 3 operations, a series of mitigation measures are proposed in Section F of this application and Chapter 9 (Air Quality and Climate) of the EIS. These measures relate to the mitigation of dust at source to prevent the generation of dust on the East Tip and are supplemented by a detailed monitoring programme to provide real time concentration of particulates and metals at the most sensitive receptor (R1) allowing for a dynamic approach to the mitigation strategy. Furthermore the Contractor will be obliged to implement this mitigation strategy to reduce the potential impact of construction dusts. With this strategy implemented the impact to air quality as a result of the Phase 2 and Phase 3 works is considered to be a *moderate adverse impact* over the temporary nature of these phases (9 months).

During Phase 4 (Capping), all results show compliance with the statutory limits and guidelines for the protection of human health. The metal results are in line with Phase 1 (dormant site) as the only source during this phase is from wind blown erosion. However the total and fine particulate levels pose a moderate risk and will require the mitigation specified in Section F of this application and Chapter 9 (Air Quality and Climate) of the EIS to ensure compliance with the guidelines.

In relation to **Asbestos:** The relevant standard is the "*Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010"* (S. I. No. 386 of 2006 and SI 589 of 2010). The indicator level for asbestos fibres for health and safety risk as defined within the 2006 Regulations is 0.1 f/cm^3 (fibres per cubic centimetre) as an eight hour time weighted average. There are no limits, standards or guidelines for environmental exposure to asbestos material and the health and safety limit should be employed as a compliance point. Above this level mitigation measures are mandatory at the source. Given the known presence of asbestos material on the East Tip, mitigation will be required for all operations where the existing slag and other materials are disturbed. Please refer to Section F of this application and Chapter 9(Air Quality and Climate) for such measures.

There are no significant impacts to atmosphere predicted through the end-use, aftercare and maintenance stages of the proposed development. While there is a small car park to be located on site the impact of emissions from vehicles using this car park will be negligible.

Noise emissions: Potential noise emissions resulting from construction activities have been assessed in accordance with the *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Schedules Activities* (NG4) (2011) and mitigation measures have been proposed to achieve noise emission limit levels standards.

During the construction phase, the predicted worst-case noise levels are above the general daytime noise criterion of 55dB as specified in the EPA Guidance document *Guidance Note for Noise: Licence Applications, Surveys and Assessments (NG4).* This criterion generally applies to fixed permanent industrial sites that are subject to EPA licences, which does not strictly apply to the temporary activities (albeit the works associated with the proposed development will last approximately 18 months). The predicted worst-case noise levels are also above the WHO noise threshold level of 55dB(A) for serious annoyance. In addition to this, the worst-case predicted noise levels are sufficiently above the background noise levels (L_{A90}) in many of the nearest noise sensitive receptor so as to constitute a significant likelihood of complaint in relation to the methodology described in BS4142:1997.

However as discussed in Chapter 10 (Noise and Vibration) of the EIS, it must be kept in mind that this is based on worst-case noise level predictions calculated on the basis that all items of plant will operate simultaneously at the nearest point of the site boundary to the respective noise sensitive receptor. Clearly, this cannot happen and, in reality, the majority of the items of plant will operate sporadically and at various different locations throughout the site (and not all at once). On this basis, the worst-case predicted noise level is a significant overestimation of the likely noise level likely to be emitted from the proposed site.

Furthermore, the proposed development will not have any impact on future action plans as described under the Environmental Noise Regulations, 2006. There will be no significant noise impact associated with the end-use, aftercare and maintenance phase of the East Tip.

Waste, soils, Surface Water and Groundwater Emissions: As part of the DQRA,bulk compositional analysis of waste and soil samples were compared to GACs for parkland use and commercialuse.

Park land use Atrisk GACs which are considered appropriate for screening soils based upon the possible future recreational use of the East Tip. The CSM for this land use and derivation of GACs assumes that the site in question has large grassed areas that are used for a range

of recreational activities including picnicking, sunbathing and casual sports uses e.g. a football 'kick around'. There is also often a small children's play area, which may have tarmac or other hard cover. Parks are also assumed to have areas such as flower beds and paddling pools or duck ponds. However, pathways relating to contact with surface water are not included within the GACs.

Commercial and industrial land use GACs, have been recently derived in the UK by the Chartered Institute of Environmental Health and the Land Quality Management Team at the University of Nottingham. These were developed through collaboration of a number of UK contaminated land specialist practitioners and published jointly by CLAIRE and CIEH, (CIEH, 2009). These screening criteria can be considered to be appropriate in assessing risks to the health of current users of the site. They assume that buildings are present, normally for office use on site and that indoor pathways are therefore applicable. Outdoor contact pathways are restricted to lunchtimes or break times. There is currently a building on site which, on occasion, is utilised as an office. It should be noted that these GACs are typically less than the above park land use GACs and therefore generally the use of park land use GACs provides for a more conservative assessment

Waste leachate, groundwater, surfacewater and seepages for the site were compared to Water Quality Standards (WQS) drawn from surface water quality standards considered appropriate for the site and the main receptor of marine water in Cork Harbour. Table 4 of the DQRA (Appendix A of the EIS) outlines the individual water quality concentrations adopted. Where a specific Irish Surface Water Standard is not available, then other standards such as drinking water standards (Irish standards if available) were utilised or environmental quality standards (EQS) from the UK. These are mainly national statutory standards sourced from, in order of preference, European Communities Environmental Objectives (Surface Waters) Regulations 2009 (Annual Average) for surface waters other than inland waters e.g. coastal and transitional waters; European Communities Environmental Objectives (Surface Waters) Regulations 2009 (Annual Average) for inland surface waters; and other international water quality standards namely UK Environmental Quality Standards (EQS) and UK Drinking Water Standards (DWS). These are used as screening standards in the first instance to determine which of the potential contaminants of concern (COC) should be further assessed for significance of the risk posed.

In order to assess potential contaminants of concern (PCOCs), compliance point standards are required which should be appropriate for the receptor being considered. For the East Tip site, the Cork Harbour waters are considered to be the primary receptor. As a result the preferred quality standards adopted are EQS values for "other surface waters".

Section 40(4)(b) requires that the activity concerned will not cause environmental pollution. This project is a proposed remediation activity with the objective of reducing the existing potential for environmental pollution emanating for the site in it's current state. Premised on the back of a DQRA and EIS completed for the project, remediating the site will have a positive impact on the surrounding environment. Please refer to the referenced documents for further information.

Section 40(4)(bb) requires that if the activity involves the landfill of waste, the activity will comply with Council Directive 1999/31/EC on the landfill of waste. With respect to this requirement it should be noted that it is only intended to import material that is suitable for remediation, End use, Maintenance and Aftercare purposes, to the site and on this basis there will be no landfill activities carried out at the site in the future.

The only works that are proposed to be carried out under the Waste Licence are those works that are required to facilitate the effective remediation, Enduse, Maintenance and Aftercare of the East Tip. It is proposed that the remediation of the site will be carried out under a hazardous waste licence as this is the statutory mechanism used to ensure that the proposed works and the methods to achieve same are appropriately regulated and carried out. The

East Tip project is however a remediation project rather than a landfill project. Therefore on this basis it is considered that the requirements of Section 40(4)(bb) have been satisfied.

Section 40(4)(c) requires that Best Available Techniques (BAT) are used. Throughout this application, particularly in Section D, reference has been made to the application of BAT. BAT is defined as:

B	"best" in relation to techniques, means the most effective in achieving a high general protection of the environment.
A	"available techniques" means those techniques developed on a scale which allows implementation in the relevant class of activity under economically the technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced within the State, as long as they are reasonably accessible to the person carrying out the activity
T	"techniques" includes both the technology used and the way in which the installation is designed, built, managed, maintained, operated and decommissioned.

BEST– A DQRA has been prepared for the East Tip which recommends remediation with respect to human health and with respect to the Cork Harbour waters. The recommendation for remediation includes the installation of a low permeability cap and the installation of an engineered perimeter structure with a max. permeability of $1x10^{-5}$m/s. The proposed remediation solution meets the requirements of the DQRA and as such is considered to achieve a high general protection of the environment. In addition to this, in developing the outline design solution for the capping system due cognisance has been taken of all relevant guidance documentation. These documents include the EPA Landfill Design Manual, The EPA Landfill BAT guidance note and the CIRIA Special Publication 106 – Remedial treatment for Contaminated Land – Volume VI: Containment and hydraulic measures. The remediation of the site will be carried out under a hazardous Waste Licence as this is the statutory mechanism used to ensure that the proposed works and the methods to achieve same are appropriately regulated and carried out.

This project is however a remediation project rather than a landfill project and therefore whilst the Design Manual and the EPA Landfill BAT guidance note can be used as guidance, they do not have to prescribe the proposed capping system for this site which has been selected to effectively address the risk presented by the site . It is considered more appropriate that the detailed design for the capping system at Haulbowline East Tip is undertaken having regard to CIRIA Special Publication 106 - Remedial Treatment for Contaminated Land - Volume VI: Containment and hydraulic measures and other associated CIRIA documents where relevant as opposed to the other referenced documents. Therefore the proposed capping system design will be based on the particular risks and generic recommendations as set out in the DQRA thus ensuring the most effective means of ensuring a high general protection of the environment.

Particular reference should also be made to the re-use of slag in the creation of the Perimeter Engineered Structure and the drainage layer asthis would further support this element of BAT as it would result in a significant quantity of engineering material not being required to be imported to the site by road and further mitigate any potential wider impact to the community as a result of the remediation works. The re-use of the slag would directly replace the use of imported engineering material and would support a more environmentally sound remediation solution.

AVAILABLE TECHNIQUES – A number of alternatives to the proposed remediation solution have been discussed in Chapter 4 "Assessment of Alternatives" of the EIS. This assessment indicates that the proposed remediation solution provides for techniques developed on a scale which allows implementation in the relevant class of activity under 'economically the technically viable' conditions, taking into consideration the costs and advantages. For example, as it is proposed that the remediation of the East Tip is undertaken using a risk based approach, at the forefront of the remediation solution selection process was the DQRA. The DQRA has quantified the potential risk posed by the site in its current state and has defined generic remediation solutions to break all source, pathway, receptor linkages that may be present.

The DQRA has demonstrated that installing a low permeability capping system and a perimeter system with a max permeability of $1x10^{-5}$m/s is sufficient to negate any potential impacts to the Cork Harbour Waters purely as a result of reducing the flux to and from the site. Therefore, based on a risk approach the proposed Perimeter Engineered Structure with a maximum permeability of $1x\ 10^{-5}$m/s is entirely appropriate. The installation of any of the alternatives assessed such as reactive barriers/ low permeability barriers would not be considered the application of BAT as they would incur additional cost from an installation and maintenance perspective, have greater impacts associated with their installation and long term maintenance and critically, the risk posed by the site does not warrant their installation (these issues are discussed in greater detail in Chapter 4 "Assessment of Alternatives" of the EIS). The PES can be constructed using imported engineering fill, however the most cost effective and environmentally sound means of constructing the PES is through the re-use of slag sourced and processed on site.

It should be noted that in the assessment of alternatives for the low permeability capping system it was considered that there were limited alternatives. As outlined under the heading of "Best" the detailed design of the Engineered Capping System is to be risk based and have due regard to relevant guidance documents with particular reference to CIRIA Special Publication 106 - Remedial Treatment for Contaminated Land - Volume VI.

TECHNIQUES – As stated with reference to "Available Techniques" a number of alternatives to the proposed remediation solution have been discussed in Chapter 4" Assessment of Alternatives" of the EIS. These alternatives demonstrate the various different techniques which have been considered as part of the development of the proposed remediation solution. As stated in the previous sections and in Chapter 4 of the EIS, the preferred solution is the installation of a low permeability capping system and a Perimeter Engineered Structure with a maximum permeability of $1x10^{-5}$m/s. This represents the best solution for the site from a risk, technical and environmental perspective. In addition to this a Technical Dialogue has been conducted with a considerable number of contractors (i.e 17) with experience working in the marine environment and on waste and contaminated sites to explore the various different options for the construction of the PES. The Technical Dialogue proved that there were a number of ways the requirements of the PES could be achieved. It is therefore considered that the Best Available Techniques have been considered as part of the development of the remediation solution for the East Tip.

Therefore on the basis of the points outlined above it is considered that BAT has been applied and considered throughout the development of the outline design solution for the East Tip. Examples of the application of BAT include:

- The sustainable and cost-effective nature of the permeable perimeter system which meets the requirements of the DQRA,
- The installation of a low permeability engineered capping system which is designed on the basis of risk as opposed to being prescribed,
- The application and re-use of material sourced on site as part of the remediation project,
- The creation of formation levels to work with the existing landform as far as is possible and to balance cut and fill volumes,

- The use of various different methods to control sediment during the execution of the remediation works and,
- All other potential construction impacts which have been assessed and mitigation proposed for throughout the EIS which accompanies this waste licence application.

It should be noted that throughout the preparation of the outline design, EIS and Waste Licence Application reference has been made to the EPA BAT guidance note on Landfill, However, given that the East Tip is a remediation project as opposed to an active Landfill facility the majority of the note is of limited relevance in this case.

Section 40(4)(cc) requires that the activity concerned is consistent with the objectives of the relevant waste management plan and will not prejudice measures taken for the purposes of implementation of any such plan. This proposed remediation activity does not prejudice measures taken to implement the Plan. Action 74 of the Cork County Waste Management Plan 2004, recognises sites may give rise to hazardous waste due to past activities and such sites will be assessed and where necessary the appropriate restorative measures undertaken. It is therefore considered that the proposed activity is consistent with the objectives of the Waste Management Plan.

Section 40(4)(d) – please refer to section L2 of this application for further details.

Section 40(4)(e) In accordance with Section 40(4)(e) and Section 53 of the Waste Management Act as amended, the DAFM, on behalf of the Irish State, is committed to providing the necessary funding for the remediation, maintenance, aftercare and monitoring work required. Please refer to Section L.2 of this application for further details.

Section 40(4)(f-g) requires that energy will be used efficiently and any noise will comply with any regulations under Section 106 of the Act of 1992. With respect to satisfaction of this section of the Act please refer to Section G of this application and Chapter 10 (Noise and Vibration) of the EIS.

Section 40(4) (h) requires that necessary measures will be taken to prevent accidents and to limit consequences to the environment. As stated previously this waste licence application is to facilitate the remediation of the East Tip site. Construction works associated with the remediation of the works shall be conducted in accordance with the requirements of the Safety, Health and Welfare at Work (Construction) Regulations. The ultimate object of the regulations is to provide legislative backup in order to help prevent occupational injuries, illness and fatalities in the Construction Industry. In addition to this, it is a requirement that a detailed Construction Environmental Management Plan (CEMP) is prepared prior to commencement and updated for each stage of the planned remediation work. Please refer to section C of this application for further information on the CEMP. On this basis it is considered that the foregoing requirement is satisfied.

Section 40(4)(i) requires that necessary measures will be taken upon cessation of the activity to avoid any risk of environmental pollution. As stated previously this Waste Licence application is to facilitate the remediation of the East Tip site which includes it's conversion to a parkland amenity as the end-use. As such it is deemed that this particular requirement is not relevant to the East Tip and is therefore satisfied.

Section 40(4)(j) requires that the intended method of treatment is acceptable from the point of view of environmental protection, in particular when the method is not in accordance with section 32(1) of the Act. As detailed above, the intended method of remediation is in line with the recommendations of the DQRA and will break the pathway between the source of the risks (the waste body) and the receptors (human health and the surrounding marine waters). On this basis it is considered that this treatment method is acceptable from the point of view of environmental protection.

Appropriate Assessment and Natura Impact Statement

A Natura Impact Statement (NIS) was completed for the East Tip remediation project in accordance with Article 6 (3) of the 'Habitats' Directive 92/43/EEC (Please refer to Volume 4 of the EIS). TheStatement provides a professional scientific examination of the project and the relevant Natura 2000 sites, identifying and characterising any possible implications for the Natura 2000 site in view of the conservation objectives taking account of in-combination effects.

Robust and effective mitigation measures have been proposed for the avoidance of any impacts affecting water quality within all relevant Natura 2000 sites. Specific mitigation measures have been proposed for the prevention of impacts to all relevant Annex I species. Likewise, precautions will be taken in relation to non-native invasive species during the construction phase.

The mitigation measures outlined in Section 4.5 of the NIS (Volume 4 of the EIS) will form the backbone of the detailed construction method statements. Exact implementation details in the Construction Method Statements will be agreed between Cork County Council and NPWS representatives.

The conclusion of this Natura Impact Statement is that there will be no potential for cumulative impacts arising in combination with any other plans or proposals, with the implementation of best practice and the recommended mitigation measures, it is considered that the proposed East Tip Remediation Project, Haulbowline, Co Cork will not adversely affect the integrity of Cork Harbour SPA.

L.2 Fit and Proper Person

The WMA in Section 40(4)(d) specifies that the Agency shall not grant a licence unless it is satisfied that the applicant (if the applicant is not a local authority) is a fit and proper person. Section 40(7) of the WMA specifies the information required to enable a determination to be made by the Agency.

- Indicate whether the applicant or other relevant person has been convicted under the Waste Management Act 1996, as amended, the EPA Act 1992, as amended, the Local Government (Water Pollution) Acts 1977 and 1990 or the Air Pollution Act 1987.

- Provide details of the applicant's technical knowledge and/or qualifications, along with that of other relevant employees (Link to Section C.1 of the application).

- Provide information to show that the person is likely to be in a position to meet any financial commitments or liabilities that may have been or will be entered into or incurred in carrying on the activity to which the application relates or in consequence of ceasing to carry out that activity (Link to Section K of the application).

Supporting information should be included as **Attachment L.2** with reference to where the information can be found in the application.

Attachment included	**yes** ☐	**no** ☐	**not applicable** ☒

Attachment L.2 Fit and Proper Person

This section is not applicable as the Minister for Agriculture, Food and the Marine is the applicant and by virtue of his position is deemed fit and proper.

L.3 Waste hierarchy

Section 21A of the Waste Management Act 1996, as amended, as amended, requires that the waste hierarchy shall apply. When applying the waste hierarchy, the Agency is obliged to take measures to encourage the options that deliver the best overall environmental outcome. Any departures from the hierarchy can be justified by life-cycle thinking on the overall impacts of the generation and management of specific waste streams. Applicants should justify any departures from the hierarchy on this basis and as set out in section 21A(2) of the Acts.

Applicants should be aware of the requirements related to recovery of waste set out in section 29(2A) of the Acts. (See section H.5 above).

In accordance with article 12(1)(v) of the Waste Management (Licensing) Regulations, 2004, as amended, describe in **Attachment L.3** how the waste hierarchy is applied in or by the proposed activity.

Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment L.3 Waste Hierarchy

The waste hierarchy sets out the preferred methods of waste management which member states must adhere to as a priority order. Statutory authorities are required to take measures to encourage options that deliver the best overall environmental outcome.

While disposal is the least favoured method of waste management in the hierarchy and this application is for a hazardous waste landfill, it is important to point out this application is being made to facilitate the remediation of an existing landfill and it is not proposed to accept any further waste at the facility for disposal.

The remediation strategy proposed was developed on the back of a DQRA completed to determine risks posed by the site and to determine measures necessary to deliver the best environmental outcome.

In determining the best environmental outcome a number of alternatives were considered. Furthermore, consideration was given to the technical aspects (design options and construction methods) and likely environmental impacts associated with various alternatives. Please refer to Chapter 4 (Alternatives) of the EIS for further detail.

Based on the DQRA, the design option found to deliver the best environmental outcome was one involving the use of a capping/cover system across the top of the site and installation of a perimeter engineered structure around the perimeter of the site.

Following on from the DQRA, it was also found that the treatment of waste off site would not deliver the best overall outcome due to environmental and technical difficulties and also the significant costs associated with such works. Similarly, in-situ treatment of waste was not considered to deliver the best overall environmental outcome due to the potential noise, dust, surface water, groundwater and marine water impacts resulting from such methods.

Furthermore, the use of very low permeability or reactive barriers as part of the PES were not considered further as the DQRA found that the site does not warrant such systems.

Furthermore, the requirements for on-going pollution control and maintenance systems and the additional costs associated with the installation and management of these systems are not warranted when the risk posed by the East Tip, as outlined in the DQRA, can be mitigated through the installation of a capping system together with construction of a PES with a proposed maximum permeability of $1x10^{-5}$ m/s which meets the requirements for protection of the environment. This option therefore represented a more environmentally sustainable and cost effective solution than the alternatives considered.

In line with the requirements of the waste hierarchy, it is also proposed to recycle/ recover processed slag on site and reuse as part of the PES and drainage layer. This will present an opportunity to minimise the impact from the importation of fill and further support the environmentally sustainable nature of the proposed PES.

The recovery or scrap metal and millscale (subject to feasibility) isalso proposed.

L.4 Principles of self-sufficiency and proximity

Applicants should state in **Attachment L.4** how the proposed activity contributes to the requirements of Section 37A of the Waste Management Act 1996, as amended.

Attachment included	**yes** ☒	**no** ☐	**not applicable** ☐

Attachment L.4 Principles of self-sufficiency and proximity

Section 37(A) of the Waste Management Act 1996 as amended makes provisions for the development of an integrated and adequate network of waste disposal and recovery installations for municipal and other waste types taking into account best available techniques.

This application is for the remediation of an existing landfill site within the functional area of Cork County Council. The landfill was developed to cater for waste material arising from the adjacent Irish steelworks site. It is now proposed to remediate the site by constructing aPerimeter Engineered Structure (PES) and capping system to ensure the bulk of the existing waste body present is self- contained within the confines of these structures.

It is only proposed to remove minimal quantities of waste of site during the constructionphase. . The only material proposed for removal off site is scrap metal and possibly millscale for recovery at appropriately authorised facilities and unsuitable suspect material should it be encountered during construction. It is proposed to recover slag material within the confines of the site for reuse within the PES. Sourcing construction materials locally will be encouraged where technically and feasibly practicable.

SECTION M - DECLARATION

Declaration

I hereby make application for a licence / revised licence, pursuant to the provisions of the Waste Management Act 1996, as amended and Regulations made thereunder.

I certify that the information given in this application is truthful, accurate and complete.

I give consent to the EPA to copy this application for its own use and to make it available for inspection and copying by the public, both in the form of paper files available for inspection at EPA and local authority offices and via the EPA's website. This consent relates to this application itself and to any further information, submission, objection, or submission to an objection whether provided by me as Applicant or any person acting on the Applicant's behalf.

Signed by : Paschal Hayes **Date :** 11TH NOVEMBER 2013

(A person authorised to authenticate the Official Seal of the Minister for Agriculture, Food and the Marine)

Print signature name: Paschal Hayes

Position in organisation: Principal Officer

Official Seal of the Minister for Agriculture, Food and the Marine

ANNEX 1 STANDARD FORMS

Standard forms are provided in this section for the recording and presentation of environmental monitoring and site investigation results

TABLE E.1(i) LANDFILL GAS FLARE EMISSIONSTOATMOSPHERE
Emission Point:Not Applicable

Emission Point Ref. N^{o}:	
Location :	
Grid Ref. (12 digit, 6E,6N):	
Vent Details Diameter: Height above Ground(m):	
Date of commencement of emission:	

Characteristics of Emission : **Not Applicable**

CO		mg/m^3
Total organic carbon (TOC)		mg/m^3
NOx		mg/Nm^3 0^{o}C. 3% O_2(Liquidor Gas), 6% O_2(Solid Fuel)
Maximum volume of emission		m^3/hr
Temperature	^{o}C(max) ^{o}C(min)	^{o}C(avg)

(i) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up/shutdown to be included):*

Periods of Emission (avg)	min/hrhr/day day/yr

TABLE E.1(ii) MAIN EMISSIONSTOATMOSPHERE(1 Page for each emission point)

Emission Point Ref. N^{o}:	**Not Applicable**
Source of Emission:	
Location :	
Grid Ref. (12 digit, 6E,6N):	
Vent Details Diameter: Height above Ground(m):	
Date of commencement:	

Characteristics of Emission : **Not Applicable**

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	m^3/d
Maximum rate/hour	m^3/h	Min efflux velocity	$m.sec^{-1}$
(ii) Other factors			
Temperature	^{o}C(max)	^{o}C(min)	^{o}C(avg)
For Combustion Sources: Volume terms expressed as :☐ wet. ☐dry. _____%O_2			

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	min/hrhr/day day/yr

TABLE E.1(iii): MAIN EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: Not Applicable

Parameter	Prior to treatment[1]				Brief description of treatment	As discharged[1]					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Not Applicable											

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0^{o}C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.

TABLE E.1(iv): EMISSIONS TO ATMOSPHERE - Minor /Fugitive

Emission point Reference Numbers	Description	Emission details[1]				Abatement system employed
		material	mg/Nm^{3} (2)	kg/h.	kg/year	
A2-1	Dust arising from construction activities	Dust			Variable with phase	Refer to Section 9.5.1 of Volume 2 of the EIS for full list of dust mitigation measures.
	Asbestos fibres arising from construction activities	Asbestos			Trace	Refer to Section 9.5.1 of Volume 2 of the EIS for full list of asbestos mitigation measures.
	Greenhouse gases arising from construction activities	Greenhouse gases			17,899,000	Refer to Section 9.5.1 of Volume 2 of the EIS for full list of greenhouse gas mitigation measures.
	Odours arising from construction activities	Odours			Trace	Refer to Section 9.5.1 of Volume 2 of the EIS for full list of odour mitigation measures.

1The maximum emission should be stated for each material emitted, the concentration should be based on the maximum 30 minute mean.
2 Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0^{o}C101.3kPa). Wet/dry should be clearly stated. Include reference oxygen conditions for combustion sources.

The quantity of fugitive dust emissions arising as a result of construction activities will be variable depending on local weather conditions, construction activities occurring and site arrangement practices adopted.

62% of 199samples taken from the site tested positive for the presence of asbestos fibres. These fibres have the potential to become airbourne during construction activities. In light of this a separate Asbestos Construction Management Plan (ACMP) has been prepared for the construction phase of works which includes a series of mitigation measures for the management, training, monitoring and mitigation of asbestos during this phase of works. In order to minimize fugitive asbestos emissions, it will be a requirement of the appointed contractor undertaking construction works to implement the Asbestos Construction Management Plan (ACMP) prepared for the project and mitigation measures detailed in the ACMP.

The potential sources of odour from the construction stage relates to the excavation and handling of waste material known to contain low levels of sulphur and also some elevated levels of VOC's. This is also the potential for odours to arise from the importation of topsoil. Topsoil may contain bacteria that generate sulphur compounds which may cause odours. In relation to odours, there is a low potential for odour generation to occur during construction works as the material on site typically includes solid materials with low capacity to generate odours. Trace levels of odours that may occur are therefore considered negligible.

In relation to Greenhouse gases, it is estimated that approximately 17,899,000kg of GHG's will be generated per year during the construction phase primarily as a result of the imported materials (capping materials etc.) and the transport of materials to the site.

In order to minimize the above fugitive emissions it will be a requirement of the appointed contractor undertaking construction works to develop a Construction Environmental Management Plan and implement the mitigation measures detailed in Section F of this application and Section 9.5.1 of Volume 2 of the EIS.

No fugitive emissions are predicted during the End use, Maintenance and Aftercare phase.

TABLE E.2(i): EMISSIONS TO SURFACE WATERS
(One page for eachemission)

Emission Point: SW1 as per drawing DG1010 prior to and during the construction phase. The waste body is considered a diffuse emission source to the surrounding cork harbour waters/groundwater(within the waste layer) pre-construction and during the construction phase. The below tables are not considered entirely applicable given the site is surrounded by Cork Harbour, therefore, additional tables are provided under Table E.2(ii) to illustrate the rate at which tidalwaterflows (flux)from the waste body before and after the Cap and PES are constructed.

SW7 and SW8 (as per drawing DG1011) are diffuse surface water emission points following construction of the PES (Enduse Aftercare and Maintenance Phase).

Emission Point Ref. N^{o}:	SW1
Source of Emission:	The waste body and groundwater within the waste body
Location :	The East Tip
Grid Ref. (10 digit, 5E,5N):	179740.228E; 65356.729N
Name of receiving waters:	Cork Harbour
Flow rate in receiving waters:	Not Applicable $m^3.sec^{-1}$ Dry Weather Flow Not Applicable $m^3.sec^{-1}$ 95%ile flow
Available waste assimilative capacity:	kg/day

Emission Details:

(i) Volume to be emitted:Please refer to Tables under Table E.2(ii)			
Normal/day	m^3	Maximum/day	
Maximum rate/hour	m^3		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	min/hrhr/day day/yr

Emission Point: SW7 as per drawing DG1011 during the End use phase

Emission Point Ref. Nº:	SW7
Source of Emission:	Surface Water Network - Diffuse Outfall 1
Location :	The East Tip
Grid Ref. (10 digit, 5E,5N):	179687.785E; 65531.286N
Name of receiving waters:	Cork Harbour
Flow rate in receiving waters:	Not Applicable $m^3.sec^{-1}$ Dry Weather Flow Not Applicable $m^3.sec^{-1}$ 95%ile flow
Available waste assimilative capacity:	kg/day

Emission Details:

(i) Volume to be emitted			
Normal/day	m^3	Maximum/day	2030.4m^3
Maximum rate/hour	84.6 m^3		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	min/hrhr/day day/yr This will depend on rainfall.

Emission Point: SW8 as per drawing DG1011 during the End use phase

Emission Point Ref. Nº:	SW8
Source of Emission:	Surface Water Network –Diffuse Outfall 2
Location :	The East Tip
Grid Ref. (10 digit, 5E,5N):	179556.464E ; 65590.149N

Name of receiving waters:	Cork Harbour
Flow rate in receiving waters:	Not applicable $m^3.sec^{-1}$ Dry Weather Flow Not Applicable $m^3.sec^{-1}$ 95%ile flow
Available waste assimilative capacity:	kg/day

Emission Details:

(i) Volume to be emitted			
Normal/day	m^3	Maximum/day	$864m^3$
Maximum rate/hour	$36m^3$		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	min/hrhr/day day/yr This will depend on rainfall.

TABLE E.2(ii): EMISSIONS TO SURFACE WATERS - Characteristics of the emission (1 table per emission point)

Emission point reference number : *SW1 prior to and during the construction phase as per DG1010* . Additional tables are provided in this section to characteriseemissions to the surrounding Cork Harbour water from SW1 prior to construction of the remediation solution (Cap and PES) and after (during the Enduse, Aftercare and Maintenancephase). Parameter concentrations are compared to WQS.

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	
See below tables									

Table E.2(ii)(a): Groundwater Discharge to Surface water from the site

Parameter	Units	Baseline	Enduse	Reference / Comment
Daily average precipitation	m/d	0.0028	0.0028	As per DQRA Water Flux Model (Appendix AA)
Site Area	m	101,422	91,130	As per DQRA Water Flux Model (Appendix AA) & capped area of the site
Infiltration coefficient (effective precipitation)	%	100%	10%	As per DQRA Water Flux Model (Appendix AA) & conservative estimate of cap effectiveness
Daily Infiltration (P)	m3/d	284	26	P = avg. precip. x site area x infiltration coefficient
Cross sectional area (A)	m2	2,422	2,341	As per DQRA Water Flux Model (Appendix AA) & revised perimeter following PES installation along north, east and south boundaries.
Hydraulic gradient (i)	-	0.009090909	0.009090909	As per DQRA Water Flux Model (Appendix AA) & assumed to be consistent following remediation
Hydraulic conductivity (K)	m/s	2.13E-03	1.00E-05	As per DQRA Water Flux Model (Appendix AA) & lower hydraulic conductivity of the PES
Hydraulic conductivity (K)	m/d	184	0.864	As per DQRA Water Flux Model (Appendix AA) & lower hydraulic conductivity of the PES
Darcy flow discharge (Q) - continuous	m3/d	4,052	18.39	Based upon Darcy's law: Q=KiA
Total groundwater discharge per day (D)	**m3/d**	**4,336**	**43.9**	D = Q + P

Notes:
Calculations may vary slightly to those presented in the DQRA (WYG 2013a) due to rounding

Table E.2(ii)(b): Groundwater Discharge to Surface water from the site

Baseline groundwater discharge (m3/d) 4,336
Enduse groundwater discharge (m3/d) 43.9

Parameter	Average Concentration (ug/l)	Baseline Flux (kg/d)	Enduse Flux (kg/d)
Chromium VI	22	0.0954	0.000966
Chromium	11	0.0477	0.000483
Copper	12	0.0520	0.000527
Zinc	9	0.0390	0.000395
Lead	2.4	0.0104	0.000105
Manganese	535	2.32	0.023
Nickel	6.4	0.0278	0.000281
Mercury	0.2	0.0009	0.000009
Benzo(a)pyrene	0.024	0.00010	0.0000011
Benzo(k)fluoranthene	0.018	0.00008	0.0000008
Fluoranthene	0.04	0.00017	0.0000018

Notes:
Predicted concentrations are rounded to two significant figures and may vary slightly with those calculated in the DQRA due to rounding
Average Concentrations and WQS derived from DQRA (WYG 2013a)

Table E.2(ii)(c): Discharge to Surface water from the Foreshore

Baseline discharge from foreshore (assuming conservative porosity saturation model)(m3/d) 2,059

End-use discharge from foreshore (assuming simple conservative saturation model)(m3/d) 2,059

Parameter	Average Leachate Concentration (ug/l) - NRA method	Baseline Flux (kg/d)	Enduse Flux (kg/d)
Chromium VI	2	0.0041	0.0041
Chromium	0.5	0.0010	0.0010
Copper	12	0.0247	0.0247
Zinc	1.5	0.0031	0.0031
Lead	0.5	0.0010	0.0010
Manganese	9	0.0185	0.0185
Nickel	0.9	0.0019	0.0019
Mercury	0.05	0.0001	0.0001

Notes:
Predicted concentrations are rounded to two significant figures and may vary slightly with those calculated in the DQRA due to rounding
Average Concentrations and WQS derived from DQRA Addendum Foreshore Assessment Report (WYG 2013c)
PAH compounds were not included in the Foreshore Addendum report (WYG 2013c), hence values have not been calculated.

Table E.2(ii)(d): Combined (site and foreshore) flux and predicted surface water concentrations

Dilution in volume of marine water (0-10m from site) (m3/d) 5.3E+04

	East Tip (Cap & PES)[1]		Foreshore Tidal (left in-situ)[2]		Combined Flux		Predicted Surface Water Quality		
Parameter	Baseline Flux (kg/d)	Enduse Flux[2] (kg/d)	Baseline Flux (kg/d)	Enduse Flux (kg/d)	Baseline Flux (kg/d)	Enduse Flux (kg/d)	Predicted Baseline Surface Water Concentrations (ug/l) - Zone 1 (0-10m from shoreline)	Predicted Enduse Surface Water Concentrations (ug/l) - Zone 1 (0-10m from shoreline)	Water Quality Standard (ug/l)
Chromium VI	0.095	0.00097	0.0041	0.0041	0.0995	0.0051	1.88	0.096	0.6
Chromium	0.048	0.00048	0.0010	0.0010	0.0487	0.0015	0.921	0.029	4.6
Copper	0.052	0.00053	0.0247	0.0247	0.0767	0.0252	1.45	0.477	5
Zinc	0.039	0.00040	0.0031	0.0031	0.0421	0.0035	0.796	0.066	40
Lead	0.010	0.00011	0.0010	0.0010	0.0114	0.0011	0.216	0.021	7.2
Manganese	2.320	0.02349	0.0185	0.0185	2.34	0.0420	44.2	0.794	30
Nickel	0.028	0.00028	0.0019	0.0019	0.0296	0.0021	0.560	0.040	20
Mercury	0.00087	0.0000088	0.00010	0.00010	0.0010	0.00011	0.018	0.002	0.05
Benzo(a)pyrene	0.000104	0.0000011			0.0001041	0.0000011	0.0020	0.000020	0.05
Benzo(k)fluoranthene	0.000078	0.00000079			0.0000780	0.00000079	0.0015	0.000015	0.03
Fluoranthene	0.000173	0.0000018			0.0001734	0.0000018	0.0033	0.000033	0.1

Notes

1. Calculated flux from the East Tip is based on WYG (2013a) DQRA Dilution Model inputs

2. Flux reduction from East Tip based on a reduction of infiltration to 10% and hydraulic conductivity of the PES of 1 x 10^{-5} m/s (conservative estimate); Foreshore Tidal - calculations based on WYG (2013c) Foreshore Addendum Report

3. PAHs not analysed as part of foreshore, the DQRA has shown that they are not significant contaminants of concern

It should be noted when reviewing the calculated mass flux tables above that an extremely conservative approach has been adopted in order to follow the precautionary principle. Multiple layers of conservatism are therefore built into the DQRA model, which have been used to calculate the mass flux from the site of potential contaminants of concern. These are outlined in detail within the DQRA (EIS Appendix A) and in summary include:

- The use of an average hydraulic conductivity (k) of the waste that has included disturbed particle size distribution estimates that are an order of magnitude (factor of 10) higher than the in-situ calculated hydraulic conductivity.

- The use of average groundwater concentrations across the site, specifically in relation to CrVI, which was only detected in one location.

- Multiple conservative assumptions used in the foreshore addendum risk assessment (e.g. that all leachable concentrations will be achieved and discharged from the foreshore materials with each tidal cycle).

Furthermore, the conservative nature of the model is confirmed by surface water quality sampling, which has not observed any of the predicted compounds above laboratory method detection limits.

Emission point reference number : SW7 during the End use phase as per DG1011

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	
Total Suspended Solids (TSS)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	50	50	Peak Load= 101.52 kg/day This will only occur during prolonged periods of rainfall	This will depend on yearly rainfall	

Emission point reference number : SW8 during the End use phase as per DG1011

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	
Total Suspended Solids (TSS)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	50	50	Peak Load= 43.2 kg/day This will only occur during prolonged periods of rainfall	This will depend on yearly rainfall	

TABLE E.3(i): EMISSIONS TO SEWER (One page for each emission)

Emission Point: Not Applicable

Emission Point Ref. N^{o}:	**Not Applicable**
Location of connection to sewer :	
Grid Ref. (10 digit, 5E,5N):	

Name of sewage undertaker:	

Emission Details:

(i) Volume to be emitted			
Normal/day	m^3	Maximum/day	m^3
Maximum rate/hour	m^3		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	min/hrhr/day day/yr

TABLE E.3(ii): EMISSIONS TO SEWER - Characteristics of the emission (1 table per emission point)

Emission point reference number : Not Applicable

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average	Max. daily average	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	

	(mg/l)	(mg/l)							
Not Applicable									

TABLE E.4(i): EMISSIONSTOGROUNDWATER(1 Page for each emission point)

Emission Point or Area: Cannot be identified specifically for the construction stage but are within the waste body.

Emission Point/Area Ref. Nº:	Cannot be identified specifically for the construction phase. (The waste body may act as an emission point) There will be no emissions to groundwater during the End use, Maintenance and Aftercare phase.
Emission Pathway: (borehole, well, percolation area, soakaway, landspreading, etc.)	Temporary soakaway during construction stage for recirculated seepage water collected at the foreshore during construction of the PES.
Location :	During Construction: The East Tip Waste Body.
Grid Ref. (10 digit, 5E,5N):	179740.228E; 65356.729N
Elevation of discharge: (relative to Ordnance Datum)	3.3- 5.1mOD
Aquifer classification for receiving	Discharge is to made ground / waste material on the East Tip

groundwater body:	and not to underlying natural geological strata or groundwater bodies.
Groundwater vulnerability assessment (including vulnerability rating):	Discharge is to made ground / waste material on the East Tip and not to underlying natural geological strata or groundwater bodies. Therefore groundwater vulnerability is not relevant.
Identity and proximity of groundwater sources at risk (wells, springs, etc):	None as groundwater in the made ground / waste and in the underlying natural strata is saline.
Identity and proximity of surface water bodies at risk:	It is not known how far away the soakway areas will be from the Marine waters in Cork Harbour. However the waste body is surrounded by marine waters. It should be noted that the PES will reduce potential contaminant flux to surface water when constructed.

Emission Details: Cannot be estimated at this point

(i) Volume to be emitted			
Normal/day	m^3	Maximum/day	m^3
Maximum rate/hour	m^3		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	min/hrhr/day day/yr

Table E.5 (i): NOISE EMISSIONS - Noise sources summary sheet

Source	Emission point Ref. No	Equipment Ref. No	Sound Pressure[1] dBA at reference distance	Octave bands (Hz) Sound Pressure[1] Levels dB(unweighted) per band									Impulsive or tonal qualities	Periods of Emission[2]
				31.5	63	125	250	500	1K	2K	4K	8K		
Pulverizer mounted on excavator (demolition - breaking up concrete)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	80dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Breaker mounted on excavator (demolition - breaking up brick)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	90dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Tracked excavator loading dump truck (dumping brick rubble)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	85dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Tracked excavator (breaking up / cutting steel)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	82dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Lump hammer (breaking windows)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	81dB(A) @10m										Yes	Variable & sporadic throughout construction phase.

Source	Emission point Ref. No	Equipment Ref. No	Sound Pressure[1] dBA at reference distance	Octave bands (Hz) Sound Pressure[1] Levels dB(unweighted) per band									Impulsive or tonal qualities	Periods of Emission[2]
				31.5	63	125	250	500	1K	2K	4K	8K		
Dozer (clearing site)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	75dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Tracked excavator (clearing site)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	78dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Wheeled backhoe loader (clearing site)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	68dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Dozer (ground excavation)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	81dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Tracked excavator (ground excavation)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	79dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Wheeled loader (ground	Variable throughout	Exact Equipment												Variable & sporadic

Source	Emission point Ref. No	Equipment Ref. No	Sound Pressure[1] dBA at reference distance	Octave bands (Hz) Sound Pressure[1] Levels dB(unweighted) per band									Impulsive or tonal qualities	Periods of Emission[2]
				31.5	63	125	250	500	1K	2K	4K	8K		
excavation)	site during construction phase.	not sourced at this stage.	80dB(A) @10m										Yes	throughout construction phase.
Tracked semi mobile crusher (crusher)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	90dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Screen stockpiler (screener)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	81dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Dump truck (distribution of material - tipping fill)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	79dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Dump truck (distribution of material - empty)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	87dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Roller (rolling & compaction)	Variable throughout site during construction	Exact Equipment not sourced at this stage.	73dB(A) @10m										Yes	Variable & sporadic throughout construction

Source	Emission point Ref. No	Equipment Ref. No	Sound Pressure[1] dBA at reference distance	Octave bands (Hz) Sound Pressure[1] Levels dB(unweighted) per band									Impulsive or tonal qualities	Periods of Emission[2]
				31.5	63	125	250	500	1K	2K	4K	8K		
	phase.													phase.
Piling (sheet steel piling - vibratory)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	88dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Piling - fender (pre-cast concrete piling - hydraulic hammer)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	89dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Water pump	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	65dB(A) @10m										Yes	Variable & sporadic throughout construction phase.
Road sweeper (general activities)	Variable throughout site during construction phase.	Exact Equipment not sourced at this stage.	76dB(A) @10m										Yes	Variable & sporadic throughout construction phase.

1. For items of plant, sound power levels may be used.
2. Periods of emission should state if the plant item in question operates on a continuous or intermittent basis. If intermittent then further details of the hours of operation and any potential impulsive components associated with the source should be clearly identified.

TABLE F.1: ABATEMENT / TREATMENT CONTROL

Emission point reference number: All plant listed in Table E5(i) will be active throughout proposed site at variable times and in a sporadic nature as required as part of the construction phase activities. Abatement control is outlined below in relation to a combined worst-case noise level from all of the plant listed and assuming it is all active at the boundary of the proposed development site.

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Noise Barrier	2-3m high temporary noisebarrier along western boundary of proposed site and adjacent to road construction works on Haulbowline Island.	Regular maintenance checks throughout construction phase to ensure integrity of barrier.	N/A	N/A
Earthworks - Bunds	As part of the landscaping of the proposed site, elevated earth bunds will be created. These bunds will be created early in the construction phase so that they offer noise attenuation from construction phase noise in a northerly and southerly direction.	N/A	N/A	N/A
Noise Management Plan	This document will define: Mode of construction activity; Timing of construction activity; Liaison with local residents & sensitive receptors; Liaison with Cork County Council; Measures Include: • ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order;	N/A N/A	N/A N/A	N/A N/A

Standard Measures to Reduce Noise from All Plant (Ref: BS5228: 2009)	• careful selection of quiet plant and machinery to undertake the required work where available; • all major compressors should be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use; • any ancillary pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers; • machines in intermittent use should be shut down in the intervening periods between work; • ancillary plant such as generators, compressors and pumps should be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines should be placed away from sensitive locations, in order to cause minimum noise disturbance. Where possible, in potentially sensitive areas, acoustic barriers of enclosures should be utilised around noisy plant and equipment. • Handling of all materials should take place in a manner which minimises noise emissions; • Audible warning systems should be switched to the minimum setting required by the HSA.			

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
All noise control measures outlined in table above in relation to proposed construction activities	Monitoring to be conducted at locations illustrated in DG1012a that accompanies this appliction. Monitoring to be conducted as per outlined in EPA guidance document Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)	Integrating averaging sound level meters (Type 1) as specified in BS EN 60804.	Calibrator appropriate to the relevant integrating averaging sound level meter used.

Emission point reference number *:*SW1as per Drawing DG1010 during the construction phase

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Construct the PES	As detailed in Section D of this application	Not Applicable	Not Applicable	Not Applicable

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Mitigation measures specified in Section F of this application and Chapter 13 (Soils, Geology and hydrogeology)	Monitoring to be carried at surface water and groundwater monitoring locations as detailed in Section F of this application and as per Drawing DG1012a during Construction and DG1012b during the End use phase	To be determined at detailed design	As per manufacturer's instructions

[1]List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3]List the monitoring of the control parameter to be carried out.

Emission point reference number *:*SW7 as per Drawing DG1011 during the End use phase

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Capping and drainage layer	As detailed in Section D of this application	To be determined at detailed design	To be determined at detailed design	To be determined at detailed design

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Mitigation measures specified in Section F of this application and Chapter 13 (Soils, Geology and hydrogeology)	Monitoring to be carried at surface water monitoring locations SW1-SW8 as per Drawing DG1012b	To be determined at detailed design	As per manufacturer's instructions

[1]List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3]List the monitoring of the control parameter to be carried out.

Emission point reference number *:*SW8 as per Drawing DG1011 during the End use phase

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Capping and drainage layer	As detailed in Section D of this application	To be determined at detailed design	To be determined at detailed design	To be determined at detailed design

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Mitigation measures specified in Section F of this application and Chapter 13 (Soils, Geology and hydrogeology)	Monitoring to be carried at surface water monitoring locations SW1-SW8 as per Drawing DG1012b	To be determined at detailed design	As per manufacturer's instructions

[1] List the operating parameters of the treatment / abatement system which control its function.

[2] List the equipment necessary for the proper function of the abatement / treatment system.

[3] List the monitoring of the control parameter to be carried out.

Emission point reference number *:*GW1 as per Drawing DG1010 during the construction phase

Control[1]parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Mitigation measures detailed in Section F of this application	As detailed in Section D of this application	To be determined at detailed design	To be determined at detailed design	To be determined at detailed design

Control[1]parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Mitigation measures specified in Section F of this application and Chapter 13 (Soils, Geology and hydrogeology)	Monitoring to be carried at groundwater monitoring locations as per Drawing DG1012a during construction and DG1012b during the End use phase.	To be determined at detailed design	As per manufacturer's instructions

[1]List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3]List the monitoring of the control parameter to be carried out.

TABLE F.2 to F.8 : EMISSIONS MONITORING AND SAMPLING POINTS - (1 table per media)

Emission Point Reference No(s). :Noise Emission Point N1 as per DG1010. Noise Monitoring Locations N1-N5 as detailed on Drawing DG1012a that accompanies this application (applicable to emissions during the construction phase). No emissions or monitoring is proposed during the End use phase)

Parameter	Monitoring frequency	Accessibility of Sampling Points
L_{Aeq}	As outlined by EPA in Waste Licence	Accessible
L_{Amax}	As outlined by EPA in Waste Licence	Accessible
L_{Amin}	As outlined by EPA in Waste Licence	Accessible
L_{A10}	As outlined by EPA in Waste Licence	Accessible
L_{A90}	As outlined by EPA in Waste Licence	Accessible

Emission Point Reference No(s). : Surface Water Emission point SW1 as per DG1010 during the construction phase and emission points SW7and SW8 as per drawing DG1011 during the End use phase. Surface Water Monitoring Locations SW1-SW6 are applicable during the construction and End use phase as detailed on Drawing DG1012a and DG1012b that accompanies this application

Parameter	Monitoring frequency	Accessibility of Sampling Points
During Construction		
Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al),	As outlined by EPA in Waste Licence	Boat required
Speciated PAH's,	As outlined by EPA in Waste Licence	Boat required
petroleum	As outlined by EPA in Waste Licence	Boat required
hydrocarbons	As outlined by EPA in Waste Licence	Boat required
Suspended solids	As outlined by EPA in Waste Licence	Boat required
During the End use, Maintenance and Aftercare phase		
Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn,	As outlined by EPA in Waste Licence	Boat required

Ni, Hg, Al),		
Speciated PAH's	As outlined by EPA in Waste Licence	Boat required

Emission Point Reference No(s). : During the construction phase the waste body is considered the Ground water emission point GW1 as per Drawing DG1010. Ground Water Monitoring Locations are detailed on Drawing DG1012a that accompanies this application. No groundwater emissions are anticipated during the End use phase, however monitoring is proposed at locations as per DG1012b.

Parameter	Monitoring frequency	Accessibility of Sampling Points
During Construction		
Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), ,	As outlined by EPA in Waste Licence	Accessible
Speciated PAH's	As outlined by EPA in Waste Licence	Accessible
Petroleum	As outlined by EPA in Waste Licence	Accessible
Hydrocarbons	As outlined by EPA in Waste Licence	Accessible
pH	As outlined by EPA in Waste Licence	Accessible
Eh	As outlined by EPA in Waste Licence	Accessible
DO	As outlined by EPA in Waste Licence	Accessible
EC	As outlined by EPA in Waste Licence	Accessible
During the End use, Maintenance and Aftercare phase		

Metals (As, Cd, Cr, CrVI, Cu, Zn, Pb, Mn, Ni, Hg, Al), Speciated PAH's, pH, Eh, DO, EC	As outlined by EPA in Waste Licence	Accessible
Speciated PAH's	As outlined by EPA in Waste Licence	Accessible
pH	As outlined by EPA in Waste Licence	Accessible
Eh	As outlined by EPA in Waste Licence	Accessible
DO	As outlined by EPA in Waste Licence	Accessible
EC	As outlined by EPA in Waste Licence	Accessible

TABLE Ff: Fugitive ENVIRONMENT MONITORING AND SAMPLING LOCATIONS (1 table per media)

Monitoring Point Reference No :AA1-AA5 during the construction phase. It is not proposed to carry out air monitoring during the End use, Maintenance and Aftercare phase.

Parameter	Monitoring frequency	Accessibility of Sampling point
Construction Phase		
Dust	Monthly	AA1-AA5
PM10	Daily	AA1,AA2,AA3
Fine Particulates and metals	Real time	AA1
Metals	Daily (only during dry days0Note 1	AA2,AA3

Note 1: During days of dry weather (i.e. <0.2mm rainfall recorded at CorkAirport) during months 1 to 9 of the construction program.

Monitoring Point Reference No :_____

Parameter	Monitoring frequency	Accessibility of Sampling point

Monitoring Point Reference No :_____

Parameter	Monitoring frequency	Accessibility of Sampling point

Table G.1 Details of Process related Raw Materials, Intermediates, Products, etc., used or generated on the site

Ref. Nº or Code	Material/ Substance[1]	CAS Number	Danger[2] Category	Amount Stored (tonnes)	Annual Usage (tonnes)	Nature of Use	R[3] - Phrase	S[3] - Phrase
	Engineering Capping System							
N/A	Stone/Inert material	N/A	N/A	56,700	27,000m3	Regulation Layer	N/A	N/A
N/A	Geosynthetic	N/A	N/A	118,800	54,000m3	Clay Layer	N/A	N/A
N/A	LLDPE	N/A	N/A	60	60 rolls	Liner	N/A	N/A
N/A	Geocomposite	N/A	N/A	43,200	27,000m3	Drainage Layer	N/A	N/A
N/A	Subsoil and topsoil	N/A	N/A	180,000	90,000m3	capping	N/A	N/A
N/A	Inert engineering fill	N/A	N/A	713	324m3	Anchor trenches	N/A	N/A
N/A	stone	N/A	N/A	800	500m3	Surface water drains	N/A	N/A
	Perimeter Engineered Structure (North, east and southern boundary)							
N/A	Inert Engineering fill	N/A	N/A	70,000-90,000	35,000-45,000m3	Slope construction	N/A	N/A
N/A	Rocks	N/A	N/A	25,000-30,000	25,000-35,000	Rock armour	N/A	N/A
	Perimeter Engineered Structure (Western boundary)							
N/A	Inert Engineering fill	N/A	N/A	3,500	1,750	Inert Engineering fill material if imported	N/A	N/A
	Landscaping							
N/A	Sub soil and topsoil	N/A	N/A	24,000	12,000m3	Landscape mounds		
N/A	Stone	N/A	N/A	210	100m3	Footpaths and Walkways		
	Road and Pathway Improvements							
N/A	Stone, surface layer material	N/A	N/A	14,700	7,000m3	Access road, car park, road improvements and path improvements	N/A	N/A
N/A	Drainage Stone	N/A	N/A	4,000	2,500m3	Drainage layer	N/A	N/A
	General							
N/A	Water	N/A	N/A		N/A	Dust Suppression	N/A	N/A
N/A	Diesel Fuel	68334-30-5	XN, N, F		unknown	Power vehicles	R40, R65,R66, R51/53	S36/37,S61,S62

Notes: 1. In cases where a material comprises a number of distinct and available dangerous substances, please give details for each component substance.

2. c.f. Article 2(2) of SI Nº 77/94
3. c.f. Schedules 2 and 3 of SI Nº 77/94

TABLE H.4(i): WASTE - Hazardous Waste Recovery/Disposal

Waste material	EWC Code	Main source[1]	Quantity		On-site Recovery/Disposal (Method & Location)	Off-site Recovery, reuse or recycling (Method, Location & Undertaker)	Off-site Disposal (Method, Location & Undertaker)
			Tonnes / month	m^3 / month			
Furnace Dust	10 02 07*	Steelwork processing – Waste present on site	27	18	Landfill on site	Not Applicable	Not Applicable
Sludge	10 02 13*	Steelwork processing – Waste present on site	358	358	Landfill on site	Not Applicable	Not Applicable
C&D	170106*; 170204*; 170301*; 170503*; 170605*; 170903*	Steelwork processing – Waste present on site	Unknown (accounted for in Table H.4(ii))	Unknown (accounted for in Table H.4(ii))	Landfill on site	Not applicable	Not Applicable

[1] A reference should be made to the main activity / process for each waste.

The inclusion of various materials in the above table is determined by the relevant EWC Codes. The quantity of waste per month is based on the total quantity of each waste type present on site divided by an 18 month construction timeline.

TABLE H.4(ii) WASTE - Other Waste Recovery/Disposal

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
Scrap Metal	17 04 07	Steelwork Processing-Waste present on site	12,007	2,401	Landfill on site	Authorised Scrap metal recycling company e.g Hammond Lane, Haulbowline, Cork	Not Applicable
C&D	170101;170201;170202;170203;170407;170504;170904	Demolition of Steelworks facility-waste present on site	27	18	Landfill on site and possible reuse/recovery in PES	Not Applicable	Not Applicable
Refuse	20 03 01	Domestic – Waste present on site	4	18	Landfill on site	Not Applicable	Not Applicable
Slag	10 02 01/ 10 02 02	Steel processing-Waste present on site	68,813	22,938	Landfill on site and possible reuse/recovery in PES	Not Applicable	Not Applicable
Topsoil	17 05 04	Waste present on site	5	4	Landfill on site and possible reuse/recovery in PES	Not Applicable	Not Applicable
Millscale	10 02 10		7,258	4,839	Landfill on site	Possible recovery at an authorised off site facility	Not Applicable
Refractories	10 02 99	Steel processing-Waste present on site	8,277	5,518	Landfill on site	Not Applicable	

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
		Steel processing- Waste present on site					

1 A reference should be made to the main activity/ process for each waste.
2 The method of disposal or recovery should be clearly described and referenced to Attachment H.1

The inclusion of various materials in the above table is determined by the relevant EWC Codes. The quantity of waste per month is based on the total quantity of each waste type present on site divided by an 18 month construction timeline..

Furthermore, it should be noted that while classified as non-hazardous, most of these waste types are mixed together on site and as a result chemical analysis of pure waste types completed are limited. As a result of such mixing, chemical analysismay identify the presence of hazardous parameters and/ or elevated concentrations of various parameters in each waste type. Please refer to Appendix P of the DQRA for further information.

Following on from the DQRA, it should be noted that RPS completed a slag characterisation study in 2013, which found that pure processed slag stockpile samples were 100% non-hazardous and the majority of unprocessed slag are non-hazardous. Furthermore, it also found that any slag material displaying hazardous characteristics is a result of foreign dangerous substances that have been artificially introduced.

Table I.2(i) SURFACE WATER QUALITY

(Sheet 1 of 2) Monitoring Point/ Grid Reference: _ Please refer to Appendix L 'Water Analysis' of the DQRA (WYG 2013a) (Appendix A of the EIS)_

Parameter	**Results (mg/l)**				**Sampling method[2] (grab, drift etc.)**	**Normal Analytical Range[2]**	**Analysis method / technique**
	Date	**Date**	**Date**	**Date**			
pH							
Temperature							
Electrical conductivity EC							
Ammoniacal nitrogen NH_4-N							
Chemical oxygen demand							
Biochemical oxygen demand							
Dissolved oxygen DO							
Calcium Ca							
Cadmium Cd							
Chromium Cr							
Chloride Cl							
Copper Cu							
Iron Fe							
Lead Pb							
Magnesium Mg							
Manganese Mn							
Mercury Hg							

Surface Water Quality (Sheet 2 of 2)

Parameter	Results (mg/l)				Sampling method (grab, drift etc.)	Normal Analytical Range	Analysis method / technique
	Date	Date	Date	Date			
Nickel Ni							
Potassium K							
Sodium Na							
Sulphate SO_4							
Zinc Zn							
Total alkalinity (as $CaCO_3$)							
Total organic carbon TOC							
Total oxidised nitrogen TON							
Nitrite NO_2							
Nitrate NO_3							
Faecal coliforms (/100mls)							
Total coliforms (/100mls)							
Phosphate PO_4							

Table I.4(i) GROUNDWATER QUALITY

(Sheet 1 of 2) Monitoring Point/ Grid Reference: Please refer to Appendix L 'Water Analysis' of the DQRA(WYG 2013a)(Appendix A of the EIS)

Parameter	Results (mg/l)				Sampling method (composite etc.)	Normal Analytical Range	Analysis method / technique
	Date	Date	Date	Date			
pH							
Temperature							
Electrical conductivity EC							
Ammoniacal nitrogen NH_4-N							
Dissolved oxygen DO							
Residue on evaporation (180^{o}C)							
Calcium Ca							
Cadmium Cd							
Chromium Cr							
Chloride Cl							
Copper Cu							
Cyanide Cn, total							
Iron Fe							
Lead Pb							
Magnesium Mg							
Manganese Mn							
Mercury Hg							
Nickel Ni							

Parameter	**Results (mg/l)**				**Sampling method (composite etc.)**	**Normal Analytical Range**	**Analysis method / technique**
Potassium K							
Sodium Na							

GROUNDWATER QUALITY (SHEET 2 OF 2)

Parameter	Results (mg/l)				Sampling method (composite, dipper etc.)	Normal Analytical Range	Analysis method / technique
	Date	Date	Date	Date			
Phosphate PO_4							
Sulphate SO_4							
Zinc Zn							
Total alkalinity (as $CaCO_3$)							
Total organic carbon TOC							
Total oxidised nitrogen TON							
Arsenic As							
Barium Ba							
Boron B							
Fluoride F							
Phenol							
Phosphorus P							
Selenium Se							
Silver Ag							
Nitrite NO_2							
Nitrate NO_3							
Faecal coliforms (/100mls)							
Total coliforms (/100mls)							
Water level (m OD)							

Table I.6 (i): AMBIENT & BACKGROUND NOISE ASSESSMENT

Need to carry out an assessment for tonal and impulsive noise[1]

	National Grid Reference (6N, 6E)	Sound Pressure Levels (dB)					
		L_{Aeq}		L_{A10}		L_{A90}	
		Ambient	Background[2]	Ambient	Background[2]	Ambient	Background[2]
2. NOISE SENSITIVE LOCATIONS[3]							
Location 1 (6-7/11/12)							
Day - 12:41 - 12:56			58		54		44
Day - 13:56 - 14:11			48		49		45
Day - 15:09 - 15:24			51		48		44
Evening - 20:56 - 21:11			41		42		39
Evening - 22:36 - 22:51			40		41		39
Night - 23:00 - 23:15			41		42		39
Night - 00:05 - 00:20			38		39		37
Night - 00:21 - 00:36			38		39		37
Location 2 (6-7/11/12)							
Day - 13:11 - 13:26			47		47		44
Day - 14:19 - 14:34			48		49		44
Day - 15:33 - 15:48			45		47		42
Evening - 21:18 - 21:33			42		43		37
Night - 23:21 - 2336			42		40		36
Night - 00:44 - 00:59			41		43		35
Location 3 (6-7/11/12)							
Day - 13:33 - 13:48			63		67		45
Day - 14:42 - 14:57			63		64		45
Day - 15:55 - 16:10			64		67		45
Evening - 21:41 - 21:56			55		48		37

	National Grid Reference	Sound Pressure Levels (dB)					
Night - 23:42 - 23:57			51		45		40
Night - 01:04 - 01:19			38		39		36
Location 4 (6-7/11/12)							
Day - 12:16 - 12:31			48		49		44
Day - 13:06 - 13:21			46		48		41
Day - 13:56 - 14:11			46		46		41
Day - 14:12 - 14:27			45		46		42
Evening - 21:35 - 21:50			45		48		37
Evening - 22:23 - 22:38			51		51		35
Night - 23:14 - 23:29			47		49		37
Night - 00:11 - 00:26			41		40		33
Location 5 (6-7/11/12)							
Day - 11:43 - 11:58			53		53		49
Day - 12:42 - 12:57			52		54		49
Day - 13:33 - 13:48			50		52		48
Evening - 21:10 - 21:25			47		50		43
Evening - 22:00 - 22:15			43		44		42
Evening - 22:46 - 23:01			44		45		42
Night - 23:45 - 00:00			54		54		54
Night - 00:34 - 00:49			49		52		43
Night - 00:50 - 01:05			44		45		43

1. Refer to section 5 of the Agency's *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (2012).
2. Background noise levels should be determined in the absence of site specific noise. Where an installation is operational on a 24hr basis, estimates may be given for background noise levels, but this should be noted.
3. All locations should be identified on accompanying drawings.