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Attn. Kieran Doherty,
Strategic Infrastructure Development and
Local Authority Projects Section,
An Bord Pleanála,
64 Marlborough Street,
Dublin 1.

14th February 2014

Our Ref: CP12006/MCE0734

RE: PLANNING APPLICATION FOR APPROVAL FOR THE EAST TIP REMEDIATION PROJECT, HAULBOWLINE ISLAND, CO. CORK UNDER SECTION 181 (3) OF THE PLANNING AND DEVELOPMENT ACT 2000, AS AMENDED.

ABP REF.: MT 04.MT0001

FURTHER INFORMATION RESPONSE

Dear Sir,

I refer to the above mentioned planning application and to the request for further information (RFI) dated January 17th 2014. For ease of reference, this response addresses the items in the order in which they are raised in the An Bord Pleanála correspondence. I also refer to your letter dated February 3rd 2014 which confirms that this response is to reach the offices of the Board not later than 5.30pm on February 14th 2014.

Natura Impact Statement

Item 1: Section 4.5.1 - A full assessment of the impact on birds and cetaceans for the piling construction option is required. Framework details of a before and after monitoring programme shall be outlined in the event that the construction technique is used.

At the outset it should be noted that there are no definite proposals to carry out piling operations during the development process. This is explained in Chapter 6 'Construction Methodology' of the EIS. Piling is considered as only one of a number of possible options. Furthermore, should piling occur, it is likely to be installed and removed in stages. For the purposes of the assessment of the impacts on birds and cetaceans (on which the Board requires additional information to be provided), it is considered reasonable to assume an approach whereby piling would be installed in sections. Works would be carried out in that piled area and then the piles would be moved to the next area requiring same. It is estimated that each section would be approximately 50-100m in length and would be in place for a temporary period only. A reasonable estimate of this time is one month although this could be shorter or slightly longer depending on the specific ground conditions at each location along the perimeter as work proceeds.

A focussed impact assessment has been prepared in order to provide additional detail on the potential impacts from piling to birds and cetaceans that may arise in the event that this activity forms part of the construction technique. This assessment also sets out additional mitigation measures and monitoring proposals with respect to those potential impacts in the event that piling is used. The impact assessment is provided as part of an Addendum to the Natura Impact Statement (NIS), in keeping with the requirements of Item 1 of the RFI (See Schedule A attached).

The content takes into account the Board's RFI and also the content of the National Parks and Wildlife Service's (NPWS) submission on the planning application. Particular consideration has been given to the potential noise levels associated with piling, potential receptors (including breeding birds of conservation interest, which may transit the site), and the likely extent of impacts arising from noise generated by piling activities. Mitigation measures focused on mitigating potential impacts from piling are included and *inter alia* comprise the appointment of a Marine Mammal Observer, the need to incorporate 'soft start' methods when piling, the use of Passive Acoustic Monitoring Systems and the need to set out a monitoring framework, particularly during the construction phase. The impact assessment concludes that all impacts on cetaceans and birds as a result of proposed development will be of negligible magnitude and negligible significance.

While the Board seeks the assessment to be carried out under the NIS heading and as such the information is presented as an Addendum to same, the impact assessment should also be considered as an Addendum to the EIS where applicable.

As part of the Monitoring Framework for the site, birds and cetaceans will be monitored pre-, during and post-construction in the event that piling takes place. As a detailed decision on the requirement for piling will not be taken until detailed design and contractor appointment, the proposed pre-construction surveys will take place post receipt of planning permission.

Item 2: Section 4.5.2 – This section should be elaborated upon to include framework details of a monitoring programme for the long term end use and aftercare.

Additional detail on the monitoring proposals set out in Section 4.5.2 of the NIS is included within the Addendum to the NIS (See Schedule A).

It should be noted that some aspects of the monitoring programme framework provided (i.e. post-construction bird monitoring) overlap with the response to Item 1 above, however, the proposed long-term monitoring proposals are not tied into the scenario whereby piling is employed during the construction phase. The detail presented provides a framework, as requested, and will be updated as necessary on receipt of planning permission.

With respect to the future use of the site by wildlife specifically, the introduction confirms that the applicant, in conjunction with the NPWS, will adaptively manage the site to maximise its potential as a roost area in the end-use, maintenance and aftercare phase.

Item 3: The applicants attention is drawn to a missing reference (Cronin et al), please amend accordingly.

The reference that was omitted in error from the Natura Impact Statement is as follows:-

> Cronin, M., McGovern, E., McMahon, T. and Boelens, R. (2006) *Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters*, Marine Institute/Department of Communications, Marine and Natural Resources.

A revised References section is included in the Addendum to the NIS at Schedule A.

Environmental Impact Statement

Item 4: Section 2.6 and Appendix D to be revised to include further details of planning permissions directly relating to the site, details of the precise locations and physical extent of the permissions/approvals granted, and shall include if possible the original site plans, with particular reference to permissions ref. 77 1907 and 70 1507.

Section 2.6 and Appendix D of the Environmental Impact Statement (EIS) have been revised to include additional details of the planning permissions directly relating to the site, with particular reference to Pl. Reg. Ref. 77/1907 and 70/1507 as requested. Additional detail has also been provided with respect to Pl. Reg. Ref. 97/4031, which permitted a sea wall at the East Tip itself and reference has been made to Pl. Reg. Ref. 64/1246 (the planning permission for Haulbowline Bridge) within Section 2.6 of the EIS, as the planning application boundary for the current proposal includes the bridge. The revised Section 2.6 and Appendix D are provided in Schedule B, in the form of EIS Addendum 1: Revised Planning Context Section and EIS Appendices Addendum 1: Revised Appendix D – Planning and Licensing History.

The location and physical extent of the permitted developments relating directly to the site are shown on a new figure, Figure 2.1: Extent of Previous Permitted Development at the Subject Site, which is also provided within EIS Addendum 1 (See Schedule B). The original planning application documents for the planning references in question are unavailable; the information used to inform the preparation of Figure 2.1 is from microfiche copies of the planning applications held by Cork County Council and black and white prints of same, which are of variable quality. While every effort has been made to ensure that the detail presented is as accurate as possible, RPS cannot guarantee the precision of the information presented. Where possible, copies of the prints of the relevant site layout drawings have been provided for the Board's reference.

Item 5: Chapter 7 shall be amended to include an assessment of the impact of the proposed works to any commercial or leisure fisheries (including shellfish fisheries) within Cork Harbour.

The potential impacts on fisheries are discussed in Chapters 7 'Community and Socio-Economics' and 14 'Ecology' of the EIS. This information has been consolidated and supplemented and is provided as Schedule C EIS Addendum 2: Addendum to Chapter 7 – Fisheries Impact Assessment. The impact assessment concludes that potential impacts on commercial and recreational fisheries from the construction phase are of minor significance and negligible impact and of a temporary nature and that in the long-term, a positive impact on fishing/shellfish harvesting in the area is predicted due to the predicted improvement in the quality of harbour waters.

Item 6: Chapter 9 (Figures 9-1 and 9-2) – Details of an air quality monitoring point in, or in the vicinity of, the village of Shanbally shall be included.

Figure 9.1 of the EIS shows the locations at which air quality monitoring was undertaken for the Air & Climate Impact Assessment prepared for the proposed development. Therefore, Figure 9.1 is not required to be updated.

An additional air quality monitoring point has been identified at Shanbally. The proposed additional monitoring point will be located adjacent to the public road at Shanbally village and is indicated on a Revised EIS Figure 9.2: Proposed Remediation Air Modelling Locations. The original Figure 9.2 as submitted with the EIS has been updated to show the additional air quality monitoring point, which is identified as point 'AA6' thereon. It is proposed that dust deposition monitoring will be undertaken at AA6. The revised EIS Figure 9.2 is included as Schedule D.

Item 7: Chapter 15 – Additional information with regard to the potential impact on the 'convicts causeway' archaeology feature. The additional information should clarify if visible remains of this feature can be identified around the site at low tide and if it can be identified, specific proposals for its recording during works shall be included.

In relation to the first part of the above, i.e. '*the additional information should clarify if visible remains of this feature can be identified around the site at low tide*,' we wish to clarify that no visible remains of the 'convicts causeway' feature were identified during archaeological fieldwork (including intertidal survey and dive survey) completed in 2012.

As outlined in Section 15.3.1.1 of the EIS, 'Cartographic Sources and Images', the causeway is most clearly recorded on the Ordnance Survey 1912 map, which is reproduced as part of Figure 5 of the 'Archaeological Intertidal and Underwater Assessment' contained in Appendix P of the EIS. The feature does not appear on the mid-1800s OS map, but is indicated on a painting of c.1870s, which is also included as part of Figure 5 of the afore-mentioned report in EIS Appendix P. The causeway above water appears to have been a timber construction, supported by pairs of upright posts that extended down to the seabed.

The information indicates that the causeway extended from the marine yards on Haulbowline's reclaimed eastern half, across to Spike Island, where it appears to have been merged into the end of the island's pier. Today, the line of the causeway as it crosses the East Tip is not visible because this area is buried under the waste. A stone mass forms a short extension from the southeast corner of the East Tip.

Consideration was given to the causeway during the on-site assessment. Field inspection concluded that the line of the causeway as it crosses the East Tip is not visible because this area is buried under the waste. There is a stone mass (with a metal pipe), unrelated to the causeway, in this area that forms an extension from the southeast tip of the East Tip. The stone mass feature appears to terminate just below the Low Water Mark. There was no indication of timber piles or associated features that may have supported an earlier walkway above the waterline. When the area of the stone mass is overlaid with the line of the causeway recorded on the 1912 OS Map, they appear to occupy the same area (see Figure 2 'Archaeological Intertidal and Underwater Assessment' of Appendix P, where these elements are overlaid). Therefore, if the causeway survives in that area, it may lie underneath the stone mass.

The seabed is however very sandy and is an ideal entrapment area, where siltation and natural processes could readily bury low-lying features in sand. Although there were no visible remains of the causeway in terms of timber piles, it is possible that such features survive as eroded bases underneath the covering sands below the Low Water mark. It is also possible that remnants of the causeway survive on land, under the waste.

To respond to the second part of Point 7 regarding 'the specific proposals for its recording during works', where the proposed development coincides with the line of the causeway, it is proposed that an aarchaeological investigation take place within the development footprint in advance of construction works under licence from the DAHG. The investigation will be led by an archaeologist experienced in maritime archaeology who would clarify whether there are elements of the original causeway buried in the area. If elements of the original causeway are found, then further mitigation would include a full archaeological excavation of the features within the development footprint for preservation by record. This work will include manually cleaning-down the exposed features to ascertain their extent within the works area; describing the features exposed; and photographing and recording in plan the features exposed. If it is not possible for the construction works to avoid the material, and subject to the approval of the National Monuments Section at the DAHG, full excavation will be carried out of the features within the development footprint, to present a detailed record of the features.

Generally, to mitigate the possibility that elements of the original causeway or other material are revealed during development works, construction works will be archaeologically monitored, under licence from the DAHG. The monitoring archaeologist will be experienced in maritime archaeology. In the event that material of archaeological significance is observed, full archaeological recording will take place (as outlined in the paragraph above).

Item 8: An assessment should be included of the potential impact on rising sea levels on the proposed armoured shoreline.

This item requests further information comprising "*an assessment … of the potential impact on rising sea levels on the proposed armoured shoreline*". We also note the content of the National Parks and Wildlife (NPWS) submission which states that it "*is recommended that the armoured shoreline protections is confirmed to be sufficiently high to take into account sea-level rise predictions based on up-to-date climate change models, in order to avoid erosion of the toe of the waste capping layers*."

We refer the Board to Section 5.3.1.5 of the EIS, which considers sea level rise in terms of the mid-range and high-end climate change scenarios as recommended by the OPW. Design sea levels as outlined in the EIS are based on the latest available hydraulic modelling studies for Cork Harbour, namely the Irish Coastal Protection Strategy Study and the Lee Catchment Flood Risk Management Study as referenced within the EIS. Furthermore the estimates for sea levels rise are based on current OPW guidance in this regard.

In relation to the design of the armoured shoreline (part of the Perimeter Engineered Structure) around the East Tip as described in this EIS, the top of the sloped rock armour protection is proposed to be constructed at a level of +3.5mOD. This level is just under the maximum recorded sea level in the vicinity of the site, i.e. +3.54mOD Malin Head, recorded in 1962. This level is more than 1.5m above the Highest Astronomical Tide level in the area (+1.912mOD) and is over 0.2m above the mid-range climate change scenario for the area.

In addition a minimum depth of approximately 1.3m of capping and topsoil will be placed over this rock armour level. Therefore the minimum height of the finished ground level around the perimeter of the East Tip will be at least +4.8mOD. This is more than 1m above the high end climate change design water level.

The detailed design of this structure will take account of the sea levels including climate change as presented in the EIS. To clarify, this detailed design will also include measures to reduce the risk of erosion of the toe of the capping layers covering the waste.

Item 9: EIS and NIS – Both these documents should be amended to include framework details of a before and after construction sediment sampling programme based on the selected sample points identified in the Detailed Quantitative Risk Assessment Report (WYG 2013) (Appendix A Volume 3 of the EIS).

A before and after construction sediment sampling programme has been provided in the Addendum to the NIS (See Schedule A) and in EIS Addendum 3: Construction Sediment Sampling Programme, which is provided in Schedule E. The sampling programme is based on six monthly sediment sampling to be undertaken at the 6 monitoring sites for marine sediment quality identified as showing exceedances in Figure 15 of the "Environmental Assessment of the East Tip area of Haulbowline Island" by White Young Green (2008) and reported on in the in the DQRA (WYG, 2013) report.

Other: Flood Risk Management

While the Board's Request for Further Information does not specifically refer, we note the content of the submission to the Board from the Office of Public Works (OPW) in relation to flood risk management.

The Flood Risk Assessment (FRA) for the proposed development was completed based on the principles outlined in the *Flood Risk Management Guidelines for Planning Authorities* published in November 2009 (OPW/DEHLG). Furthermore, the vulnerability of the proposed end use to flood risk (i.e. Open Space and Amenity Uses are classified as Water Compatible Development) was identified with reference to these Guidelines, see Section 5.3.1.5 of the EIS.

We note that the OPW welcome the flood level reference and detail contained in Section 5.3.1 of the EIS. However, the submission requests that additional detail is provided to outline the *Flood Risk Management Guidelines'* Planning Principles in relation to the development, referencing the outcomes of the FRA included in Section 5.3.1.5.

The Planning Principles set out in the *Flood Risk Management Guidelines* are set out as follows in the OPW submission:-

> *"The Guidelines highlight the need for a Sequential Approach to managing flood risk. This incorporates; the need to identify flood risk at as earliest stage as possible. Development shall be in areas with minimal risk or avoid* [*sic*]*. Appropriate land use shall be incorporated in zoning development areas otherwise unavoidable. A precautionary approach shall be implemented to reflect uncertainty in flood risk.*

The Guidelines place a firm onus on local authorities to avoid, mitigate or manage flood risk and for Development Plans of a certain type, it recommends the need for defining three flood zones for this purpose so as to allow for the application of the Guidelines Planning Principles using a Sequential Approach and where appropriate Justification Test, when zoning development in relation to flood risk."

Based on the *Guidelines* the 10%, 0.5% and 0.1% Annual Exceedance Probability (AEP) flood levels define Flood Zones A, B and C respectively. These levels, based on the latest coastal modelling as included in the Irish Coastal Protection Strategy Study, Phase III, Work Package 2, 3, and 4A Report (IBE0071/South_Rev04) completed by RPS on behalf of the OPW in 2011 are:-

- Flood Zone A (10%AEP) = 2.45mOD.
- Flood Zone B (0.5%AEP) = 2.73mOD.
- Flood Zone C (0.1%AEP) = 2.88mOD.

Drawing 18, as provided in Schedule F, indicates Flood Zones A, B and C as requested by the OPW.

The Sequential Approach was considered in preparing this development in accordance with these Guidelines. In particular, the flood risk in the area was identified and the development was progressed to minimise or avoid this risk. Firstly, it should be noted that there are no alternative locations with respect to the remediation aspect of the development proposal.

It is noted that the minimum finished ground levels (3.9mOD to 9.4mOD), as indicated on Drawing MCE0734/DG0014 Rev P02, will be significantly in excess of these levels throughout the proposed development. Therefore the finished site will be located entirely outside of the flood plain as the finished levels will not be below Flood Zone C.

Notwithstanding this, the proposed development has low vulnerability to flood risk. Furthermore, as the area is tidal and any encroachment below the high water mark will be minimal in the context of the area of Cork Harbour, the completion of this development will not increase flood levels elsewhere.

In their review of the Engineering Report the OPW requested more detail in relation to the calculation of Greenfield runoff rates for this site. The greenfield runoff calculations are based on IH124 methodology and calculations are included in Schedule G.

We highlight that conservative assumptions are applied to this calculation and that the factorial standard error and climate change factors are also not applied to estimate the 100 year greenfield runoff. These assumptions would result in a lower greenfield runoff rate than that which would be suggested by other methods, such as the Modified Rational Method. As this calculation is used to select a limiting discharge at the outfall from the site this approach is judged appropriate and conservative.

RPS

CONCLUSION

Having regard to the foregoing, we respectfully submit that the information supplied with the further information response addresses the matters raised by An Bord Pleanála.

Yours faithfully,

Michelle Bennett

Michelle Bennett
Associate Director
For and on behalf of RPS
MB/CC

Encl.

Schedule A: Addendum to Natura Impact Statement

Schedule B: EIS Addendum 1: Revised Planning Context Section
EIS Appendices Addendum 1: Revised Appendix D – Planning and Licensing History

Schedule C: EIS Addendum 2: Addendum to Chapter 7 – Fisheries Impact Assessment

Schedule D: Revised EIS Figure 9.2

Schedule E: EIS Addendum 3: Construction Sediment Sampling Programme

Schedule F: Drawing A: Flood Risk Zones

Schedule G: Greenfield Runoff Calculation

SCHEDULE A

ADDENDUM TO NATURA IMPACT STATEMENT

PART 1

East Tip Remediation Project

Addendum to Natura Impact Statement: Impact Assessment of Piling Construction Option on Birds and Cetaceans

DOCUMENT CONTROL SHEET

Client:	**Cork County Council**					
Project Title:	**East Tip Remediation Project**					
Document Title:	**Addendum to Natura Impact Statement: Impact Assessment of Piling Construction Option on Birds and Cetaceans**					
Document No:	**MCE0734RP0005A**					
This Document Comprises:	**DCS**	**TOC**	**Text**	**No. of Appendices**	**List of Figures**	**List of Tables**
	1	**1**	**32**	**1**	**0**	**0**

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F01	Final	JM	M. Bennett C.Cahill	L. O'Toole	Cork	14.02.14

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NON-TECHNICAL SUMMARY – IMPACT ASSESSMENT OF PILING CONSTRUCTION OPTION ON BIRDS AND CETACEANS

This document is a Non-Technical Summary of a more detailed response to An Bord Pleanála's (ABP) Request for Further Information (RFI) dated 17th January 2014 in which they request that a full assessment of the impact on birds and cetaceans for the piling construction option be carried out. Piling was included in the project description in the event the detailed design of onsite construction requirements resulted in a need for piling to be carried out. Piling is proposed as a possible mitigation option for the enclosure of works in the foreshore to prevent contamination being released into the surrounding waters. The details of piling required and/or the type of sheet piling required will be determined at the detailed design stage.

The potential impacts to birds and cetaceans have been assessed within the East Tip Remediation Project EIS and NIS in relation to construction and piling activity. The East Tip Remediation Project EIS Chapter 14 'Ecology' and the Natura Impact Statement and Annex IV Species Assessment have considered:-

- Construction Noise impacts on marine mammals and birds;
- Visual and Lighting disturbance to marine mammals and birds;
- Physical disturbance to species due to changes in vessel activity in the area;
- Effect of increased suspended sediments and sedimentation on the behaviour of marine mammals during works and any proposed piling; and
- Indirect effects of prey availability due to changes in the fish and shellfish resources as a result of the proposed construction works.

The EIS and NIS concluded that the potential impacts of the works on these factors is of *negligible magnitude* and *negligible significance* and, where relevant, mitigation measure have been proposed.

In response to the ABP RFI, an Addendum to Chapter 14 of the EIS and the NIS was prepared. The Addendum is intended to address the specific issues in relation to piling operations and associated potential impacts. The main marine interaction with birds and marine mammals from piling operations is marine noise. In response to the ABP RFI and to ensure the completeness of the impact assessment the Addendum addresses the potential impacts of noise from piling on marine mammals and birds, in the event that this construction technique is used on site. The interactions that could occur from piling in addition to those already considered during the construction phase of the development are:-

- Submarine acoustic noise disturbance to marine mammals, in particular during the piling activity;
- Noise and disturbance to diving birds in particular during the piling activity; and
- Noise and disturbance to fish as a prey for birds and cetaceans in particular during the piling activity.

The noise generated from piling in the marine environment is dependent on the type of pile, the installation method and the substrate. Piling is to create short section (50-100m) cofferdam areas as a mitigation measure, within which perimeter construction can be undertaken with minimal risk of sediment re-suspension or contaminant release into the water columns during construction. Piling is estimated at 70 days including a 20 day contingency and the piling will be non-continuous, with piling being installed for a section of the works following which the piles will be removed and used in the next section of the works. 20 days were estimated for piling removal.

In assessing the potential for noise disturbance to cetaceans and birds, and considering the potential impacts on their prey (fish) the potential for piling to cause physical or auditory damage was assessed, as well as the potential for behavioural disturbance causing startle responses.

The assessment of the site assumes a worst case that the piles would be driven into water. Given that the piling is most likely to occur on exposed intertidal areas and not in water, and that the site construction plan includes the use of sediment screening which may not only assist to dampen the noise but also well ensure species cannot access the works, the potential for piling to injure cetaceans or birds is negligible.

The behavioural response at which avoidance of the site is likely was 735m, (vibration installation) and 858m (impact installation). These areas would not form a barrier effect within the channel, and were not considered significant as there is little evidence for any cetacean usage of the East Tip area, and minimal current bird usage of the site with not significant bird habitat located at the East Tip.

As a result the impacts from piling with regard to cetaceans and birds were considered negligible and the overall effect of the site remediation is an improvement in water quality and habitat for these species.

IMPACT ASSESSMENT OF PILING CONSTRUCTION OPTIONS ON BIRDS AND CETACEANS

1. INTRODUCTION

This Addendum to the Natura Impact Statement (NIS) provides further information in response to An Bord Pleanála's Request for Further Information (RFI) dated 17th January 2014 in relation to the effects on the environment of the proposed East Tip Remediation Project. This report specifically responds to item 1 of the RFI, which states:

> *"Item 1: Section 4.5.1 - A full assessment of the impact on birds and cetaceans for the piling construction option is required. Framework details of a before and after monitoring programme shall be outlined in the event that the construction technique is used."*

At the outset it should be noted that there are no definite plans to carry out piling operations during the development process. Piling is considered as only one of a number of possible options. Furthermore, should piling occur, it is likely to be installed and removed in stages with each stage in place for a temporary period only. Further detail is provided in Section 1.1 below.

The assessment is based on the baseline environment of cetaceans (dolphins, whales and porpoises) birds and fish as characterised by their distribution and abundance in the East Tip Remediation Project Environmental Impact Statement (EIS) and on information provided in and the conclusions of the East Tip Remediation Project Natura Impact Statement (NIS). This addendum to the NIS (and EIS as required) is an impact assessment of potential piling operations at the site, with particular focus on birds and cetaceans. Framework details of a monitoring programme are set out in Section 6.5 herein, as requested in the RFI.

1.1 DESCRIPTION OF PROPOSED CONSTRUCTION METHOD USING PILING

The EIS states:-

> *"If required piling will be in the form of both sheet piles and/or tubular steel piles, with diameters varying between approximately 800mm and 1500mm. Piles will be installed by driving, although there may also be a need for drilling to assist in installation of piles. Full details of piling activity will be determined at the detailed design stage."*

The piling is proposed as only one option for the temporary enclosure of sections of the site to allow construction of the Perimeter Engineered Structure (PES) and was included in the project description in the event the detailed design of onsite construction requirements resulted in a need for piling to be carried out. In this event, piling is proposed as a mitigation option for the enclosure of works in the foreshore to prevent contamination being released into the surrounding waters during construction of the PES. The details of piling required and / or the type of sheet piling required will be determined at the detailed design stage.

For the purposes of the assessment of the impacts on birds and cetaceans, it is considered reasonable to assume an approach whereby piling would be installed in sections. Works would be carried out in that piled area and then the piles would be moved to the next area requiring same. It is estimated that each section would be approximately 50-100m in length and would be in place for a temporary period only. A reasonable estimate of this time is one month although this could be shorter or slightly longer depending on the specific ground conditions at each location along the perimeter as work proceeds. Piling would occur predominantly at low tide.

Once construction is completed in that section, the piles will be moved and the next section will be enclosed. It is anticipated that pile driving would occur in stages; installation activities would be expected over approximately 70 days (including 20 days contingency) and 20 days has been estimated for pile removal over the course of the project. These activities would not be continuous given the likely phased approach to works and all activities will be monitored by the Environmental Clerk of Works on site.

The potential impacts to birds and cetaceans have been assessed within the East Tip Remediation Project EIS and NIS in relation to construction and piling activity. The East Tip Remediation Project EIS Chapter 14 'Ecology' has considered:-

- Construction Noise impacts on marine mammals and birds;
- Visual and Lighting disturbance to marine mammals and birds;
- Physical disturbance to species due to changes in vessel activity in the area;
- Potential impacts of increased suspended sediments and sedimentation on the behaviour of marine mammals during works and any proposed piling; and
- Indirect impacts of prey availability due to changes in the fish and shellfish resources as a result of the proposed construction works.

The EIS concluded that the potential impacts of the works on these factors are of *negligible magnitude and negligible significance* and where relevant, mitigation measures have been proposed.

This Addendum is intended to address the specific issues in relation to piling operations and potential impacts. The main marine interaction with birds and marine mammals from piling operations is marine noise. In response to the An Bord Pleanála (ABP) RFI and to ensure the completeness of the impact assessment this Addendum addresses the potential impacts of noise from piling on marine mammals and birds, in the event that this construction technique is used on site. The interactions that could occur from piling during the construction phase of the development are:-

- Submarine acoustic noise disturbance to marine mammals, in particular during the piling activity;
- Noise and disturbance to diving birds in particular during the piling activity; and
- Noise and disturbance to fish as a prey for birds and cetaceans in particular during the piling activity.

This addendum will outline the baseline conditions, the risks from noise generated, evaluate the likely noise generated from piling use and conduct an impact assessment. Mitigation and suitable controls in relation to these interactions are also suggested.

Annex 1 to this addendum characterises the likely noise generated from piling activities on the site.

2. RELEVANT LEGISLATION

This assessment has been conducted to assist An Bord Pleanála in determining the potential interactions with cetaceans and birds under the following legislation.

2.1 CETACEANS

Cetaceans are protected under Annex IV of the EC Habitats Directive (92/42/EEC) because they are endangered, vulnerable or rare. Harbour porpoise and bottlenose dolphins are Annex II species for which Special Areas of Conservation (SAC) are designated by Member States to ensure their protection and for the conservation of habitats that are essential to their life and reproduction. The Appropriate Assessment process has evaluated these sites through a Natura Impact Statement and determined them as not significantly at risk from the project.

All species of cetacean are listed in Annex IV of the EC Habitats Directive, and are protected by law from deliberate capture, injury or killing, deliberate disturbance, or damage to a resting place. There is currently no SAC designated for cetaceans within the study area. The Natura Impact Statement included an Article 12 Assessment for Annex IV species and determined cetaceans as not significantly at risk from the project.

2.2 BIRDS

Birds are protected under the Birds Directive. There are a number of SPAs within the wider Cork Harbour area. The European Communities (Birds and Natural Habitats) Regulations 2011 consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats)(Control of Recreational Activities) Regulations 2010, as well as addressing transposition failures identified in judgments of the Court of Justice of the European Union (CJEU). An Appropriate Assessment process through a Natura Impact Statement has evaluated these sites and species as not significantly at risk from the project.

2.3 FISH

Fish have been considered separately under the EIS in terms of their ecology (Chapter 14) and as a resource for fisheries (Addendum - Impact Assessment of Fisheries). This section will only review the potential interaction with noise with respect to their function as prey for marine mammals and birds.

3. METHODOLOGY

This addendum has been compiled to address potential impacts in relation to the proposed option for use of piling onsite and the potential impacts on cetaceans and birds.

The evaluation and the impact assessment in relation to piling impacts not fully assessed within the EIS has been conducted by:-

- Baseline descriptions of the species occurrence from the EIS including a detailed literature review to characterise the marine mammal ecology of the Haulbowline and surrounding area.
- A detailed review of the published literature on the effects of noise on marine mammals and birds.
- A determination of the potential impacts of the noise generated on site in relation to the hearing thresholds of birds and cetaceans based on noise attenuation assessment and analysis of published sources.
- An assessment of the zones of noise in relation to the proposed works and the thresholds for cetaceans and birds.
- An assessment of the effects on fish as a prey species for cetaceans and birds, including the distance assessment in relation to disturbance thresholds.
- An assessment of the likely impacts, residual impacts and suggest the relevant mitigation for this interaction.

No specific marine mammal surveys were conducted to inform this characterisation on the basis that historic records indicated very low numbers of marine mammals in the study area. In order to provide spatial and temporal information on marine mammals within the study area, several sources of information were used including broad scale data sources (e.g. the Atlas of cetacean distribution in northwest European waters[1] and the SCANS studies[2,3]).

A detailed review of the published literature on piling and noise generation, from which the likely impacts from the operations on site have been identified, has been carried out and is included in **Annex 1**.

Steel sheet pile (SSP) wall is a common wall type to facilitate deep excavations and enclose marine construction activities. Sheet piles are usually interlocking steel “AZ” type piles that are typically about 0.6 meters wide and vary in length depending on the particular site conditions and requirements. They are commonly used to construct walls and cofferdams in marine environments.

[1] Reid, J., Evans, P.G.H.and Northridge, S. (Eds) (2003). *An atlas of cetacean distribution on the northwest European continental shelf*. Joint Nature Conservation Committee, Peterborough.

[2] Hammond, P. S., Berggren, P., Benke, H., Borchers, D. L., Collet, A., Heide-Jorgensen, M. P., Heimlich, S., Hiby, A. R., Leopold, M. F. and Øien, N. (2002). *Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters*. Journal of Applied Ecology, 39 (361-376).

[3] Hammond, P.W. (2006) *Small cetaceans in the European Atlantic and North Sea*. Final report submitted to the European Commission under project LIFE04NAT/GB/000245. 55pp. Available from http://biology.st-and.ac.uk/scans2/inner-finalReport.html

These piles are usually installed using a vibratory driver/excavator and the noise generated is dependent on the substrate the piles are driven into. Piling on site will preferably be conducted by vibro driving, however impact or excavator installation may be used. A summary of sound pressures is outlined in Table 1.

Table 1: Summary of Near-Source (10-Meter) Un-attenuated Sound Pressures for In- Water Pile Installation

			Average Sound Pressure Measured in dB		
	Pile Type and Approximate Size	**Relative Water Depth**	**Peak**	**Root Mean Square (RMS)**	**Sound Exposure Level (SEL)**
Vibratory Driver/ Extractor	0.30 meter (12-inch) Steel H-type	<5 meters	165	150	150
	0.30 meter (12-inch) Steel Pipe Pile	<5 meters	171	155	155
	0.6 meter (24-inch) AZ Steel Sheet –Typical	~15 meters	175	160	160
	0.6 meter (24-inch) AZ Steel Sheet –Loudest	~15 meters	182	165	165
Impact Hammer	0.30 meter (12-inch) Steel H-type - Thin	<5 meters	190	175	160
	0.30 meter (12-inch) Steel H-type - Thick	~5 meters	195	183	170
	0.6 meter (24-inch) AZ Steel Sheet	~15 meters	205	190	180

4. BASELINE DATA

The following section summarises the baseline data for birds and cetaceans onsite from the NIS and EIS (Chapter 14).

4.1 CETACEANS

Whilst there have been very occasional records of other cetacean species such as common dolphin (*Delphinus delphis*) and orca (killer whale; *Orcinus orca*) (June 2001) in Cork Harbour, only two species occur, or are likely to occur, on a regular basis: harbour porpoise and bottle-nosed dolphin; both are listed under Annexes II and IV of the Habitats Directive. Between February 2006 and March 2011 a pod of six bottle-nosed dolphins were regular visitors to the Outer Cork Harbour area. None have been observed in the vicinity or Cobh or Haulbowline. Table 2 (Table O1-2 of the East Tip Remediation Project EIS Appendix O) outlines the species present in the region.

Table 2: Cetacean Observations in SW Ireland (Reid et al., 2003; DCENR, 2011; O'Cadhla et al., 2004 and IDWG, 2011)

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Common Dolphin	The most frequently recorded dolphin species in Irish waters. Present in the Celtic and Irish Sea, predominantly in the summer and early autumn (Reid *et al*., 2003). Most abundant and breeding along the south and south west coasts of Ireland.											
Bottle-Nosed Dolphin	Found in all Irish coastal waters and are the second most frequently recorded dolphin species in Irish waters. They occur inshore around all Irish coasts with a semi-resident groups historically reported outside Cork Harbour and at Kenmare (O'Brien et al 2009). They also occur offshore in the Celtic Sea and in the Irish Sea. They are present year round and breed in Irish waters. Inshore and offshore ecotypes may exist.											
Risso's Dolphin	Continental shelf species. Recorded throughout the year in Irish waters with a wide distribution (Aecom & Metoc, 2010). Some seasonal movements apparent (Baines & Evans 2009). Occasionally, observed inshore and in bays along the southwest and southeast coasts (NPWS, 2008). Regularly occurring in the southern and central Celtic Sea (Baines & Evans 2009). Breeds in Irish waters.											
Harbour Porpoise	Ireland's only porpoise species. Abundant in the inshore waters throughout the year along the south and southwest coasts. Breeds in Irish waters. Occurs throughout the Irish and Celtic Sea with some large aggregations noted off the south coast in the Autumn months. Some evidence for an offshore movement in spring between March and June (IWDG, 2010b) which may be linked to calving.											
Killer Whale						Observed off all coasts and in the Irish Sea. Inshore sightings tend to increase during late summer and autumn (Berrow *et al*., 2010).						
Fin Whale					The majority of inshore sightings come from counties Cork, Waterford and Wexford (Berrow *et al*., 2010). These species move inshore in early summer between May and June with a regular peak in sightings during November in west Cork. A single sighting (2007) within Cork Harbour of an individual later believed to have stranded. There has only been one recorded sighting in the area from 2000-2009 (IWDG,2011)						
Key		Absent		Present								

4.1.1 Marine Mammals Site Data

A detailed literature review was undertaken to characterise the marine mammal ecology of the Haulbowline and surrounding area. No specific marine mammal surveys were conducted to inform this characterisation other than observations collected during field surveys (see Section 14.3.7.2 of EIS) on the basis that historic records indicated very low numbers of marine mammals in the study area. In order to provide spatial and temporal information on marine mammals within the study area, several sources of information were used including broad scale data sources (e.g. the Atlas of cetacean distribution in northwest European waters[i] and the SCANS studies[ii,iii]).

During site visits and walkovers, no species were observed. Anecdotal evidence suggested adult seals occasionally travel along the south side of the island to access areas inshore of the location.

4.2 BIRD SPECIES

4.2.1 Breeding Birds Within the East Tip Site

The site provides suitable breeding habitat for a very limited number of bird species. Table 3 (Table O1-3 of the East Tip Remediation Project EIS Appendix O) presents details of the bird species recorded at the site during the site visit on the 14th August 2012, and includes species which were not recorded during the site visit, but for which potentially suitable breeding habitat is present at the site.

Table 3: Bird Species Recorded During Field Survey, 14th August 2012; and Bird Species Likely to Breed at the Site

Common Name	Scientific Name	Number Recorded 14/08/12	Likely Breeding Status
Ringed Plover	*Charadrius hiaticula*	0	Possible but unlikely breeding species in spoil areas
Feral Pigeon	*Columbia livia* var. *domestica*	0	Likely breeding species in buildings
Rock Pipit	*Anthus petrosus*	0	Shoreline provides suitable breeding habitat, possible breeding species
Meadow Pipit	*Anthus pratensis*	0	Possible breeding species in better vegetated spoil areas and around sports field
Pied Wagtail	*Motacilla alba*	1	Likely breeding species in buildings and in spoil areas
Swallow	*Hirundo rustica*	1	Likely breeding species in buildings
Dunnock	*Prunella modularis*	0	Possible breeding species around the sports field
Robin	*Erithacus rubecula*	0	Possible breeding species around the sports field
Wren	*Troglodytes troglodytes*	0	Likely breeding species around the sports field, buildings and possibly in spoil areas
Wheatear	*Oenanthe oenanthe*	2	Possible but unlikely breeding species in spoil areas
Stonechat	Saxicola torquata	0	Possible breeding species in vegetated spoil areas and around the sports field
Song Thrush	*Turdus philomelos*	0	Possible breeding species around the sports field
Blackbird	*Turdus merula*	0	Possible breeding species around the sports field

Common Name	Scientific Name	Number Recorded 14/08/12	Likely Breeding Status
Jackdaw	*Corvus monedula*	0	Likely breeding species in buildings and other structures
House Sparrow	*Passer domesticus*	0	Likely breeding species in buildings and other structures
Starling	*Sturnus vulgaris*	30	Likely breeding species in buildings and other structures
Linnet	*Carduelis cannabina*	12	Possible breeding species around sports field
Goldfinch	*Carduelis carduelis*	20	Unlikely to breed

The breeding bird community of the site consists of common bird species of lowland Ireland; the site does not support habitats that are suitable to be of importance to any breeding bird species of high conservation concern or of limited range.

4.2.2 Breeding Birds from Outside the East Tip Site

Common Terns breeding at both the Deep Water Port at Ringaskiddy and at the Martello Tower between Fota Island and Great Island feed in the vicinity of Great Island, particularly to the east at the Spit Bank, which is located approximately 1km from the site. Breeding Common Terns are present in the area during the period between early April and late August each year.

Other bird species which breed locally and on occasion use the area around Haulbowline Island for feeding include Grey Heron and Little Egret.

4.2.3 Non-Breeding Birds

During autumn and winter, and to a lesser extent at other seasons, Cork Harbour supports Internationally Important populations of non-breeding waterbirds. The shoreline of the site provides limited feeding habitat for various species of gulls, waders and other waterbirds; however the relatively undisturbed and remote situation of the shoreline around site makes it potentially suitable as a high tide roost location for these species. This possibility was investigated by conducting a series of high tide surveys of the shoreline of the East Tip between October 2012 and January 2013. Table 4 (Table 14.4 of the East Tip Remediation Project EIS) presents results of these surveys.

Table 4: Usage of Haulbowline East Tip site by Waterbirds during Winter 2012/2013

Species	23rd Oct	9th Nov	23rd Nov	4th Jan
Grey Heron	0	1	3	0
Little Egret	0	3	0	0
Sanderling	2	0	0	0
Snipe	0	0	5	0
Redshank	0	3	0	0

Results of the survey indicate that very small numbers of birds roost along the shoreline of the site, and indeed, all of the Grey Herons and one of the Little Egrets that were recorded were feeding rather than roosting. Hence, it is concluded that the site is not currently of any importance to roosting waterbirds (waders, gulls, ducks, herons, cormorants, etc).

The open water areas around Haulbowline are used for feeding by a range of species including, most frequently, Great Crested Grebe, Great Northern Diver, Gannet, Cormorant, Shag, Black-headed Gull, Common Gull, Mediterranean Gull, Kittiwake, Herring Gull, Lesser Black-backed Gull, Great Black-backed Gull, Sandwich Tern and Common Tern (see also Section 14.3.7 of the EIS). Ranges of other species are also recorded in the area on occasion.

5. ASSESSMENT OF POTENTIAL IMPACTS FROM PROPOSED PILING

This section provides an assessment of the potential impacts from the East Tip Remediation Project on marine mammals and birds.

This assessment has been prepared as a contingency measure in the event that piling should form part of the construction methodology of the detailed design solution. In considering the potential impacts from possible future piling operations within the EIS, it was concluded that a waterborne noise model was not considered necessary in view of the very low numbers of marine mammals and birds historically recorded within the site. Furthermore, the only significant potential source of significant construction noise was from piling and mitigation is proposed for same.

5.1 SUBMARINE ACOUSTIC NOISE DISTURBANCE TO MARINE MAMMALS

5.1.1 Marine Mammals and Noise

As outlined in Section 14.4.1.3.1 (page 14-26 of the EIS) sound plays an important role in the life-histories of marine mammals. Marine mammals use sound to communicate, find prey, avoid predators, and navigate about their environment. Anthropogenic noise which exceeds natural background levels has the potential to cause disturbance and, in extreme cases, injury to marine mammals. The effects of noise depend on the hearing sensitivity of a species together with the components of the noise itself (e.g. intensity, duration, frequency bandwidth) and the distance to the noise source. The range of potential effects will also be shaped by the physical and environmental parameters, including water depth, salinity and substrate. The impacts of underwater sound can be broadly summarised into three categories: physical injury and mortality, auditory damage (either permanent or temporary) and behavioural responses:-

- **Physical injury/fatality:** Intense underwater noise can have a severe effect on marine mammals from blast type injuries. Lethal effects may result in immediate mortality or physiological damage such that an animal is debilitated and mortality will ensue after a period of time. Lethal effects may occur where peak to peak pressure levels exceed 240dB re 1µPa, whilst physical injury may occur where peak to peak pressure exceeds 220dB re 1µPa.
- **Auditory damage:** Damage to auditory structures may either result from a single pulsed sound of high magnitude or from longer exposure to lower magnitude sound, depending on the frequency and duration. One potential effect is a shift in the threshold at which sounds can be detected, the level of which increases after a trauma and sounds can become more difficult to detect. The threshold shifts can either be temporary (TTS) or permanent (PTS) and it is likely that animals experiencing PTS will be unable to forage successfully, detect predators or navigate. As a result PTS may eventually lead to mortality. Noise levels at which TTS and PTS may occur are described below.
- **Behavioural responses:** At lower noise levels than those causing auditory injury, there may be behavioural effects on a species, of which the most significant would be avoidance of the ensonified area. Avoidance may have negative effects on an animal if it causes a migratory species to be delayed or diverted, inhibits feeding in an important foraging area, or generally leads to stresses on an individual that may reduce fitness and have biological consequences such as reduced breeding success. In other cases, avoidance of an area may have no effect on the individual, particularly where prey species are abundant or species are wide-ranging in nature showing no particular affinity for an area. The magnitude of effect also depends on the duration of avoidance and this is considered for each species for which there is a potential noise impact.

Richardson et al (1995) summarise the many studies of marine mammal hearing. In general terms the toothed whales, or Odontocetes, are known to communicate at frequencies from 1 kHz to greater than 20 kHz and to echolocate from a few kHz to typically 30-50 kHz although some species can produce higher frequency signals. Most Odontocetes have best hearing sensitivity in the many kHz range with their optimal hearing band dependant on species. Most of the underwater noise sources likely to be detected near the proposed construction will have dominant frequencies in the low kHz region, and for the signals produced inside the berm in the low hundred Hz region, thus will overlap poorly with Odontocete hearing. The most common dolphin likely to be found in the vicinity of the proposed construction, the bottlenose dolphin (*Tursiops sp.*) has an optimal hearing frequency range of ~15 kHz to 50 kHz. Thus the proposed noise sources will not overlap well with the hearing range of Odontocetes.

The hearing response of the larger baleen whales has not been determined by any experimental means, due to their size and the inherent problem of working with such large animals. But, the baleen whales are known to produce signals over the frequency range of tens Hz to many kHz and thus for most environmental noise assessment purposes are considered to hear down to lowest expected ocean ambient noise conditions in the 10 Hz to 1000 Hz range. The site location is such that any potential impact will be minimal due to the lack of presence of larger baleen whales.

All 'noise' can mask signals or make them more difficult to detect. Assessing how this will impact animals in the vicinity of the site is difficult and depends on many factors, such as:-

- The respective time history of the masking noise and the signals being masked – do the times of sound production/detection by animals potentially impacted overlap with the times of masking noise (i.e. daytime)?;
- The use made by animals in the vicinity of the East Tip of noise cues; and
- The frequency overlap of the masking noise and the signals of interest.

Of note here is that most Odontocete signals will not be masked at all by noise produced by the proposed construction as their frequency content is well above that of most noise produced.

The sensitivity of marine mammals to noise can be assessed by the following approach which is summarised below, i.e. the M-weighted SEL approach.

The approach considers the sound exposure level (SEL) over a given period, thereby accounting for both the Sound Pressure Level (SPL) at sound source and the duration the sound is present in the acoustic environment[4]. This method proposes a range of hearing for marine mammals in water within four main functional groups. For each group, auditory injury criteria for SEL and SPL have been proposed at which animals are likely to be sensitive to hearing damage. For the low, medium and high frequency cetaceans the criteria is given as an SEL of 183dB re 1μPa^2/s for the onset of behavioural effects and 198dB re 1μPa^2/s for the onset of PTS. For pinnipeds in water the SEL criteria is 171dB re 1μPa^2/s for behavioural effects and 186dB re 1μPa^2/s for PTS.

Table 5 presents the measured noise levels from piling operations at a number of Offshore Wind Farm (OWF) projects in the UK, including a number of projects from the Outer Thames Estuary. Also presented are the predicted marine mammal impact ranges for physical injury, auditory damage (TTS and PTS) and behavioural impacts. These predicted impact ranges were based on noise modelling

[4] Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R., Darlene, D.K., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A. and Tyack, P.L. (2007) *Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations.* Aquatic Mammals, 33:411-509.

studies to inform the EIAs for these wind farms and actual piling noise measurements collected during the construction phases of these wind farms. Physical injury ranges for harbour porpoise and common seal varied between 130m for a 7m pile and 10m for a 2.5m pile at the Galloper OWF site. The M-weighted SEL showed auditory injury ranges of 1.4km for high frequency cetaceans (i.e. harbour porpoises) and 16km for pinnipeds (i.e. seals) for a 7m pile and 3.2km for pinnipeds for a 2.5m pile. However, recent studies into the impacts of underwater noise on marine mammals suggest that there may be uncertainties associated with the M-weighted SEL approach, proposed by Southall *et al*. (2007), of using the 186dB re 1µPa^2/s for PTS in pinnipeds and that this approach may be over-precautionary. It has been proposed for recent OWF projects that the M-weighted 198dB re 1µPa^2/s PTS criteria (i.e. that used for cetaceans) should also be adopted for pinnipeds.

In the case of the East Tip site the species present can be assumed to have some acclimation to noise from anthropogenic sources. 150dB is used as a guideline for behavioural changes in cetaceans and other species. As can be seen in the table this represents the equivalent source of most vessel types at close proximity. At 10m the noise from inshore vessels, RIBS etc. is estimated at 118 dB in shallow water conditions (Southall *et al*. 2007). In the case of a busy harbour this is assumed to be the peak sub surface background noise exposure for most species.

Modelled behavioural impact ranges also varied from 24km (7m pile at Galloper OWF) to 4km (6m pile at Kentish Flats OWF Extension) for harbour porpoise and 12km (7m pile at Galloper OWF) and 2.1km (6m pile at London Array OWF) for common seal. The behavioural impact zones calculated from actual underwater noise measurements at OWF sites were considerably lower than those modelled ranges used to inform the EIAs. For harbour porpoises the behavioural impact zones ranged from 10km (4.7m pile at Barrow OWF) to 2.5km (4.3m pile at Kentish Flats) for harbour porpoises and 6km (4.7m pile at Barrow OWF) to 2.2km (4.3m pile at Kentish Flats) for common seal. The lower impact ranges may partly be explained by the smaller pile sizes used during construction than those used during the noise modelled studies.

In the case of this proposed development sheet piling and support piling, although unlikely to be used, will be 800 – 1500 mm, i.e. 25% of the scale of offshore piles and with consequently lower noise levels. The complex shallow bathymetry and seabed sediment will have a significant noise attenuation effect in comparison to the open water site outlined in Table 5.

Table 5: Summary of Noise Levels and Marine Mammal Impact Ranges Associated with Piling Projects in UK. Values Presented are Based on Noise Modelling and Actual Underwater Noise Measurements During Piling Operations

Offshore Wind Farm	Pile Diameter (m)	Source Level (Peak to Peak Unweighted)	Source Level (peak to peak dB_{ht}(species) @ 1m)	Physical Injury Range	Auditory Injury	Behavioural Impact Range, i.e. 90 dB_{ht} (species)
Based on Noise modelling						
Galloper	2.5				**M-weighted SEL approach** High frequency cetaceans 10m Pinnipeds 3200m	Harbour Porpoise 14km Common seal 6.5km
Based on underwater noise measurements						
North Hoyle	4	249dB re 1µPa^2 @ 1m	Harbour porpoise 191 Common seal 154			Harbour porpoise 9km Common seal 3km
Scroby Sands	4.2	257dB re 1µPa^2 @ 1m				
Kentish Flats	4.3	243dB re 1µPa^2 @ 1m	Harbour porpoise 201 Common seal 175			Harbour porpoise 2.5km Common seal 2.2km
Barrow	4.7	252dB re 1µPa^2 @ 1m	Harbour porpoise 199 Common seal 179			Harbour porpoise 10km Common seal 6km
Burbo Bank	4.7	249dB re 1µPa^2 @ 1m				Harbour porpoise 5km Common seal 3km

Sources:

Nedwell, J.R., Parvin, S.J., Edwards, B., Workman, R. Brooker, A.G., Kynoch, J.E. (2007) *Measurement and interpretation of underwater noise during construction and operation of offshore windfarms in UK waters*. Subacoustech Report No. 544R0738 to COWRIE Ltd. ISBN: 978-0-9554279-5-4.
RPS (2005) *London Array Offshore Wind Farm Environmental Statement Volume 1: Offshore Works*. London Array Ltd., Environmental Statement, 657pp
Global Renewable Energy Partnership (2002) *Kentish Flats Offshore Wind Farm Environmental Statement.* Prepared by EMU Ltd. August 2002, 297pp.
Royal Haskoning (2011). *Galloper Wind Farm Project Preliminary Environmental Report - Chapter 15: Marine Mammals.* June 2011 87 pp
Parvin, S.J., Nedwell, J.R. Workman, R. (2006) *Underwater noise impact modelling in support of the London Array, Greater Gabbard and Thanet offshore wind farm developments.* Subacoustech Report No. 710R0515
Vattenfall (2011) *Kentish Flats Offshore Wind Farm Extension Draft Environmental Statement: Section 11: Marine mammals*, 50pp

Table 6: Representative Levels of Noise from Other Marine Anthropogenic Sources present in Cork Harbour

Noise Source	Frequency Range(Hz)	Underwater Noise Level (dB re 1 µPa)
Small vessels[1]	250–6,000	151 dB rms at 1 m
Large vessels[2]	20–1,500	170–180 dB rms at 1 m
Tug docking barge[3]	200–1,000	149 dB rms at 100 m
Vibratory driving of Steel Sheet pile[4]	50–1,500	159 dB rms at 10 m
Impact driving of Steel Sheet pile[5]	50–1,500	186 dB rms at 10 m

m=meter
Sources: [1] Lesage et al. 1999; [2] Richardson et al. 1995; [3] Blackwell and Greene 2002; [4] Illingworth & Rodkin 2012; [5] WSDOT 2010b

For the purposes of assessment of potential impacts, the duration of piling work is estimated at 70 days comprising: 50 days of vibratory driving and 20 days of impact driving. In addition, a 20 days contingency has been included and an estimated 20 days for removal of temporary works were also considered in the assessment. The fast flowing tidal stream in the area makes the site unsuitable for the use of bubble-curtains. The proposed works (sheet piling) are identical in nature to the construction of a cofferdam. No sound mitigation methods (bubble curtains, coffer dams, etc.) are therefore proposed and therefore no engineering attenuation measures are included in the proposed methodology. The construction proposal includes for sediment screens to be in place throughout these activities. These will provide some localised attenuation, and form a barrier to exclude species from the immediate vicinity of the piling. There are, however, no references to the efficacy of these measures in relation to piling so these were not included in the acoustic assessment.

For vibratory driving, the acoustic analysis used the assumption that a maximum of four templates (each consisting of four clutch or bracing piles and five sheet pile pairs) could be driven each day of piling, for a maximum total length of approximately 70-75m. The assessment therefore estimated that noise would be produced at each point of a 35 m length of wall in a given day. Once the perimeter construction work inside the piling is completed the sheet pile section will be removed and the next section will be installed.

For impact driving, based on the available literature it is assumed that a maximum of 20 strikes of the impact hammer per section. This assumption was used to calculate cumulative SEL values for all relevant species for case study examples (WSDOT 2010, CDOT, 2007 and CDOT, 2009).

The calculations presented in Table 7 below assume an acoustic free field i.e. free of obstruction, which is unrealistic, because the site does not represent open water conditions and sounds will attenuate as they encounter the site, adjacent islands and coasts or other solid obstacles.

The actual distances to the behavioural disturbance thresholds for impact and vibratory pile driving will generally be shorter than those calculated due to the irregular contour of the seafront and the maximum fetch (furthest distance sound waves travel without obstruction reflection/refraction at the project area).

In addition, this has assumed pile driving will occur in water, whereas it is most likely piling will occur predominantly on exposed shores at low tide and sound transferal will be substantially reduced.

Table 7: Calculated Distance and Area Based on Marine Mammal Noise Thresholds During Sheet Pile Installation – Assumes Driving in Water which Represents Worst Case

Pile Driving Type	Threshold (dB re 1µPa rms)	Distance(m)	Area in (km2)
Vibration installation	Level A (injury threshold) 180	0.74	0
	Level B (behavioral Threshold)	735.9	0.29
Impact	Level A (injury threshold) 180	39.8	0.004
	Level B (behavioural Threshold)	858	0.67

All sound levels expressed in dB re 1 µPa rms. dB=decibel; rms=root-mean-square; µPa=microPascal
Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations
Sound levels expressed as dB re 1 µPa rms and dB re 1 µPa peak for RMS and Peak SPL measurements,respectively. Average and Max values for Pile data are based on 10-second rms measurements over the 10 minute driving time for the pile.

Sources: Illingworth & Rodkin 2012; Washington Department of Transportation 2010; California Department of Transportation 2009; Washington Department of Transportation 2011

The estimates of maximum likely levels of sound in the water column produced by impact sheet piling carried out on the upper shore and transmitted via the seabed into the water column surrounding East tip are 198, 180, 166, 150 and 123 dB re 1 µPa (msp) at 50, 200, 500, 1000 and 2000 m range (respectively). These ranges assume optimum coupling of the sheet piling noise into the seabed and maximum efficiency in conversion of the seabed transmitted energy into waterborne noise energy.

The effects of pile driving on marine mammals are dependent on several factors, including the species, size of the animal, and proximity to the source; the depth, intensity, and duration of the pile driving noise; the depth of the water column; the substrate of the habitat; the distance between the pile and the animal; and the propagation properties of the environment. Impacts to marine mammals from pile driving activities, if any, are expected to result primarily from acoustic pathways. As such, the degree of effect would be intrinsically related to the received level and duration of the noise exposure, which would be influenced by the distance between the animal and the source. The farther away from the source, the less intense the exposure should be. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to rapid sound attenuation. In addition, soft substrates in the harbour basin (i.e. silt and gravel) will absorb or attenuate the noise more rapidly than suggested by the practical spreading model. Soft substrates will also require less time to drive the pile, and possibly less forceful equipment, which would ultimately decrease the source level of the noise.

Impacts to marine species are expected to be the result of physiological responses to both the type and strength of the acoustic signature (Viada et al. 2008). Only behavioural impacts would be expected, but the type and severity of these effects are difficult to define due to limited number of studies addressing the behavioural effects of impulsive sounds on marine mammals.

Potential effects from impulsive sound sources can include behavioural disturbance, and slight injury of the auditory system (DON 2001).

Behavioural responses to sound can be highly variable. For each potential behavioural change, the magnitude of the change ultimately determines the severity of the response. A number of factors may influence an animal's response to noise, including its previous experience, its auditory sensitivity, its biological and social status (including age and sex), and its behavioural state and activity at the time of exposure. Habituation occurs when an animal's response to a stimulus such as pile driving noise wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok et al. 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is sensitisation, when an unpleasant experience leads to subsequent responses,

often in the form of avoidance, at a lower level of exposure. Behavioural state or differences in individual tolerance levels may affect the type of response as well. For example, animals that are resting may show greater behavioural change in response to disturbing noise levels than animals that are highly motivated to remain in an area for feeding (Richardson et al. 1995; National Research Council 2003; Wartzok et al. 2003). Indicators of disturbance may include sudden changes in the animal's behaviour or avoidance of the affected area. A marine mammal may show signs that it is startled by the noise and/or it may swim away from the sound source and avoid the area. Increased swimming speed, increased surfacing time, and cessation of foraging in the affected area would indicate disturbance or discomfort.

Controlled experiments with captive marine mammals showed pronounced behavioural reactions, including avoidance of loud sound sources (Ridgway et al. 1997; Finneran et al.2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices and including pile driving) have been varied, but often consist of avoidance behaviour or other behavioural changes suggesting discomfort (Morton and Symonds 2002; also see reviews in Gordon et al. 2004; Wartzok et al. 2003; and Nowacek et al. 2007). Some studies of acoustic harassment and acoustic deterrence devices have found habituation in resident populations of seals and harbour porpoises (see review in Southall et al. 2007). Blackwell et al. (2004) found that ringed seals exposed to underwater pile driving sounds in the 153–160 dB rms range tolerated this noise level and did not seem unwilling to dive. One individual was as close as 63 meters from the pile driving. Responses of two pinniped species to impact pile driving at the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project were mixed (Caltrans 2001; Thorson & Reyff 2006; Thorson 2010). Harbour seals were observed in the water at distances of approximately 400–500 meters from the pile driving activity and exhibited no alarm responses, although several showed alert reactions, and none of the seals appeared to remain in the area. One of these harbour seals was seen to swim to within 150 meters of the pile driving barge during pile driving. Several sea lions, however, were observed at distances of 500–1,000 meters swimming rapidly and porpoising away from pile driving activities. The reasons for these differences are not known, although Kastak and Schusterman (1998) reported that sea lions are more sensitive than harbour seals to underwater noise at low frequencies.

Studies of marine mammal responses to non-impulsive noise, such as vibratory pile installation, are limited.

Marine mammal monitoring at the Port of Anchorage marine terminal redevelopment project for example found no response by marine mammals swimming within the threshold distances to noise impacts from construction activities including pile driving (both impact hammer and vibratory driving) (Integrated Concepts & Research Corporation 2009).

The potential for physical or auditory injury to marine mammals as a consequence of piling operations at the East Tip is low and practically negligible. Due to the small size of the pile to be employed in the site, the enclosed nature of the site and the scarcity of marine mammals in the vicinity of the site, it is unlikely that injury to marine mammals will occur as a result of piling operations.

Behavioural impact ranges presented in Table5 were found to vary considerably, though all piles are substantially larger that proposed here. Water depths around the Haulbowline are shallow (0-5m) and the enclosed nature of the site compared to the offshore windfarm sites in Table 5**.** The shallow water depths at the North Hoyle site resulted in a rapid decrease on measured sound level from the source lead to rapid attenuation of noise from the source. At this site the inshore nature and potential for piling to occur in dry intertidal areas means attenuation would be assumed to be even more pronounced.

In summary, due to the nature of the noise levels associated with the construction operations (i.e. not likely to cause physical or auditory injury and not likely to result in behavioural effects over a wide area) and the low number of marine mammals in the vicinity of the Haulbowline, impacts on cetaceans due to construction related submarine acoustic noise are predicted to be of *minor magnitude and minor significance* to cetacean populations in the area. Additional mitigation is however proposed to minimise any risk.

5.2 INDIRECT IMPACTS OF PREY AVAILABILITY DUE TO CHANGES IN THE FISH AND SHELLFISH RESOURCES AS A RESULT OF THE PROPOSED CONSTRUCTION WORKS

As discussed in the Chapter 14 'Ecology' of the EIS marine mammals are unlikely to use the area as foraging habitat. However, some species recorded in the Outer Cork Harbour area may use the area in certain conditions or life cycle stages (for example there is anecdotal evidence of young common seals in transit and marine mammals sheltering in outer Cork during inclement weather). Consequently, indirect impacts may occur as a result of impacts on prey species due to construction works at the East Tip.

Cetaceans and birds have a variety of food sources dependant on their species. Individuals m ay take a variety of prey, including sandeels, gadoids, herring and sprat, flatfish, octopus and squid. The fish communities in the vicinity of the area may include, flatfish, gadoids, bass, clupeids (e.g. sprat and herring) and small demersal fish species (e.g. goby and pogge), Chapter 14 of the EIS, indicating that prey species are likely to be present in the area around the East Tip.

Impacts on these prey species from piling are likely to be *negligible magnitude and negligible significance* and the high mobility and large foraging ranges of common seal means that they are likely to be able to accommodate such localised changes in prey distribution and abundance.

Table 8: Calculated Distance and Area Based on Fish Noise Thresholds During Sheet Pile Installation – Assumes Driving in Water which Represents Worst Case

Pile Driving Type	Threshold (dB re 1µPa rms)	Distance(m)	Area in (km2)
Vibration installation	Level A (injury threshold) 180	0.74	0
	Level B (behavioural threshold(all):150 dB re 1 µPa rms	73.6	0.011
Impact	Injury (all): 206 dB re 1 µPa rms	8.6	0.00058
	Injury (≥ 2g): 187 dB re 1 µPa2sec SEL	21.6	0.00019
	Injury (< 2g): 183 dB re 1 µPa2sec SEL	39.9	0.0045
	Behavioural (all):150 dB re 1 µPa rms	398.1	0.14

All sound levels expressed in dB re 1 µPa rms. dB=decibel;
rms=root-mean-square; µPa=microPascal; Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations; 1Sound pressure levels used for calculations are given in Tables

Given the low importance of the East Tip area as foraging habitat for marine mammals and the relatively minor impacts on prey species, it is predicted that the impacts on cetaceans as a result of changes in prey availability will be of *negligible magnitude and negligible significance* to populations in the area.

The greatest potential interaction with prey species during construction would result from benthic habitat displacement from re-suspension of sediments, rather than behavioural disturbance due to pile driving noise. Impact assessment and mitigation measures in relation to sediments and fish are outlined in Chapter 13 and Chapter 14 of the EIS respectively.

5.3 POTENTIAL IMPACTS ON BIRDS

The majority of the published literature on bird hearing focuses on terrestrial birds and their ability to hear in air. A review of 32 terrestrial and marine species reveals that birds generally have greatest hearing sensitivity between 1 and 4 kHz (Beason 2004; Dooling 2002). Very few can hear below 20 Hz, most have an upper frequency hearing limit of 10 kHz, and none exhibit hearing at frequencies higher than 15 kHz (Dooling 2002; Dooling et al. 2000). In comparison to humans, birds typically hear less well over a narrower frequency bandwidth (Dooling and Popper 2007).

Behavioural responses of birds to pile driving are not well known. Temporary threshold shift (hearing loss) (TTS) resulting from exposure to elevated sound pressure levels is typically not considered an injury effect (Popper et al. 2006), but can result in behavioural disorientation (USFWS 2008). Results of disorientation may include increased vulnerability to predators, inability to communicate with mates, or inability to identify potential prey. Other adverse behavioural effects could include flushing, aborted feeding attempts, cessation of feeding, interrupted resting attempts, and avoidance of the zone of disturbance. These behavioural changes may impair birds' ability to forage, provision chicks in the nest, create and maintain pair bonds, or rest. Energy expenditures due to avoidance of elevated sound pressure levels may increase. However, observations of seabirds suggest that if fish are injured or disorientated as a result of pile driving, foraging birds may be attracted to the work area to feed on the fish in spite of the noise levels (Cooper 1982).

Even without the attractant of fish, birds could continue to forage close to the project area and would be at risk or exposure to noise-related injuries or disturbance.

For example, monitoring work at the Hood Canal Bridge in Washington demonstrated that marbled murrelets would continue to dive and forage within 984 ft of active pile driving operations (Entranco and Hamer Environmental 2005), well within the zone of potential behavioural disturbance anticipated by USFWS (2006), indicating that foraging bird species may habituate to pile driving.

Expected airborne noise levels from the proposed action are not expected to be injurious to birds within the project area. The source levels for airborne noise from pile driving (vibratory: 96 dBA at 15m; impact: 100 dBA at 11m) are well below those known to cause injury to birds in laboratory situations.

Studies of TTS in captive birds indicate that long-term exposure to high levels (≥ 93 dBA) of non-impulsive noise (i.e. vibratory pile driving) or to multiple impulses over 125 dBA can cause TTS (Dooling and Popper 2007). Behavioural reactions could occur at levels below 93 dBA out to the range at which noise from the proposed action falls below ambient noise levels (Dooling and Popper 2007). Airborne ambient noise in the project area is expected to average around 65 dBA in relation to normal port entry levels. These are further discussed in Chapter 10 'Noise and Vibration' of the EIS.

Within the project area, birds will not be exposed to injurious noise levels, and are unlikely to experience TTS due to a lack of foraging habitat or other attractants to the site.

In relation to prey species there are no important foraging areas within 75m of the site and therefore there is unlikely to be any effects from the proposed construction activities.

There are no SPA areas or Important Bird areas within 650m of the site. Therefore potential noise exposure is likely to be limited to birds transiting the area in flight, and be at levels well below what would be disruptive to their behaviour.

Given the low importance of the East Tip area as habitat for birds, the low likelihood of exposure to significant noise levels and the relatively minor impacts on prey species and low importance of the immediate area for foraging, it is predicted that the impacts on birds as a result of proposed development will be of *negligible magnitude and negligible significance*.

6. MITIGATION MEASURES FOR PILING

6.1 SOFT STARTS

Although all impacts on marine mammals as a result of the proposals at Haulbowline East Tip are predicted to be of negligible magnitude and negligible significance to local population, the use of 'soft start' methods should be employed during piling operations in order to minimise any potential noise impacts on marine mammals. This is a common technique that is generally utilised as a matter of good practice and ensures that noise emissions start at relatively low levels and are gradually increased over a short period until full operational power is achieved. If there is a pause in the piling operations for a period of greater than 30 minutes, then the soft-start procedure should be repeated. This would ensure that mammals which are present within the zone of ensonification would be able to move away from this area before full operational power is achieved.

6.2 NPWS GUIDANCE FOR NOISE RISK MANAGEMENT DURING PILING

In full compliance with the NPWS guidelines[5] the following procedure will be in place for all piling:-

1. A qualified and experienced marine mammal observer (MMO) will be appointed to monitor for marine mammals and to log all relevant events using standardised data forms (NPWS 2013 Appendix 6).

2. The MMO must advise the Ecological Clerk of Works within a previously agreed timeframe prior to scheduled activity if environmental conditions (e.g., sea state, light, visibility) are insufficient for effective visual monitoring. In such conditions, the activity of concern will be postponed until acceptable conditions prevail.

3. In the event of suitable environmental conditions, a clear on-site communication signal will be agreed between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). The activity will only proceed on positive confirmation with the MMO, which must be recorded by the MMO.

4. The use of clear "ramp-up" (i.e., "soft-start") procedures will be implemented depending on the pile specification, the driving mechanism and the receiving substrate. Depending on the assessment of the pile specification, the driving mechanism and the receiving substrate, the ramp-up sequence of pile strikes may also employ an inter-strike time delay in order to minimise the initial cumulative impact of individual strikes.

5. The MMO will conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence, continuing monitoring during and for 30 minutes following the activity. Sound-producing activity will not commence until at least 30 minutes have elapsed with no marine mammal detections by the on-site MMO.

6. Operations will not commence if marine mammals are detected within a 1,000m radial distance of the intended sound source, i.e., within the Monitored Zone. This restriction also applies to any ramp-up procedure where the maximum sound output has not yet been attained.

7. Once begun, the activity may continue if weather conditions deteriorate or if marine mammals enter the 1,000m-radius Monitored Zone following start-up.

[5] NPWS 2013 Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters

8. If there is a break in pile striking activity for a period greater than 30 minutes then all pre-piling monitoring measures and ramp-up (where this is possible) should recommence as for start-up. For larger scale pile driving operations which have the potential to produce injurious levels of underwater sound (see sections 2.4, 3.2), there may be a requirement to adopt a shorter 10 minute break limit, after which all pre-piling monitoring measures and ramp-up (where this is possible) should recommence as for start-up.

9. Full reporting on MMO operations and mitigation undertaken will be provided to the Department of Arts, Heritage and the Gaeltacht to facilitate reporting under Article 17 of the EC Habitats Directive and future improvements to guidance at the end of the project.

6.3 PILE REMOVAL AND INSTALLATION BEST MANAGEMENT PRACTICES (BASED ON US NAVY AND UK ENVIRONMENT AGENCY GUIDANCE)

- A containment area of silt screen shall be used around the work area during piling and pile removal to contain and collect any floating debris or sediment.

- Removed piles and associated sediments (if any) shall be contained within the work area and sediment screens. Piles and sediments may be stored in a containment area near the construction site with suitable sediment control measures in place.

- Piles that are below the waterline may be removed by wrapping the piles with a cable or chain and pulling them directly from the sediment with a crane. If this is not possible, they shall be removed with a clamshell bucket. To minimize disturbance to bottom sediments, the contractor shall use the minimum size bucket required to pull out piles based on pile depth and substrate. The clam shell bucket shall be emptied of piles and debris on a contained area. If the bucket contains only sediment, the bucket shall remain closed and be lowered to the mud line and opened to redeposit the sediment. In some cases (depending on access, location, etc.), piles may be cut below the mud line and the resulting hole backfilled with clean sediment.

- Any floating debris generated during installation shall be retrieved. Any debris in a containment boom shall be removed by the end of the work day or when the boom is removed, whichever occurs first. Retrieved debris shall be disposed of correctly.

- If excavation around piles is necessary, hand tools, power tools or a siphon dredge shall be used to excavate around piles to be replaced.

6.4 TIMING RESTRICTIONS

Where possible:-

- All in-water construction activities shall occur during daylight hours (sunrise to sunset), and

- Non in-water construction activities could occur between 6:00 a.m. and 10:00 p.m. during any time of the year.

As indicated in Section 6.1 of the EIS, depending on the construction methodology adopted by the Contractor, the installation of the Perimeter Engineered Structure (PES) may involve an element of working with the tidal cycle. In this instance an extended working day may be preferable to the Contractor in order to optimise work during periods of low water. This would ensure that the construction programme is maintained and would limit standing time of plant on site.

Site working hours are outlined below.

Normal working hours for the majority of works:-

- 7.00am - 7.00pm Monday to Friday; and
- 9.00am and 4.00pm on Saturdays.

Working hours for works required in the tidal area of the East Tip:

An extended working day may be required to optimise the tidal cycle. The working day will be defined relative to the tidal cycle on any given day with specific reference to the time of low water. During periods where low water is achieved outside the normal working hours as outlined above an extended day, up to a 24 hour work period, may be required. Works undertaken outside the normal working hours to accommodate the tidal cycle will be limited to works in the foreshore area where tides have an impact. In addition such works would be limited to a defined working area within the foreshore i.e. such works would not extend around the perimeter of the site. In-water piling work will occur during the hours will occur during daylight hours.

In addition to this every effort will be made by the Applicant / Developer and the appointed Contractor to notify the residents in the surrounding areas of any extended working hours and the reasons for them. In this regard it should be noted that the Site Contractor will be required to conform with relevant standards and regulations for Health and Safety on site (*Safety, Health and Welfare (Construction) Regulation 2006*), which will mitigate any risks to the temporary working community. The CEMP should include measures for liaison with the public.

6.5 CETACEAN AND BIRD MONITORING

As part of the Monitoring Framework for the site, birds and cetaceans will be monitored pre, during and post construction in the event that piling takes place. As a definitive decision on the requirement for piling will not be taken until detailed design stage and contractor appointment, the proposed pre-construction surveys will commence post receipt of planning permission.

Table 1 of Part 2 of the Addendum to the NIS provides details on the pre, during and post construction monitoring for the East Tip. In response to Item 1 on Section 4.5.1 of the NIS - '*Framework details of a before and after monitoring programme shall be outlined in the event that this construction technique us used*', it specifies the pre and post construction monitoring for birds and cetaceans if piling is an option for construction of the works. As the decision to use piling is unknown at this stage, it is proposed to undertake such pre construction bird and cetacean monitoring in the event that piling is used on site.

A suitably qualified ecologist will be appointed to undertake the bird and cetacean monitoring. As outlined in Chapter 6 of the EIS, an Environmental Clerk of Works will be appointed to oversee the works at the construction contract stage. This officer will be responsible for the monitoring programme during the construction stage and will have the control to stop works if negative impacts on wildlife are detected. For pre-construction monitoring, the appointed ecologist will co-ordinate with and report to the applicant or applicant's agent as appropriate. As outlined in Section 14.5.1 of the EIS:-

> *As part of the Environmental Clerk of Works (ECoW) responsibilities, visual monitoring of the sediment screens and works containment measures will be undertaken during foreshore operations. In the event any turbidity is observed during works outside this containment, works will cease, and an investigation of the source and deployment of additional screens will be undertaken prior to recommencement.*

6.5.1 Pre-Construction

Preconstruction assessment has been carried out for the EIS including baseline habitats and species. Two monitoring points will be established in the north east and south east corner of the East Tip site.

These points will be monitored quarterly for a 12 hr period for birds and marine mammals. Birds will be monitored and recorded in adherence to the iWEBS protocols. Marine Mammals will be recorded in adherence to the JNCC Marine monitoring Handbook and IWDG shoreline observation and recording protocols.

6.5.2 Construction

Quarterly bird and marine mammal recording will be conducted at the two observation points in adherence to the procedures outlined above.

During any piling activity the NPWS 2013 Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters will be adhered to.

An Environmental Clerk of Works (ECoW) will be appointed by the Applicant / Developer and/or the site agent during the construction stage to oversee the works. Any observations of bird usage of the site or marine mammals in the vicinity during construction will be recorded.

A Marine Mammal Observer will be appointed and report to the ECoW.

Full reporting on MMO operations and mitigation undertaken will be provided to the Department of Arts, Heritage and the Gaeltacht within one month of project completion.

Observations of any species mortality on site will be recorded.

6.5.3 Post-Construction

Quarterly bird and marine mammal recording will be conducted at the two observation points in adherence to the procedures outlined above 12 months after construction. A sampling event will occur in year 3 and year 5 post construction.

Bird feature usage surveys will occur quarterly for the first 12 months and survey events at 3 and 5 years post construction will be carried out of any constructed bird habitat improvement measures. These will be conducted with the bird surveys above.

7. RESIDUAL IMPACTS

Impacts are directly associated with the noise generation activities. Avoidance is only anticipated during pile driving, and for very short duration. In relation to prey, Richardson (1995) recorded behavioural avoidance of fish due to seismic operations for approximately 24hrs with a maximum avoidance of 5 days for fish density to return to normal, Knudsen (1992)[6] records similar effects in salmon. Robertis and Handegard (2013) [7] record highly localised displacement as a result of low frequency noise (>1000 Hz) disturbance lasting only for the duration of the noise.

All impacts on cetaceans were predicted to be of *negligible magnitude and of negligible significance* to populations in the region and with mitigation as proposed, no residual impacts are anticipated.

[6] Knudsen F. R., Enger P. S., Sand O. Awareness reactions and avoidance responses to sound in juvenile Atlantic salmon. Salmo salar L. Journal of Fish Biology 1992;40:523-534.
[7] Robertis A and Handegard N 2013 Fish avoidance of research vessels and the efficacy of noise-reduced vessels: a review ICES J. Mar. Sci. (2013) 70 (1): 34-45. doi: 10.1093/icesjms/fss155

8. CONCLUSION

A detailed literature review was undertaken to characterise the marine mammal ecology of the Haulbowline and surrounding area. No specific marine mammal surveys were conducted to inform this characterisation on the basis that historic records indicated very low numbers of marine mammals in the study area. In order to provide spatial and temporal information on marine mammals within the study area, several sources of information were used including broad scale data sources (e.g. the Atlas of cetacean distribution in northwest European waters and the SCANS studies).

At present, underwater ambient noise in the project area is likely to be dominated by sounds from normal port operations, which can exceed 180 dB re 1 µPa close to the source and will continue during and after the proposed action. These sounds are non-impulsive and intermittent, occurring sporadically during normal port activities. Noise from vibratory pile driving associated with the proposed action is unlikely to alter the existing ambient noise within the project area because of its relatively low source level (approximately 157 dB re 1 µPa rms at 10 m) and non-impulsive nature. Noise from impact pile driving has higher source levels (approximately 186 dB re 1 µPa at 10m) and is impulsive in nature, with a fast rise time and multiple short-duration (50–100 millisecond; Illingworth & Rodkin 2001) events.

Introduction of high-amplitude impulsive sound may temporarily alter the ambient noise environment in the channels around Haulbowline; however, the use of impact driving during the proposed project is limited to instances when vibratory driving fails, and will include a around 20 strikes per pile (estimated total net duration of 45 minutes of driving per high water period). Because of the very limited use of impact pile driving during the high water period, there is minimal expected change in the average ambient noise environment in the Haulbowline area as a result of impact pile driving.

The potential impacts on marine mammals during the construction phase as assessed in this Addendum were:

- Submarine acoustic noise disturbance to marine mammals, in particular during the piling activity;
- Noise and disturbance to diving birds in particular during the piling activity; and
- Noise and disturbance to fish as a prey for birds and cetaceans in particular during the piling activity.

All impacts on cetaceans were predicted to be of *negligible magnitude and of negligible significance* to populations in the region.

Given the low importance of the East Tip area as habitat for birds, the low likelihood of exposure to significant noise levels and the relatively minor impacts on prey species and low importance of the immediate area for foraging, it is predicted that the impacts on birds as a result of proposed development will be of negligible magnitude and negligible significance.

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ADDENDUM TO NIS FOR EAST TIP REMEDIATION PROJECT

IMPACT ASSESSMENT OF PILING CONSTRUCTION OPTION ON BIRDS AND CETACEANS

Annex 1: Piling Noise Profile Assessment

1.1 PILING AND NOISE GENERATION

The two main sources of underwater noise disturbance on marine mammals as a result of the East Tip Remediation Project are general construction noise and piling (if required). Full details of the development proposals, including the options for and extent of piling operations, are presented in Chapter 6 of the EIS (Project Construction). Construction noise and mitigation is detailed in the East Tip Remediation EIS in Chapter 10 'Noise and Vibration' and Chapter 14 'Ecology'. The impact assessment and mitigation for other relevant impacts from piling such as re-suspension of sediments are detailed in the EIS (Chapter 10 and 14).

Piling operations may be required in order to facilitate temporary enclosure of sections of the site to allow construction by sheet piling and for structural piles to be used if required at the detailed design stage.

If required, piling would generally be in the form of sheet piles. Interlocking sheet piles will be used to create a cofferdam behind which construction work can occur in intertidal areas. Sheet pile sections of interlocking piles will be used in short sections. These will be used in association with clutch, joining or bracing piles as required. Once a section is completed the cofferdam will be removed and the next section will be installed.

Although unlikely structural tubular steel piles or concrete piles may be required in limited circumstances with diameters varying between approximately 800mm and 1500mm for construction purposes. Piles would be installed by vibro-piling where possible, although there may also be a need for impact driving in the installation of some piles.

A steel sheet pile (SSP) wall is a common wall type to facilitate deep excavations and enclose marine construction activities. Sheet piles are usually interlocking steel "AZ" type piles that are about 0.6 meters wide and range in length. They are commonly used to construct walls and cofferdams in marine environments.

These piles are usually installed using a vibratory driver/excavator. The SSPs are required to be driven to a prescribed depth below the final excavation level to prevent (i) kick-out and (ii) hydraulic related instability. In assessing the drivability of SSPs, it is necessary to review the sub-surface ground conditions and the driving methods. In some situations where hard-driving of SSPs is anticipated, the section modulus and driving force required for the SSP could be solely controlled by the drivability rather than the strength requirement as derived from the Excavation and Lateral Support (ELS) system design.

The East Tip site perimeter has been investigated by Site Investigation work. The perimeter is a variety of sedimentary areas and gravels (including slag gravel) in the north and north east of the site, sections where slag waste has concreted due to exposure, either on the surface or throughout a section, cobbles and boulders and large objects and boulders within the waste in the east and south of the site, together with an area of infralittoral rock on the south side of the site. This wide range of potential sediments can affect the noise transmission and attenuation from piling activities.

Guidance is given for determining the SSP section modulus with respect to SPT-N values (Standard Penetration Test) of granular soils. Simple methods for calculating vibration level (in terms of peak particle velocity, mm/s) and noise level (in dB) during pile driving are provided as well as that for the vertical load carrying capacity of SSP.

As documented in many technical literatures, SSPs could not normally be driven through soil stratum with SPT-N values greater than 50 easily. Hard-driving using strong SSP sections might then have to be employed.

The density (or compactness) of non-cohesive soils can be correlated to the results of various field test methods as shown in Table 1.1 below.

Table 0.1: Non-Cohesive Soil Densities

SPT (N Values)	CPT (MN/m2)		Pressure/Meter Test (MN/m2)	Density
PL			EM	
< 4	2.5	< 0.2	1.5	Very loose
4 – 10	2.5 – 7.5	0.2 – 0.5	1.5 – 5.0	Loose
10 – 30	7.5 – 15	0.5 – 1.5	5.0 – 15	Compact
30 – 50	15 – 25	1.5 – 2.5	15 – 25	Dense
> 50	> 25	> 2.5	> 25	Very Dense

Installation equipment for driven SSP includes two broad families, i.e. Impact Drivers and Vibratory Drivers. Their suitability for use in different non-cohesive ground conditions, as represented by SPT-N values, is shown in Table 1.2 below.

Table 0.2: SSP Installation Equipment Selection Based on SPT-N and Soil Density

Installation Equipment	SPT-N Values			
Impact Drivers				
	0-10	**11-30**	**31-50**	**>50**
Small Drop / Hydraulic Drop	**A**	**A**	B	C
Large Drop / Hydraulic Drop	**C**	**B**	A	A
Air Hammers	**A**	**A**	C	D
Diesel Hammers	**C**	**B**	A	A
Vibratory Drivers				
Small Vibro	**A**	B	B	D
Large Vibro	B	**A**	B	C

A: Most suitable; **B**: Suitable; **C**: Not Ideal; **D**: Not suitable

1.2 VIBRATIONS & NOISE LEVEL FROM PILING

Some simple methods for determining approximate magnitudes of vibration and noise levels are given below.

1.2.1 Vibrations

When an SSP is driven into ground, some of the driving energy is transmitted into the adjacent soils and can be experienced on the surface as vibrations, which could be gauged by measuring the induced peak particle velocity (**PPV**) in mm/s. An empirical equation can be used to estimate the PPV given the hammer energy per blow (or per cycle).

$$v = \frac{C\sqrt{W}}{r}$$

Where:

v is the estimated PPV (mm/s)
C is a parameter related to soil type and hammer (see Table 1.3 for values of C)
W is the hammer energy per blow or cycle (Joule/blow or Joule/cycle)
r is the horizontal distance from the piling operation to the point of interest (m)

For a hydraulic hammer driving SSPs in medium dense granular soils m (similar to East Tip site interior) with energy of 25kJ, the PPV at distances of 5m and 20m can be calculated as follows.

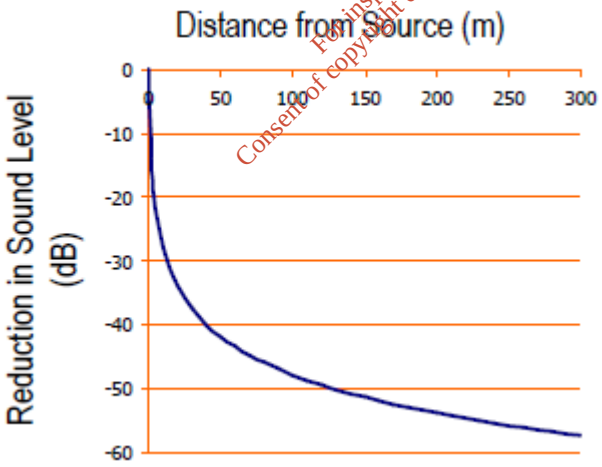

Table 0.3: Driving Method and Hammer Energy for Drop Hammer Based on Differing Soil Densities

Driving Method	Ground Conditions	East Tip	C
Impact Drivers	Very stiff cohesive soils, dense granular media, rock, fill with large solid obstructions	South of the site, and sections in the north and east where large obstructions may occur in sediments	1.0
	Stiff cohesive soils, medium dense granular media, compact fill	Concreted slag areas in the east of the site	0.75
	Soft cohesive soils, loose granular media, loose fill, organic soil	Northern sedimentary areas and areas around the causeway	0.5
Vibratory Drivers	All soil conditions		0.7

1.2.2 Noise Level

The type of noise associated with piling works depends on the method of installation. For example, pile driving using a drop hammer results in a well-defined impulsive type of noise. Diesel, hydraulic and air hammers also produce impulsive noise, although their striking rates can be much higher than drop hammers. With vibratory driving, the impulsive characteristic is virtually absent but an intermittent effect is still present. There are two summary tables of near source sound pressure for in-water driving for different types of pile installation techniques provided as Tables 1.4 and 1.5.

Noise levels experienced in the vicinity of pile driving are a function of the noise power level, Lw, which is the air pressure fluctuation at the surface of the hammer (or the pile) expressed in dB, and the distance, r, from the source. An equivalent continuous A-weighted sound level, measured in **dB**

$$L_{aeq} = Lw - 20.\log(r) - 8 \ \ dB(A)$$

(A), over the working day, Laeq, is given by the following equation

The following are the characteristic noise levels for different pile drivers (measured at 7m from the machine):-

- Impact Hammers: 90 – 115 dB(A)
- Rapid-Blow Hammers: 85 – 110 dB(A).
- Vibratory Hammers: 70 – 90 dB(A).

Typical noise levels of civil engineering plant are shown below for reference (measured at 7m from the machine):

- Piling Hammer: 110 dB(A).
- Crawler Crane: 100 dB(A).
- Pneumatic Breaker: 90 dB(A).
- Compressor: 85 dB(A).

These are the results of calculations of the A-weighted, equivalent, fifteen-minute and day sound pressure level (LAeq, 15min and LAeq, 4h) based on the results of the measurements of the LAeq, Ti and duration of the operation.[1]

As an example, four sets of pile driving noise were measured by Duncan and McCauley 2008 in marine waters and semi cohesive sands as received signal spectra. In this example two sets of pile driving noise are compared, as per:-

1. A sheet pile was being driven on land but within 50 m of a navigation channel and the noise measured in-water at 100-165 m range from the pile (blue spectra); and

2. Where a sheet pile was being driven in-water and measured at ranges of 60-100 m from the pile (red spectra).

These measurements were taken on the same day and were within a few hundred metres of each other in the uniform depth channel.

While this example is not directly transferable as the piles were greater size and the pile measurements displayed had a steep 13m vertical interface between the water and ocean, which allowed the land based signals to couple directly to the water, they do indicate the sharp filtering applied by the land to the piling signals. While the absolute levels of the signals shown on Figure 1 relate more to the piling force and range at which the measurements were taken, there is clear and sharp filtering of the land based signals below 2 kHz.

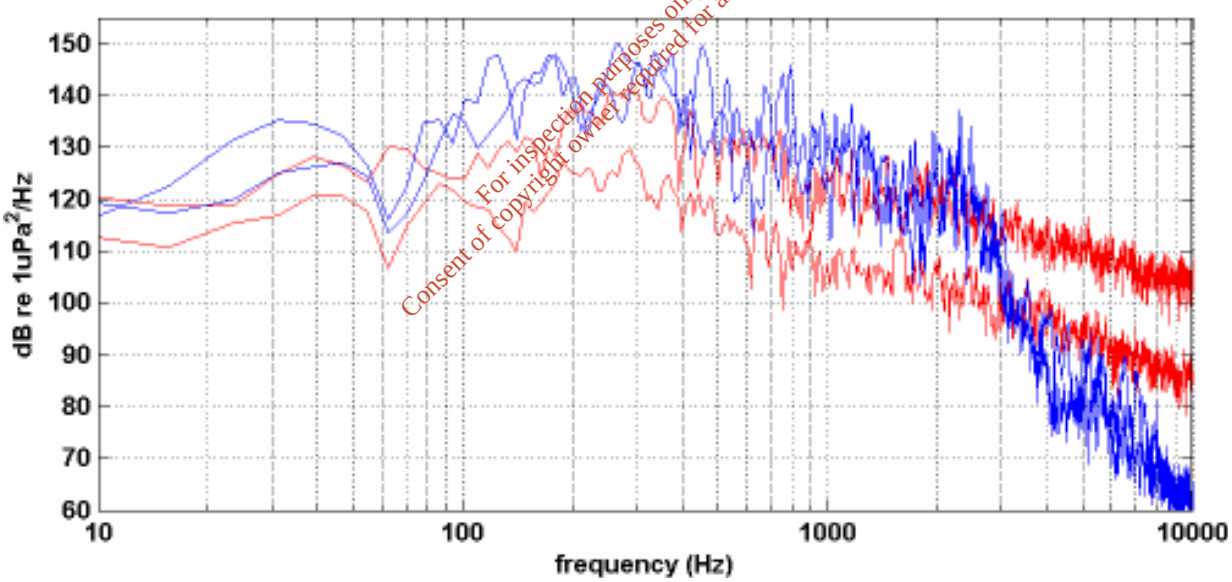

Figure 1: Measured spectra of two sets of sheet piling (each curve is the mean spectra from five impacts).

In Figure 1 above the blue curves were from land based piling measured in the ocean with excellent land-water coupling and the red curves were from water based piling also measured in the ocean.

[1] 1. “Specifiers’ Guide to Steel Piling” SCI Publication P308, The Steel Construction Institution;
2. “Installation of Steel Sheet Piles” Technical European Sheet Piling Association (TESPA);
3. “Piling Handbook” 8th edition, ArcelorMittal;
4. “Sheet Piling Handbook” 3rd edition, ThyssenKrupp

Table 1.4: Summary of Near-Source (10-Meter) Attenuated Sound Pressures for In- Water Pile Driving Using an Impact Hammer

		Average Sound Pressure Measured in dB		
Pile Type and Approximate Size	**Relative Water Depth**	**Peak**	**RMS**	**SEL**
0.30 meter (12-inch) Steel H-type - Thin	<5 meters	190	175	160
0.30 meter (12-inch) Steel H-type - Thick	~5 meters	195	183	170
0.6 meter (24-inch) AZ Steel Sheet	~15 meters	205	190	180
0.61 meter (24 inch) Concrete Pile	~5 meters	185	170	160
0.61 meter (24 inch) Concrete Pile	~15 meters	188	176	166
0.30 meter (12-inch) Steel Pipe Pile	<5 meters	192	177	--
0.36 meter (14 inch) Steel Pipe Pile	~15 meters	200	184	174
0.61 meter (24 inch) Steel Pipe Pile	~15 meters	207	194	178
0.61 meter (24 inch) Steel Pipe Pile	~5 meters	203	190	177
1 meter (36-inch) Steel Pipe Pile	<5 meters	208	190	180
1 meter (36-inch) Steel Pipe Pile	~10 meters	210	193	183
1.5 meter (60 inch) Steel CISS	<5 meters	210	195	185
2.4 meter (96 inch) Steel CISS	~10 meters	220	205	195

Table 1.5 Summary of Near-Source (10-Meter) Unattenuated Sound Pressures for In- Water Pile Installation Using a Vibratory Driver/Extractor

		Average Sound Pressure Measured in dB		
Pile Type and Approximate Size	**Relative Water Depth**	**Peak**	**RMS**	**SEL**
0.30 meter (12-inch) Steel H-type	<5 meters	165	150	150
0.30 meter (12-inch) Steel Pipe Pile	<5 meters	171	155	155
1 meter (36-inch) Steel Pipe Pile – Typical	~5 meters	180	170	170
0.6 meter (24-inch) AZ Steel Sheet – Typical	~15 meters	175	160	160
0.6 meter (24-inch) AZ Steel Sheet – Loudest	~15 meters	182	165	165
1 meter (36-inch) Steel Pipe Pile - Loudest	~5 meters	185	175	175
1.8 meter (72-inch) Steel Pipe Pile – Typical	~5 meters	183	170	170
1.8 meter (72-inch) Steel Pipe Pile – Loudest	~5 meters	195	180	180

PART 2

RESPONSE TO ITEM 2 OF AN BORD PLEANÁLA REQUEST FOR FURTHER INFORMATION: MONITORING PROGRAMME

Table 1 East Tip Monitoring Framework Summary Table provides details on post-construction (aftercare) monitoring.

This information is provided in response to Item No. 2 of An Bord Pleanála's Request for Further Information regarding the proposed remediation of the East Tip. Item 2 relates to Section 4.5.2 of the NIS and states as follows:

> "*This section should be elaborated upon to include framework details of a monitoring programme for the long term end use and aftercare".*

As outlined in Section 4.5.2 of the NIS:

> *"this monitoring will include examination of the usage by wildlife of the features that have been included in the end-use design of the site to be of benefit to wildlife including inter alia, the bird roosting area and the wetland area. The monitoring programme should aim to determine whether or not these features have been successful".*

Table 1 includes for post-construction monitoring for birds, cetaceans, habitats and fauna. With respect to the future use of the site by wildlife, the applicant, in conjunction with the NPWS, will adaptively manage the site to maximise its potential as a roost area in the end-use, aftercare and maintenance phase.

Table 1 will be updated to reflect the conditions relating to monitoring set out in the planning application permission and waste licence.

Table 1: East Tip Monitoring Framework Summary Table

	Pre construction	During Construction	Post Construction				
	1 year	18months (approx.)	1st Year	2nd year	Year 3-5	Relevant Guidance/Regulations/References/	Locations
Noise & Vibration	Baseline noise monitoring was carried out at the locations shown in Figure 10.1 (see Chapter 10 of the EIS) in accordance with the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Schedules Activities (NG4).	Noise monitoring will take place at 6 noise monitoring locations on a monthly basis as shown on Figure 10.1 of the EIS. The Noise Management Plan will be developed in repsonse to a detailed programme for the construction phase.	No post construction noise monitoring is proposed unless specified by permission/waste licence requirements.			Environmental Protection Agency (EPA) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Schedules Activities (NG4) (2011).	6 noise monitoring locations as shown on Figure 10.1 (EIS)
Air Quality	Baseline air quality data has been established from the ongoing monitoring carried out in the area (see Sectio 9.2.1 of EIS). No further pre-construction surveys are proposed.	**Air quality** See Table 9.21 of the EIS (page9-37) which outlines 5 monitoring locations and the parameters and frequency to be tested. In addition monitoring poing AA6 at Shanbally Village will be tested for dust. See updated Figure 9.2 (February 2014) Visual inspection of onsite dust will be carried out by ECoW and Site Manager. Any public comment on dust will be logged via a project email address and investigated accordingly. **Asbestos** Reassurance air tests shall be run at four monitoring points to be located within 20m of the working area as outlined in Appendix K of the EIS. 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 (see Appendix K of the EIS). Environmental air monitoring will be carried out by a specialist contractor. **Odour** Odour management plan (OMP) will be prepared for the works which will follow the EPA "Odour Impact Assessment Guidance for EPA Licensed Sites" (Guidance Note AG5, 2010) for odour monitoring. Odour will be monitored by all staff onsite. Any public comment on odour will be logged via a project email address and investigated accordingly.	No post construction air quality monitoring is proposed unless specified by permission/waste licence requirements.			Dust and Metal Deposition Limits as outlined in Table 9.22 of the EIS. "Odour Management Guidance" (H4 Guidance, 2011). Odour Impact Assessment Guidance for EPA Licensed Sites" (Guidance Note AG5, 2010). Thresholds as per Air Quality Standards Regulation 2011 (SI 180 of 2011), Ambient Air Regulations 2009 (SI 58 of 2009)	6 monitoring locations as shown on updated Figure 9.2 (February 2014).
Marine Sediments	Pre-construction assessment has been carried out for the EIS and includes on site and marine sediment quality monitoring points (see Section 14.3 of the EIS). No further pre-construction surveys are proposed.	Six monthly sediment sampling will be undertaken at the 6 monitoring sites for marine sediment quality identified as showing exceedances in Figure 15 of the "Environmental Assessment of the East Tip area of Haulbowline Island" by White Young Green (2008) and reported on in the in the DQRA (WYG, 2013) report. Sampling will consist of a 0.1m Grab or Hammon Grab and adhere to the 2008 Project Site Sampling Protocols. Samples will be assessed for parameters of concern at the site (see Table 13.24 of the EIS). The residue will be retained (frozen as per the sampling protocol) for the construction period in the event further analysis is required. Visual inspections by ECoW will be undertaken of all sediment screens during the construction stage.	6 monthly basis for 12 months post construction	Annually	A sampling event will occur in year 3 and year 5 post construction.	Project sampling protocol as used previously and included in "Environmental Assessment of the East Tip area of Haulbowline Island" by White Young Green for the Department of the Environment, Heritage and Local Government	Sediment sampling locations M01, M02, M04, M09, M011 , MO15 as identified in Figure 15 of "Environmental Assessment of the East Tip area of Haulbowline Island" by White Young Green for the Department of the Environment, Heritage and Local Government
Water Quality	Baseline ground water and marine water quality data is outlined in Chapter 13 of the EIS. No further pre-construction surveys are proposed.	See Table 13.24 of the EIS for construction stage monitoring on groundwater and marine water quality. Daily observation of works for increased sedimentation (by ECoW).	See Table 13.25 of the EIS for post construction stage monitoring on groundwater and marine water quality.				See Figures 13.11 & 13.12 of the EIS.
Cetaceans	Two monitoring points will be established in the north east and south east corner of the East Tip site. These points will be monitored quarterly for a 12 hr period for marine mammals.	Quarterly marine mammal recording will be conducted at the two observation points in the event piling is to be conducted on site. A Marine Mammal Observer will be appointed and report to the EcOW. Full reporting on MMO operations and mitigation undertaken will be provided to the Department of Arts, Heritage and the Gaeltacht within one month of project completion. An Environmental Clerk of Works by Cork County Council will oversee the works. Any observations of marine mammals in the vicinity during construction will be recorded.	Quarterly marine mammal recording will be conducted at the two observation points in adherence to the procedures outlined in the event piling is to be conducted.		A sampling event will occur in year 3 and year 5 post construction. This will include observations of the utilisation of any habitat enhancement features	JNCC Marine monitoring Handbook and IWDG shoreline observation and recording protocols. During any piling activity the NPWS 2013 Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters will be adhered to.	The two monitoring sites will be established at the start of the monitoring programme
Birds	Two monitoring points will be established in the north east and south east corner of the East Tip site. These points will be monitored quarterly for a 12 hr period for birds.	Quarterly bird surveys will be conducted in the event piling is to be conducted on site.	Quarterly bird surveys will be conducted at the two observation points in adherence to the procedures outlined in the event piling is to be conducted. In conjunction with the above, survey to assess the utilisation of any habitat enhancement features e.g. Roost areas.		A sampling event will occur in year 3 and year 5 post construction. Where possible these surveys will be conducted by existing initiatves such as the inclusion of an iWEBS point. Annual survey to assess the utilisation of any habitat enhancement features e.g. Roost areas.	Birds will be monitored and recorded in adherence to the iWEBS protocols.	The two monitoring sites will be established at the start of the monitoring programme
Habitats & Terrestrial Flora	See Section 14.3.2 &4 of the EIS. No further pre-construction surveys are proposed.	N/a	Annual habitat Survey		Annual habitat survey in year 3 and year 5.	A guide to Habitats in Ireland (Fossitt, The Heritage Council, 2000);	East Tip
Fauna	See Section 14.3.7.1 of the EIS. No further pre-construction surveys are proposed.	N/a	Annual fauna survey to assess wildlife usage		Annual fauna survey to assess wildlife usage of the site in year 3 and year 5.		East Tip
Archaeology	See Chapter 15 of the EIS for archaeology and historical background. It is proposed that an archaeological investigation take place within the development footprint along the line of the former causeway in advance of construction works under licence from the DAHG. The investigation will be led by an archaeologist experienced in maritime archaeology who would seek	Archaeological Monitoring during all seabed and inter-tidal/foreshore disturbances (licensed by the DAHG).	N/a			DAHG guidance on the recording and reporting of archaeological finds	Areas of seabed and inter-tidal/foreshore disturbances.
Traffic	Baseline data and existing condition survey records are included in Chapter 8 of the EIS. No further pre-construction surveys are proposed.	Weekly road condition inspections.	None - transfer to Cork Co Co normal road condition monitoring			n/a	Haul Route
Landscape	See Chapter 11 of the EIS. No further pre-construction surveys are proposed.	N/a	As outlined in Section 11.5.2 of the EIS (page 11-31), it is important to ensure the landscape planting and grassed areas are properly established and maintained to achieve the desired effect of an attractive parkland. Annual surveys to examine the planting are proposed.			n/a	East Tip

PART 3

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SCHEDULE B

EIS ADDENDUM 1: REVISED PLANNING CONTEXT SECTION

EIS APPENDICES ADDENDUM 1: REVISED APPENDIX D – PLANNING AND LICENSING HISTORY

2.6 PLANNING HISTORY

The East Tip itself has been the subject of only one planning application and planning permission (Pl. Reg. Ref: 97/4031 'Construction of a rock armour faced sea wall on the north, south and east sides of the East Tip'), which is summarised below. This pertains to the construction of a rock armour faced sea wall, which was not subsequently constructed.

Planning application Pl. Reg. Ref. 77/1907 'Extensions and Modifications to Steel Making Plant', which predominantly relates to the main steelworks site, included for the dumping of waste on the East Tip site and is also discussed below.

Pl. Reg. Ref. 70/1570 'Extension and Modifications' relates to the extension of buildings on the main steel plant site. No works were proposed to be carried on the East Tip as part of the planning application. However, the extension to the south of the mill buildings overlaps with the site boundary for the proposed development in the area of the existing and proposed access road between Haulbowline Bridge and the East Tip. An area of reclamation in this area to facilitate the extension was also included in the application details. Accordingly, details of this planning application have been provided below.

The subject site includes Haulbowline Bridge; the bridge was permitted under Pl. Reg. Ref. 64/1246 'The Erection of a Bridge at Cork Harbour'.

Over the years, other planning applications relating to the main steelworks site on Haulbowline Island (which is separated from the East Tip by the Naval Dockyards) and planning applications relating to other lands on the mainland were made by the operators of the former steelworks. Details of these, and other planning applications related to Haulbowline Island and Rocky Island are provided in Appendix D: Planning and Licensing Context.

The current planning status of other relevant projects in the area is provided in Chapter 16 'Indirect and Cumulative Impacts and Interaction of Impacts'.

2.6.1 Cork County Council Reg. Ref. 97/4031 Construction of a Rock Armour Faced Sea Wall on the North, South and East Sides of the East Tip

Under this planning application, Irish Ispat Ltd. (identified as site owner on the planning application form) was granted permission for the construction of a rock armour faced sea wall on the north, south and east sides of the east tip on 19th January 1998. The site area stated in the application comprised 23.76 acres. The Final Grant of Permission and Notification of Decision to Grant Permission are provided in Appendix D.

With respect to the background of the proposed development of a rock armoured sea wall, a foreshore licence granted in 1996 required that such a wall be constructed within 15 years of the issue of the licence or such extended time as may be agreed (ref. EPA Inspector's report on IPC licence application 2001) to protect the site against erosion.

The Cork County Executive Engineer's report dated November 14th 1997 advised of "*no objection to the granting of permission for the proposed development.*" A further note on file[1], dated November 26th 1997, advises that the Department of the Marine and Cork Harbour Commissioners had been notified and that a Foreshore Licence may be necessary and that he/she had no objection to the proposal.

[1] Handwritten and signatory not legible

A letter from the South Western Regional Fisheries Board dated 17th November 1997 requested that the Department of the Marine be informed of the planning application.

The National Monuments Advisory Committee, in a letter to Cork County Council dated 17th November 1997 advised the following:

> *"The proposed development site consists of an area of reclaimed sand spit at the eastern side of Haulbowline Island in Cork Harbour. Over 300 metres to the west are three sites listed in the Sites and Monuments Record of County Cork.: a military barracks (SMR No.: CO087-05901-), Martello tower (CO087-05902-) and a star shaped fort (CO087-05903-).*
>
> *It would appear that the development will have no archaeological impact. However, the developers should be informed that they must contact the National Monuments and Historic Properties Service of the Department of Arts, Heritage, Gaeltacht and the Islands if any archaeological remains are found when the development goes ahead."*

A letter from the Department of Arts, Heritage, Gaeltacht and the Islands dated 28th November 1997 advised that the Department had "*no archaeological objections to the proposed developments".*

The Planner's Report, dated December 8th 1997, states: *"This is a welcome application as it will help screen the apparent ugly dumping to the east of the industrial complex…as to what trees or shrubs would grow successfully here, whatever is planted should be screeded from wind blow."*

One condition was attached to this planning permission, as follows:

"The site shall be landscaped and planted in accordance with a comprehensive scheme to comprise predominantly native species and varieties and to include:

- *(a) Details of screen planting (which should not comprise of cupressocyparis leylandii nor grisellinia in rural situations)*
- *(b) Species, variety, number and locations of trees and shrubs*
- *(c) Programme for implementation of the scheme*
- *(d) A wind protective fence shall be erected along the entire length of the sea wall/embankment to protect the shrubs and trees.*

Full details shall be submitted to and agreed with the Planning Authority prior to commencement of development."

The permitted design, in accordance with plans and particulars submitted on 17th October 1997 and as amended by drawings on November 18th 1997[2], consisted of a rock armour wall and a geotextile filter fabric placed on top of fill material and covered by a layer of top soil. The top soil layer was proposed to be 1.5m minimum depth; the proposed rock layer was to be 900mm. The proposed rock armour wall was permitted to have a slope of 1:5 and was to be 7m tall from the base. Trees and shrubs were to be planted along the top in the topsoil. The face of the sea wall was proposed to be faced with natural stone. The works were to extend to a width of 21m on the three seaward sides of the site and were to extend for 292m along the southern side of the site, 296m at the eastern side and 320m at the northern site. The location and physical extent of the proposed sea wall is shown on **Figure 2.1**.

[2] Drawings submitted on 18th November 1997 are limited to a site location map of scale 1:10,560. Other details submitted on that date are limited to company details. This information was submitted in response to a letter issued by Cork County Council on 24th October 1997 requiring the submission of same.

No works were carried out pursuant to this grant of permission.

2.6.2 Cork County Council Reg. Ref. 77/1907 Extensions and Modifications to Steel Making Plant, Haulbowline

Irish Steel Holdings Ltd. was granted permission for extensions and modifications to the steel making plant on 23rd January 1978. A copy of the Final Grant of Permission and Notification of Decision to Grant Permission are provided in Appendix D.

The new plant was proposed to modernise and expand steel production with significant changes to the existing development identified as being the replacement of ingot casting by continuous billet casting, an increase in production capacity to 345,000 tonnes annually, the replacement of two existing mills by a single mill and the construction of a new despatch wharf. The main components of the proposed development included modifications and extensions as follows:

- Scrap Handling System
- Melting Shop
- Billet Bay
- Reheat Furnace
- Rolling Mill
- Straightening, Shearing and Bundling machines
- Despatch (via the existing bridge and proposed new loading wharf)

No new buildings/extensions were proposed within the site boundary of the current planning application for the remediation of the East Tip. See Site Map and Sketched Perspective provided in Appendix D. However, solid waste was to proposed to be disposed of at the East Tip (see below).

The application details state that pollution control was to form an essential feature of the melting shop and would collect fumes from the arc furnace and all other sources in the melt shop; the fumes would pass through a bag filter unit. Emissions details provided state that an open hearth steelmaking furnace was to be scrapped; it had not been possible to install cleaning facilities within this furnace. With respect to dust collected in filters, the application detail proposes that any reusable materials would be exported for recovery or with the agreement of the local authority, for use in Ireland at a later stage if that should prove possible. The proposed scheme sought to remove the number of chimney stacks from six to a maximum of two. Smoke emissions were to conform to the provisions of the Control of Atmospheric Pollution Regulations 1970.

The application detail advised that the plant and equipment proposed to be installed would enable the total noise emission to comply with BS 4142 for a predominantly industrial area.

All liquid wastes (sewer and surface drainage) was proposed to discharge through existing discharge pipes to the estuary; the volume of sewage being proposed to be considerable reduced from peak employment levels of 1973/74 when over 1,100 people were employed at the plant. 610 people were proposed to be employed at the extended and upgraded plant.

A report submitted with the application specified that solid waste would be disposed of by dumping to reclaim land at the eastern side of the island – Appendix G9 Areas A and B specifically, where a '*licence for dumping'* [3] was granted by the Department of Transport and Power in 1959. Areas A and

[3] The licence referenced refers to a lease issued to Irish Steel Holdings Ltd. in 1964 for the reclamation of foreshore off Haulbowline within 30 years and is discussed below in Section 2.8.

B are shown as the northern and southern parts of the East Tip. See **Figure 2. 1** and Appendix D for the location of Areas A and B.[4]

Most materials proposed to be handled were to be sea-borne with berthage for outgoing materials to be created in an existing disused dry dock.

No process water was proposed to be involved; sea water was proposed to be used as the main coolant, with a closed loop internal circulatory system based on fresh water to be used for parts of the continuous casting plant and portions of the rolling mill. The daily freshwater requirement of the company was projected to increase from 50,000-60,000 gallons to 80,000-100,000 gallons per day. Salt water was to be pumped back to the estuary via the existing outfalls (8 to 10 million gallons per day). The water was stated to be unlikely to exceed its intake temperature by more than 10^{o}C with its composition to be virtually unchanged.

Power and energy sources proposed to be used on site were heavy fuel oils to fire the reheating furnace and auxiliary firing of a water heat boiler and electricity via two 110kV lines from Raffeen. One new transformer was required.

Other than scrap, raw materials and products were proposed to be stored under cover. Scrap was to be stored in two main areas; one on the north end of the island and the other on the eastern tip head. The storage at the northern end of the island was proposed to involve the reclamation of a small area from the sea. See **Figure 2.1**.

A Request for Further Information dated 25th August 1977 requested alterations to the proposal including a revised location for the boiler/compressor house and proposals for the removal of mill scale and other suspended matter by cyclones or lagoon system. The applicant was invited to submit alternative proposals for removal of dust collected by bag filters to those suggested by the local authority (see Condition 9 (a) and (b) below). A written report was requested on the effects if any, on the environment that would result from the proposed development.

The planning application file subsequently refers to an 'Environmental Impact Analysis' carried out by the Institute for Industrial Research and Standards (I.I.R.S). The report was to cover noise and air emissions for a wider area than the island of Haulbowline and provide greater detail on the quantity and quality of liquid effluents and an evaluation on the thermal effects on the waters of the harbour (ref. letter on file dated 31st August 1977, signed by 'Oifigeach Forbartha' (Development Officer of Cork County Council). The content is informed by the Chief Planning Officer's report of the same date. Two copies of the I.I.R.S report are recorded as having been submitted but these are not evident on the microfiche file copy.

The Chief Environmental Officer recommended that conditions be attached (report dated 8th December 1977). The Chief Medical Officer of the Southern Health Board raised no objection to the development proposal (report dated 15th September 1977). The Cork Harbour Commissioners likewise raised no objection (letter dated 7th July 1977).

Conditions were attached to the permission are included in the Notification of Decision to Grant Permission in Appendix D. The most relevant to the current proposal are considered to be as follows:-

5. *Mill scale and other suspended matter shall be recovered by cyclones or lagoon system. The extracted matter shall be disposed of on the company's disposal dump.*

6. *The following solid waste materials which have been heated to a maximum of 1000 degrees C and which are non-toxic and cannot be leached by fresh or salt water shall be disposed of on the company's disposal dump in the area licensed by the Minister for Transport and Power-*

[4] As is evident from the copy of the plans provided at Appendix D, the clarity of the information available is poor in quality and therefore, a best estimate is made in transcribing these locations to Figure 2.1.

a) Melting furnace slag
b) Re-Heating furnace slag (clinker scale
(c) Cyclone scale
d) Demolition rubble from furnaces and ladles

8. Fume and dust generated –

(a) From the melting operation shall be discharged by direct extraction method into the main flue leading to the bag filter house.
(b) From the basked charging operation by furnace hood.
(c) From the furnace tapping by tapping hood.
(d) General leakage from the furnace tapping by tapping hood.
(e) Fumes generated during the casting by casting machine hood. All collected fume and dust shall be directed to the bag filter house rated at 11,300N.m^3/min for the extraction of dust. The emission from the bag filter house to atmosphere shall not exceed 115 mgs./m^3. The stack height shall be 25 metres
(f) Fume collection equipment shall be installed in the galvanising plant house to limit the emission to 230 mg/mm^3.

9. Dust collected by the bag filters shall be:–

a) Removed off site in sealed containers for export by sea or road, or
b) Pelletised on site and thereafter shipped by sea in bulk, or,
c) *Dumped in a location in Cork County, details of which shall be agreed with the planning authority within 6 months of the grant of permission.*

A submission setting out proposals for compliance with Condition 2 was lodged on 21st December 1977.

There is correspondence on file dating from April to October 1982 with respect to changes to atmospheric monitoring as a result of the advent of natural gas and the cessation of galvanising at the plant; changes to requirements under Conditions 12 and 13 are agreed.

2.6.3 Cork County Council Reg. Ref. 70/1570 Extension and Modifications, Main Steelworks Complex, Haulbowline

Irish Steel Holdings Ltd. was granted permission for extension and modifications to a steel plant on 4th January 1971. A copy of the Final Grant of Permission and the Notification of the Decision to Grant Permission is included in Appendix D. The Planner's Report dated 9th November 1971 recommends a grant of planning permission. There were no objections from the Chief Assistant County Engineer.

With respect to overlap with the site boundary for the current planning application, the proposed development included structures just west of the southern end of the Naval Dock and east of the bridge, i.e. an extension to the Mill Building, and also included for fill works at the southern end of the island to facilitate the construction of this extension, i.e. filling works in the northern channel between Rocky Island and Haulbowline. Drawings were submitted to identify the location of the proposed structures (See **Figure 2.1** and copy of layout provided in Appendix D) and a drawing showing in red the area of fill in the North Channel for the proposed extension of the Mill Building. It should be noted however that no colour copies of the planning drawings are available. The area in question appears to be adjacent the bridge, south of the earlier mill building, but is unclear from the detail available. An estimated area for the fill works is shown on **Figure 2.1**.

The application detail outlined that the existing mill consisted of nine stands arranged in two parallel lines of three and six stands which was stated to be inadequate for extended requirements. The proposal involved the resiting of seven stands into one line so that each piece of steel being rolled would pass directly from one pair of rolls to the next. After rolling, it was necessary to cool bars and the necessary increased cooling capacity was to be achieved by increasing its length; 40' was to be taken from the north to the south end of the bed and a new 60' length was to be added. The extension of the south mill was proposed to be 200ft by 67ft in size.

With respect to the reclamation aspect of the proposed development, approx. 0.66 of an acre was proposed to be reclaimed from the channel at the south of the island; this area was to line up with the sea wall projecting into the channel which was constructed when the dry dock was extended. The application detail explains that on this reclaimed area, "*three mill bays were proposed to be extended, a despatch office together with a wider carriage way and a covered duct for services*." The filled area was proposed to extend 100ft south of the existing boundary of the north channel, with a length of 290 ft.

The application detail advises that the fill works were to consist of a rock embankment up to low water level with concrete facing. The rock was to be not greater than 12 inches in maximum dimension. The lower portion of the concrete facing was to be precast; the upper was to be cast in situ. The area behind was to be filled with smaller stone and graded slag filling, and surfaced in hard core to carry a concrete roadway. The river side of the roadway was to be protected by heavy concrete upstands, carrying a steel hand rail.

No increase in volume or temperature of existing cooling water discharges was proposed. There were no proposals to alter stockpiling and processing of scrap. The application details stated that existing sanitary services, canteen and car parking facilities were sufficient.

2.6.4 Cork County Council Reg. Ref. 64/1246 Erection of a Bridge at Cork Harbour

Messrs. O'Connell and Harley of Cork Harbour were granted permission for the erection of Haulbowline Bridge on August 21st 1964. Fifteen piers were to be provided in the channels north and south of Rocky Island to connect Haulbowline Island to the new approach road 'recently installed at Paddy's Point', via Rocky Island.

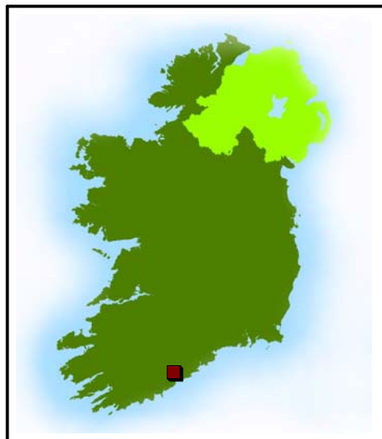
The Cork County Council Architect's report (2nd September 1964) set out concerns with respect to the following:

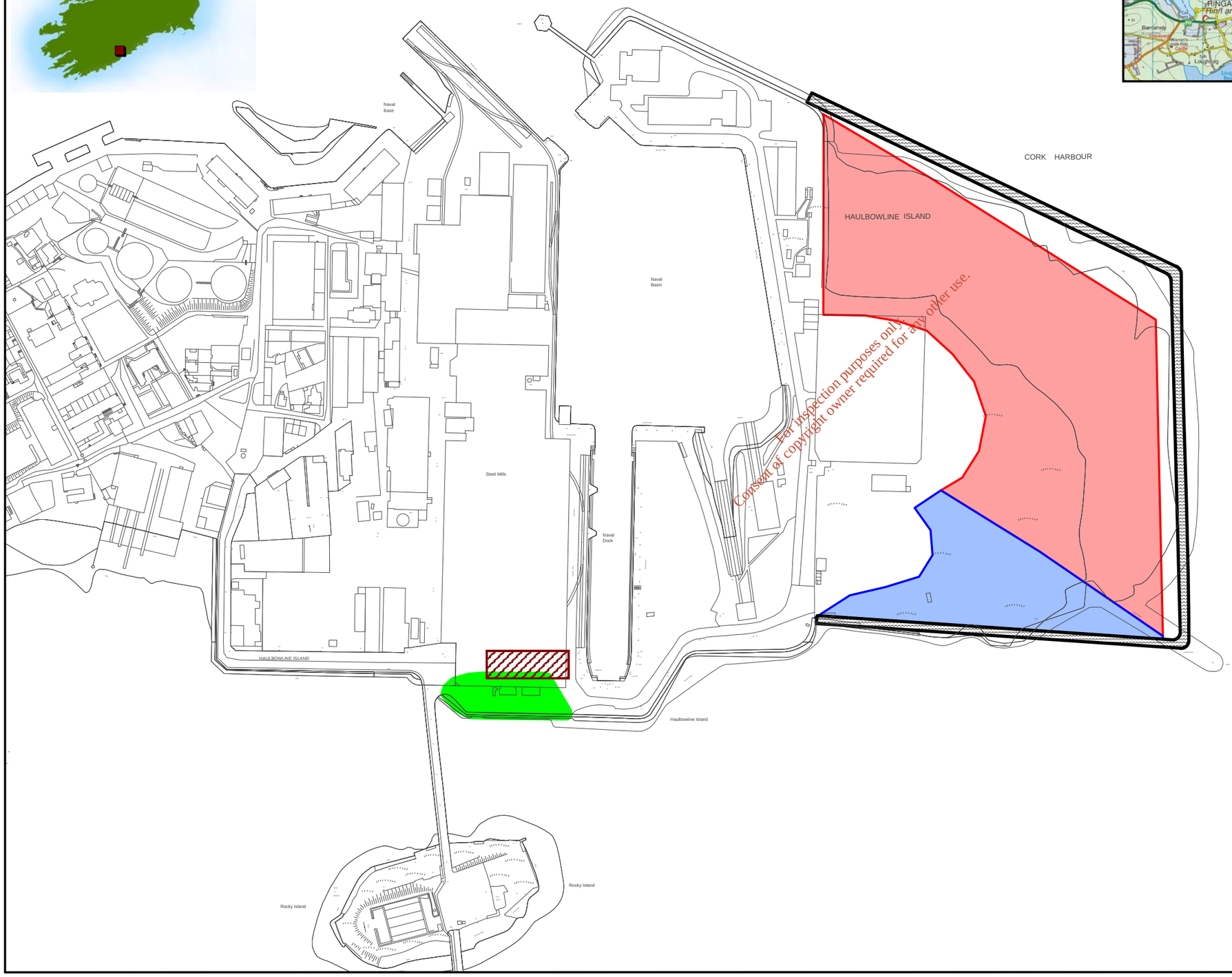
- The proposed bridge abutment cuts the sandy bank and Paddy's Point in two meaning that passage from one part of the beach to the other would be impossible excepted at low tide;
- The proposed piers (8 no. in the south channel; 7 no. in the north) would be a hazard for all but the smallest craft; and
- Unsatisfactory navigational clearance at high water in both channels.

The following conditions were recommended:

1. That arched opes should be provided on the Paddy's Point abutment to allow free use of the beach.
2. That the maximum number of piers in both channels should be 2.
3. That a minimum navigational clearance at high water of 30' should be provided in the spans.

The local authority's Roads Engineer had no objection to the proposal (report dated 26th August 1964). The County Engineer recommended approval on 14th September 1964. Copies of site layouts are provided in Appendix D.





Legend

- Area A (As per Planning Application 77 1907)
- Area B (As per Planning Application 77 1907)
- Sea Wall Permitted (As per Planning Application 97 4031)
- Mill Building Extension Permitted (As per Planning Application 97 4031)
- Reclaimed Area Permitted (As per Planning Application 97 4031)

Project ***Haulbowline Remediation Project***

Title

Extent of Previous Permitted Development at the Subject Site

Figure 2.1

RPS

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Issue Details

Drawn:	T Hurley	**Project No.**	MCE0734
Checked:	M Bennett	**File Ref.**	
Approved:	F Maguire	MCE0734MI0034F01	
Scale:	N.T.S	**Drawing No.**	**Rev.**
Date:	February 2014	MI0034	F01

Notes

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APPENDIX D - PLANNING AND LICENSING HISTORY

A. Planning History (Other than East Tip)

Main Steelworks Complex, Haulbowline

The following applications relate to developments within the main steelworks site on Haulbowline Island, which is separated from the East Tip by the Naval Dockyard. Those applications which involve development on the site on which development is now proposed are discussed in detail in Chapter 2 of the EIS.

Cork County Council Reg. Ref. 01/1854
Irish ISPAT Ltd. was granted retention permission for 3 no. two-storey and 1 no. single storey temporary office units on 4th July 2001. These portacabins were located close to the western boundary of the main steelworks site, proximate to the Irish Naval Services site.

Cork County Council Reg. Ref. 97/2379 (PL.04.103950)
Irish ISPAT Ltd. was granted planning permission by An Bord Pleanála for a 13m high environmental noise abatement barrier on the main steelworks site. The application was made in response to complaints about night-time noise from the plant. Conditions attached to the permission set out the abated night-time noise levels that the barrier should achieve when measured at the closest noise sensitive residential locations to the north and north-west of the site (at Cobh).

Cork County Council Reg. Ref. 91/1344
Irish Steel Ltd. was granted planning permission on 26th July 1991 for an extension to a baghouse, installation of new monitor and alterations to a canopy on melt shop roof. The only condition attached to this permission related to access to the point of discharge to the atmosphere from the baghouse and to electrical power points in this area.

Cork County Council Reg. Ref. 81/1111
Irish Steel Ltd. was granted planning permission for an extension to a shipping building on15th May 1981.

Cork County Council Reg. Ref. 77/1907 (also discussed in detail in Chapter 2 of EIS)
Irish Steel Holdings Ltd. was granted permission for extensions and modifications to the steel making plant on 1st January 1979. Conditions of note which were attached to the permission are as follows:-

5. Mill scale and other suspended matter shall be recovered by cyclones or lagoon system. The extracted matter shall be disposed of on the company's disposal dump.

6. The following solid waste materials which have been heated to a maximum of 1000 degrees C and which are non-toxic and cannot be leached by fresh or salt water shall be disposed of on the company's disposal dump in the area licensed by the Minister for Transport and Power –

   a) melting furnace slag
   b) re-heating furnace slag (clinker scale)
   c) cyclone scale
   d) demolition rubble from furnaces and ladles

9. Dust collected by the bag filters shall be –

   a) Removed off site in sealed containers for export by sea or road, or
   b) Pelletised on site and thereafter shipped by sea in bulk, or,
   c) Dumped in a location in Cork County, details of which shall be agreed with the planning authority within 6 months of the grant of permission.

Condition 13 specifies that air quality monitoring locations are required at the naval base, Cobh, Monkstown and Ringaskiddy Village.

A report submitted with the application specified that solid waste would be disposed of by dumping to reclaim land at the eastern side of the island – Appendix G9 areas A and B specifically, where a licence for dumping[1] was granted by the Department of Transport and Power in 1959. Areas A and B are shown as the northern and southern parts of the East Tip and are shown on Figure 2.1 of the EIS.

Cork County Council Reg. Ref. 70/1570 (Also discussed in detail in Chapter 2 of EIS)
Irish Steel Holdings Ltd. was granted permission for a steel plant on 4th January 1971. The proposed development included structures just west of the southern end of the Naval Dock and included for fill works at the southern end of the island. The application detail advises that these works were to consist of a rock embankment up to low water level with concrete facing. The area behind was to be filled and surfaced with hard core to carry a concrete roadway. The river side of the roadway was to be protected by heavy concrete upstands, carrying a steel hand rail. The area in question appears to be adjacent the bridge but is unclear from the detail available; locations of same are shown on Figure 2.1 of the EIS.

Cork County Council Reg. Ref. 70/941
Irish Steel Holdings Ltd. was granted permission for the erection of an industrial building on 26th August 1970. This building was to be located just northwest of the area where the bridge meets the island and comprised a roll turning shop of 8910 sq.ft. within an existing industrial site. The building is located outside of the site boundary of the current planning application for the remediation of the East Tip.

Paddy's Point/Ringaskiddy Lands

In addition to lands at Haulbowline, Irish Steel also lodged planning applications for development on lands on the mainland at Ringaskiddy. Planning permissions referenced in Cork County Council's Factual Report 2012 include 5 no. permissions which are located on the mainland. These are as follows.

Cork County Council Reg. Ref. 82/2945: Irish Steel Ltd. was granted permission for an extension of extraction work at their site south of the county road, Ringaskiddy on 22nd November 1982.

Cork County Council Reg. Ref. 81/1028: Irish Steel Ltd. was granted permission for the excavation of land and reclamation of foreshore at Ringaskiddy on 15th May 1981. The area to be excavated was south of the county road near the Haulbowline access road; the area to be filled was west of the same access road but north of the county road. The area to be filled lies adjacent the southern area of the site boundary of the current planning application for the remediation of the East Tip but does not encroach upon the subject site. A letter submitted with the application advised that the works were to facilitate a lorry marshalling area and to eliminate a pond of stagnant water. Conditions attached related to land grading, drainage, landscaping and contributions.

Cork County Council Reg. Ref. 68/428: Irish Steel Holdings Ltd. was granted permission for excavation and removal of fill from the hillside on their lands south of the county road at Ringaskiddy on 28th June 1968. Conditions related to landscaping and the reinstatement of the excavated area.

Cork County Council Reg. Ref. 67/1064: Irish Steel Holdings Ltd. Was granted permission for the erection of a warehouse, weighbridge and weighbridge house at Paddy's Point on 12th January 1968. The site was located just west of the Haulbowline access road opposite the industrial gases facility; conditions related to sewage disposal and visual impact of the proposed building design.

Cork County Council Reg. Ref. 64/427: Industrial Gases (IFS) Ltd. received planning permission on April 27th 1964 for the erection of a depot at Paddy's Point, east of the Haulbowline access road. The purpose of the development was to facilitate the steelwork's operations in connection with the 40 acre

[1] See clarification in Chapter 2 of EIS

site owned by the company to the south of the county road; Irish Steel Holdings Ltd. submitted an observation to the planning authority confirming that the development was of paramount importance to the industry. Issues raised by the local authority in assessing the application included the flooding of the public road during high seas and maintaining access to the public beach adjacent the site.

Other Planning History On/Adjacent Haulbowline

Department of Defence Lands: M29/80P – Cork County Council confirmed to the Department of Defence that it had no objections to the construction of a naval billet building on Haulbowline Island.

Haulbowline Bridge: 64/1246 (Also discussed in Chapter 2 of EIS) – Messrs. O'Connell and Harley of Cork Harbour were granted permission for the erection of a bridge on August 21st 1964. Fifteen piers were indicated to be provided in the channels north and south of Rocky Island to connect Haulbowline Island to the new approach road 'recently installed at Paddy's Point', via Rocky Island.

Rocky Island

05/4080 (Pl.04.214319): Strikemount Ltd. was granted conditional permission for the conversion of an industrial storage facility in a former magazine building to a crematorium, with associated site works, on February 14th 2006, on Rocky Island. The building is a recorded monument.

Condition 2 requires that the crematorium be constructed and managed in accordance with the United Kingdom Secretary of State's Process Guidance Note 5/2(04) on Crematoria. Emissions standards shall comply with those put forward in this document, particularly with regard to emission limits and controls. Air emissions shall be monitored during cremation in accordance with the Guidance Note.

Condition 5 states as follows:

> *In the event of a rise in sea level, the sea wall surrounding the building shall be increased in height to protect the crematorium from the possibility of flooding. In this regard, details of all construction works shall be submitted to and agreed with the planning authority prior to commencement of any works.*

Condition 7 required details of public access, including public parking areas, to enable access to a historic site, were to be agreed with the planning authority prior to the commencement of development.

The Inspector's Report, in discussing sea level issues, states as follows:-

> ***Sea level / tidal issues.*** *The Council's senior engineer advises that during a storm surge in 1962, a maximum level of 6.26mO.D. Poolebeg was reached at Irish steel in Cork Harbour. As a result, a ground floor level of 6.7mO.D. Poolebeg is recommended for new developments in the lower Harbour area.The proposed floor level for the crematorium is 5.87mO.D. Poolebeg. The level at the base of the ramp under the bridge to the car park is 5.15m, whilst the car park itself is no higher than 5.51m. The tidal flooding issue is dealt with in a report from ARUP – consulting engineers, submitted August 2005. The 5.87mO.D. level equates to a Malin Head level of 3.15m. The recommended finished floor level (FFL) in Cork City is 3.1mO.D.Malin and therefore the proposed FFL is 50mm above that. In addition, tide levels in Cobh are 0.4m lower than in the city area. It is concluded that the finished floor level of the facility is 0.49m higher than the recorded flood level in Cobh and in the event of a rise in sea level, the northern wall can be increased in height.*

Noise levels are limited by condition 10 and condition 11 requires that no nuisance from odour or dust occurs beyond the boundaries of the site.

Prior to the commencement of development, a demolition and construction waste management plan was required to be submitted under condition 12.

An Environmental Report accompanied the application.

B. Extracts from Planning Permissions referenced in Section 2.6 of the EIS

Microfiche prints of relevant files have been obtained from the Planning Department of Cork County Council. It should be noted that any maps and site layouts are not to scale as originals are not available. For ease of reference, Figure 2.1 of the EIS has also been provided within this Appendix.

The following documents, arranged by planning reference number, are considered to be of most relevance to the remediation of the East Tip:

Pl. Reg. Ref. 70/1570:

- Copy Final Grant of Planning Permission
- Copy of Notification of Decision to Grant Planning Permission
- Copy Site Layout Plan showing Proposed New Structures and Area to be Reclaimed

Pl. Reg. Ref. 77/1907:

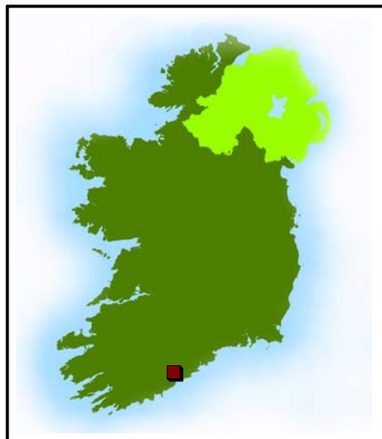
- Copy Final Grant of Planning Permission
- Copy of Notification of Decision to Grant Planning Permission
- Copy Site Map showing Proposed New Structures
- Copy Sketch Perspective of Proposed New Structures
- Copy Layout showing Areas A and B of East Tip 'being reclaimed by dumping slag, old brick and solid rubble'.

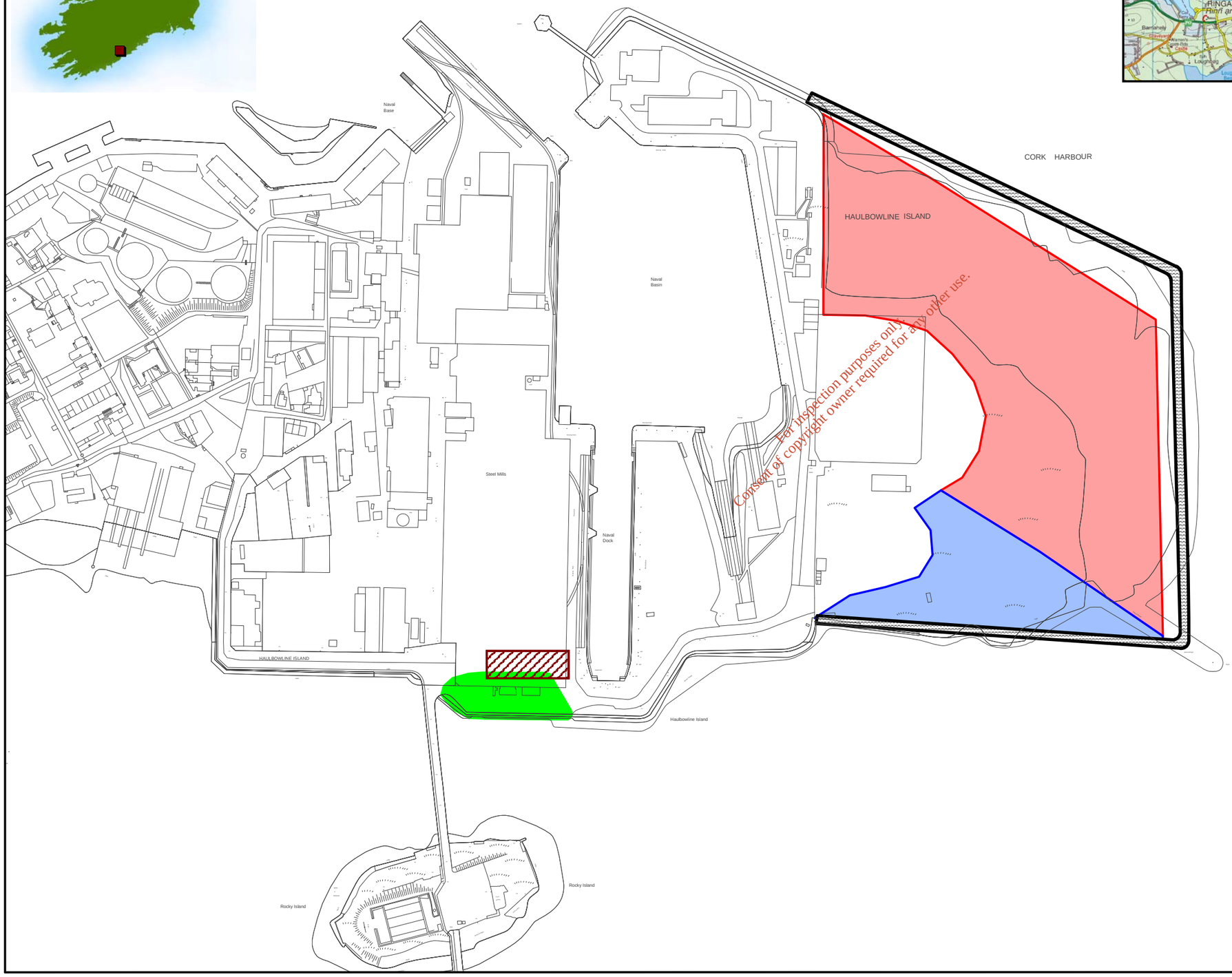
Pl. Reg. Ref. 97/4031:

- Copy Final Grant of Planning Permission
- Copy of Notification of Decision to Grant Planning Permission

Pl. Reg. Ref. 64/1246:

- Copy Final Grant of Planning Permission
- Copy Layout Plans for Bridge





Legend

- Area A (As per Planning Application 77 1907)
- Area B (As per Planning Application 77 1907)
- Sea Wall Permitted (As per Planning Application 97 4031)
- Mill Building Extension Permitted (As per Planning Application 97 4031)
- Reclaimed Area Permitted (As per Planning Application 97 4031)

Project ***Haulbowline Remediation Project***

Title

Extent of Previous Permitted Development at the Subject Site

Figure 2.1

RPS

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Issue Details

Drawn:	T Hurley	**Project No.**	MCE0734
Checked:	M Bennett	**File Ref.**	
Approved:	F Maguire	MCE0734MI0034F01	
Scale:	N.T.S	**Drawing No.**	**Rev.**
Date:	February 2014	MI0034	F01

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PI Reg. Ref. 70/1570

CORK COUNTY COUNCIL

LOCAL GOVERNMENT (PLANNING & DEVELOPMENT) ACT, 1963

M. O 1703/70
C' incoming 12/11/70
C.S. 87

To/ ~~Irish Steel Holdings,~~
~~Per Mr. Roderick Hogan, B.E.,~~
~~101 Ardoyne House,~~
~~Pembroke Park,~~
Dublin, 4.

Register No. 1570/70

APPLICATION BY Irish Steel Holdings, Per Mr. R. Hogan, B.E.,

OF 101 Ardoyne House, Pembroke Park. ON ~~12/10/70~~
Dublin, 4

FOR PERMISSION/AN APPROVAL
~~xxxxxxxxxxxxxxx~~

FOR extension and modifications

AT Steel Plant at Haulbowline

Further to notice dated ~~4/12/70~~ the Cork County Council hereby conveys a grant of Permission/Approval ~~xxxxxxxxx~~ for the development/retention ~~xxxxxxxxx~~ described above for use as ~~Steel Plant~~ subject to conditions set out in the schedule (if any) attached to the said Notice dated ~~4/12/70~~ of its intention to grant permission/approval. ~~xxxxxxxxx~~

Signed on behalf of the
Cork County Council

D. A. MURPHY

DATE: 4 JAN 1971

Room 1001,
Co. Hall,
Cork.

CORK COUNTY COUNCIL

LOCAL GOVERNMENT (PLANNING & DEVELOPMENT) ACT, 1963.

NOTIFICATION OF DECISION TO GRANT A PERMISSION/~~AN APPROVAL~~ (WITHOUT CONDITIONS) UNDER SECTION 26/~~27~~ OF THE ACT.

To/ Irish Steel Holdings,
Per Mr. Frederick Hogan. B.E.
101 Ardoyne House,
~~Pembroke Park,~~
DUBLIN 4.

Ref. No. in Planning Register. 1570/70

Application Received 12/10/70

In pursuance of the powers conferred upon them by the above-mentioned Act, the Council of the County of Cork have by order dated - 4 DEC 1970 decided to grant a permission/~~approval~~ for the development of land/~~for the extension of unauthorised structure~~, namely: Extension and modifications to Steel Plant at Haulbowline.

If there is no appeal against the said decision, a grant of permission/~~approval~~ in accordance with the decision will be issued after the expiration of the period within which an appeal may be made to the Minister for Local Government. (See footnote)

It should be noted that until a grant of permission/~~approval~~ has been issued, the development/~~extension~~ in question is NOT AUTHORISED

Signed on behalf of the said Council

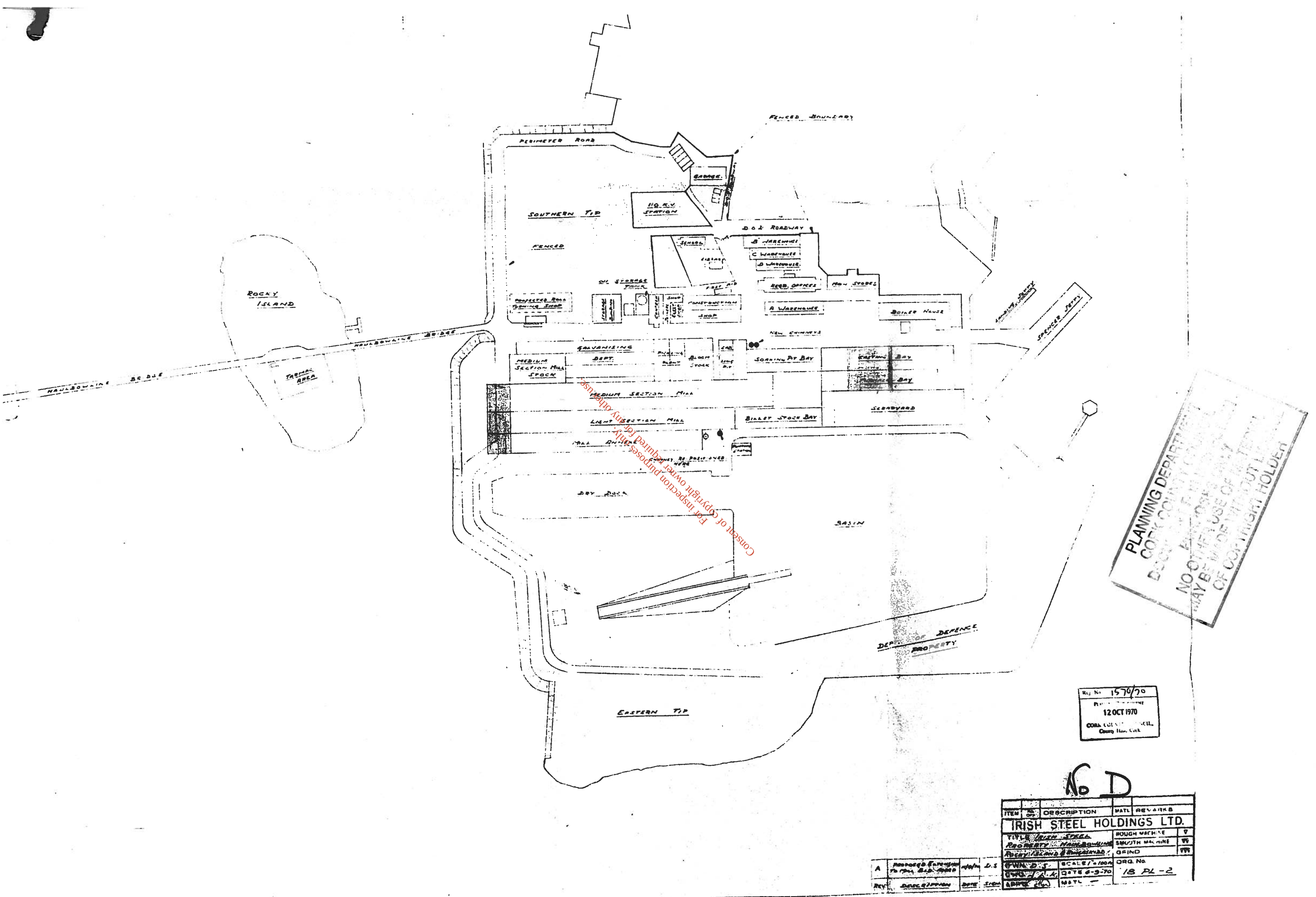
DATE: - 4 DEC 1970

Room 1001,
Co. Hall,
Cork.

NOTE:

An appeal against a decision of a Planning Authority under Section 26 or Section 27 Act of 1963 may be made to the Minister for Local Government. The APPLICANT FOR PERMISSION may appeal within ONE MONTH beginning on the day of receipt by him of the decision. ANY OTHER PERSON may appeal to the Minister within THREE WEEKS beginning date of the decision.

Appeals should be addressed to the SECRETARY, DEPARTMENT OF LOCAL GOVERNMENT (Planni Appeals Section) CUSTOM HOUSE, DUBLIN 1. An appeal by the applicant for permissior SHOULD BE ACCOMPANIED BY THIS FORM. In the case of an appeal by any other person, name of the applicant, particulars of the proposed development, or of the structure be retained and the date of the decision of the Planning Authority should be stated.



No D

ITEM	No. OFF	DESCRIPTION	MATL	REMARKS
		IRISH STEEL HOLDINGS LTD.		
TITLE: IRISH STEEL			ROUGH MACHINE	▽
PROPERTY: NAVAL BOUNDARY			SMOOTH MACHINE	▽▽
RECEIVING & DESPATCH:			GRIND	▽▽▽
DWN. D.F.		SCALE 1"=100'	ORG. No.	
CHKD. P.J.A.		DATE 5-9-70	18 PL-2	
APPD. [illegible]		MATL —		

REV	DESCRIPTION	DATE	SIGN
A	Property & Extension to Naval Base Added	16/9/70	D.S

PI Reg. Ref. 77/1907

CORK COUNTY COUNCIL

(1)

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS 1963 - 1976.

To/ Irish Steel Holdings Ltd,
Steel Makers & Rollers,
Haulbowline,
Co. Cork.

Register No. 1907/77

APPLICATION BY Irish Steel Holdings Ltd, Steel Makers & Rollers,

OF Haulbowline ON 27/6/77 & 19/11/77 (revised date)

FOR PERMISSION/[redacted]

FOR Extensions & Modifications to Steel Making Plant

AT Haulbowline

Further to notice dated 21/12/77 the Cork County Council hereby conveys a grant of Permission/[redacted] for the development/[redacted] described above [redacted] subject to the conditions set out in the schedule (if any) attached to the said Notice dated 21/12/77 of its intention to grant Permission/[redacted]

Signed on behalf of the Cork County Council.

Room 1001.
County Hall.
CORK.

E. HOARE.

DATE: 23 JAN 1978

NOTE for guidance of Developers

A grant of Planning Permission or Approval does not of itself empower a person to carry out a development unless that person is otherwise legally entitled to do so.

2

CORK COUNTY COUNCIL.

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS 1963-1976.

Notification of Decision to Grant a Permission/~~Approval~~ (Subject to Conditions).

Reference No. in Planning Register.

1907/77.

To/ Irish Steel Holdings, Ltd.
Steel Makers & Rollers,
Haulbowline,
CO. CORK.

In pursuance of the powers conferred upon them by the above mentioned Acts the Council of the County of Cork have by order dated 20 DEC 1977 decided to grant a permission/~~an approval~~ for the development of land namely:-

Extensions & modifications to Steel-Making Plant at Haulbowline.

in accordance with the plans and particulars submitted by the applicant on 27/6/77, as amended on 18/11/77, and subject to the conditions set out in Column 1 of the Schedule attached hereto. The reasons for the imposition of the said conditions are set out in Column 2 of the Schedule.

If there is no appeal against the said decision, a grant of Permission/~~Approval~~ in accordance with the decision will be issued after the expiration of the period within which an appeal may be made to An Bord Pleanala. (See footnote).

It should be noted that until a grant of permission/~~approval~~ has been issued, the development in question is NOT AUTHORISED.

Planning Dept.
County Hall,
Cork.

Signed on behalf of the said Council.

Date: 21 DEC 1977

NOTE:
An appeal against a decision of a Planning Authority under Section 26 of the Act of 1963 may be made to An Bord Pleanala. THE APPLICANT FOR PERMISSION may appeal within ONE MONTH beginning on the date of receipt by him of the decision. ANY OTHER PERSON may appeal to An Bord Pleanala within THREE WEEKS beginning on the date of the decision.

Appeals should be addressed to the SECRETARY, AN BORD PLEANALA, HOLBROOK HOUSE, HOLLES STREET, DUBLIN 2, and will be invalid unless accompanied by a deposit of £10.

An appeal by the applicant for permission SHOULD BE ACCOMPANIED BY THIS FORM. In the case of an appeal by any other person the name of the applicant, particulars of the proposed development or of the structure to be retained and the date of the decision of the Planning Authority should be stated.

3

SCHEDULE

Reference Number in
Planning Register: 1907/77.

Column 1 – Condition	Column 2 – Reason
provided that-	
(1) The siting of the boiler/compressor house shall be altered from the exposed Northern Perimeter to a protected location midway along the Eastern perimeter. The compressor shall be surrounded by an acoustically designed enclosure.	To reduce existing noise levels and to safeguard the environment of the area.
(2) (a) The net total Sound Power Emission levels of the steady and the quasi steady noise sources from the proposed total developed complex shall not be permitted to increase beyond 2 dBa above the existing level of 113 dBa re 10^{-12} watts measured at source.	To safeguard the environment of the area.
(b) A noise predication programme (e.g. Commoi) shall be embarked upon and agreement reached with the Planning Authority on the best practical Engineering methods to achieve these objectives.	
(c) All pure tones emanating from the complex shall be suppressed.	
(d) A noise monitoring system shall be installed in the vicinity of the scrap handling area aimed at a reduction of all impulsive noise Emissions from this area.	
(3) Salt water only shall be utilised for-	To limit the uses of fresh water for cooling purposes.
(i) Cooling the closed circulatory fresh water network serving the existing and proposed systems.	
(ii) Open cooling system controlling:-	
(a) The mill Rolls, (b) Bearings, (c) Certain furnace components.	contd.../

4

SCHEDULE

Reference Number in Planning Register: 1907/77 - page 2.

Column 1 – Condition	Column 2 – Reason
(4) The return cooling water from the combined cooling water streams to the estuary shall meet the following standards:- (a) In respect of the waste heat water from the cyclones, the daily flow shall not exceed 25,000 cubic metres, with a suspended Solids content not exceeding 75 mgs./litre. (b) The mass intake of Dissolved Solids in the abstracted incoming sea water for all cooling purposes, measured on a daily basis, shall not be exceeded in the returned cooling water to the estuary by more than 10% of dissolved solids in the intake sea water. (c) The maximum flow of returned cooling water from all sources shall be 43,000 cubic metres/day discharged into the tidal stream at a point not less than 1 metre below low water Ordinary Spring tide. Flow shall not exceed 2,200 cubic metres in any one hour period. (d) Temperature shall not exceed 30°C. (e) Heavy metals shall not exceed 1 mg./litre.	To prevent injury to the Fauna, Flora and marine life in the estuary and to safeguard the amenities of the area.
(5) Mill scale and other suspended matter shall be removed by cyclones or lagoon system. The extracted matter shall be disposed of on the company's disposal dump.	To ensure orderly disposal of waste and to safeguard the environment of the area.
(6) The following solid waste materials which have been heated to a minimum of 1,000°C. and which are non-toxic and cannot be leached by fresh or salt water shall be disposed of on the company's disposal dump in the area licenced by the Minister for Transport & Power.	do.

contd.../

SCHEDULE

5

Reference Number in
Planning Register: 1907/77 - page 3.

Column 1 – Condition	Column 2 – Reason
(a) Melting Furnace Slag, (b) Re-heating furnace slag (clinker scale), (c) Cyclone scale. (d) Demolition rubble from furnaces and ladles.	
(7) The emission of polluting matter to atmosphere presently through ten existing chimney stacks shall be discontinued and emissions shall in future be restricted to two stacks as follows:- (a) Emissions from the billet re-heating furnace, (b) Waste heat boiler including re-heating furnace.	To reduce emissions to atmosphere and to safeguard the environment of the area.
(8) Fume and dust generated - (a) From the melting operation shall be discharged by direct extraction method into the main flue leading to the bag filter house. (b) From the Basket Charging operation by Furnace Hood. (c) From the Furnace Tapping by Tapping Hood. (d) General leakage from the Furnace by Furnace Hood. (e) Fumes generated during the casting by Casting Machine Hood. All collected fume and dust shall be directed to the bag filter house rated at 11,300N.m^3/min for the extraction of dust. The emission from the bag filter house to atmosphere shall not exceed 115 mgs./m^3. The stack height shall be 25 metres.	do.

contd.../

SCHEDULE

6

Reference Number in
Planning Register: 1907/77 - page 4.

Column 1 – Condition	Column 2 – Reason
(f) Fume collection equipment shall be installed in the galvanising plant house to limit the emission to 230 mg/nm^3.	
(9) Dust collected by the bag filters shall be –	To protect the environment of the area.
(a) Removed off-site in sealed containers for export by seaoc: road, or,	
(b) Pelletised on site and thereafter shipped by sea in bulk, or,	
(c) Dumped in a location in Cork County, details of which shall be agreed with the Planning Authority within 6 months of the grant of permission.	
(10) Burnt lime shall be conveyed to the site in covered containers or trucks and stored in covered storage hoppers on site.	do.
(11) The basic boiler stack height for emissions from billet re-heating process shall be not less than 40 metres. The total emission of gas containing sulphur dioxide and expressed as sulphur dioxide shall not exceed 290 kgs./hour.	do.
(12) Recording and sampling points on the final cooling water pipe and atmospheric emission points shall be provided by the developer. The developer shall arrange at his own expense for regular sampling, testing and analyses of effluent and emissions to be carried out by an independent and competent person(s). The results of the analyses shall be furnished regularly to the Planning Authority, and at least once every two months.	To ensure satisfactory monitoring of discharge of the effluents to receiving water and the emissions to atmosphere.

contd.../

SCHEDULE

7

Reference Number in
Planning Register: 1907/77 - page 5.

Column 1 – Condition	Column 2 – Reason
The monitoring of the following emissions shall be provided for:- (1) Emissions from Furnace and melting shop Bag Filter to measure Kg/hour and mg/Nm^3 and the chemical composition of the dust. (2) Emission from re-heating Furnace to measure Sulphur Dioxide in Kg/hour. (3) Emission from Galvanised Bath to measure Kg/hour and mg/Nm^3 and the chemical composition of the Emission.	
(13) A baseline monitoring programme for atmospheric and Air Quality shall be carried out by the developer. This programme shall cater for continuous monitoring for a period of 6 months (with the existing plant in operation) prior to the commissioning of the new plant. This programme shall continue for a 12 month period after commissioning of the new plant and thereafter as required by the Planning Authority. The locations of the 4 monitoring stations shall be as follows:- 1. Naval Base - Haulbowline Island; 2. Cobh - at nearest point to Island as practicable; 3. Monkstown - at nearest point practicable due West of Irish Steel Holdings. 4. Ringaskiddy Village near Catholic Church.	To ensure satisfactory baseline monitoring.

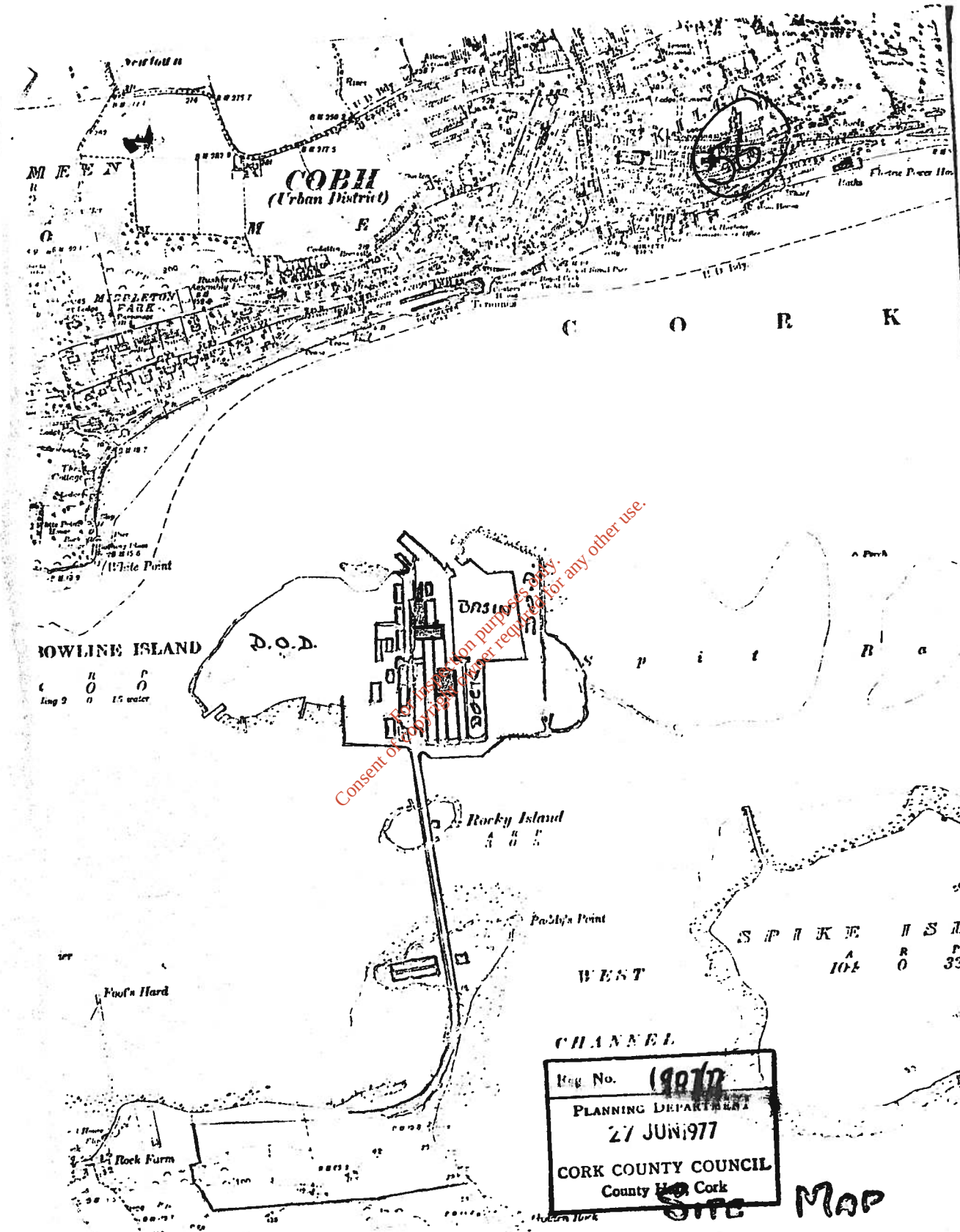
contd.../

SCHEDULE

(8)

Reference Number in
Planning Register: ~~1907/77 – page 6.~~

Column 1 – Condition	Column 2 – Reason
The monitoring requirements at each station shall be as follows:- (1) Daily average Concentration of Sulphur Dioxide. (2) Daily average Concentration of Particulates. (3) Monthly average dustfall. In addition the daily average Concentration of lead shall be monitored at Station No (1) above.	



SITE MAP

PART OF ORDNANCE SURVEY

SCALE 6" TO 1 MILE

APPENDIX B

APPENDIX F

REVISION	NO	DR.	DATE
-	-	-	-

FERRCO ENGINEERING LIMITED
WHITBY, ONTARIO, CANADA

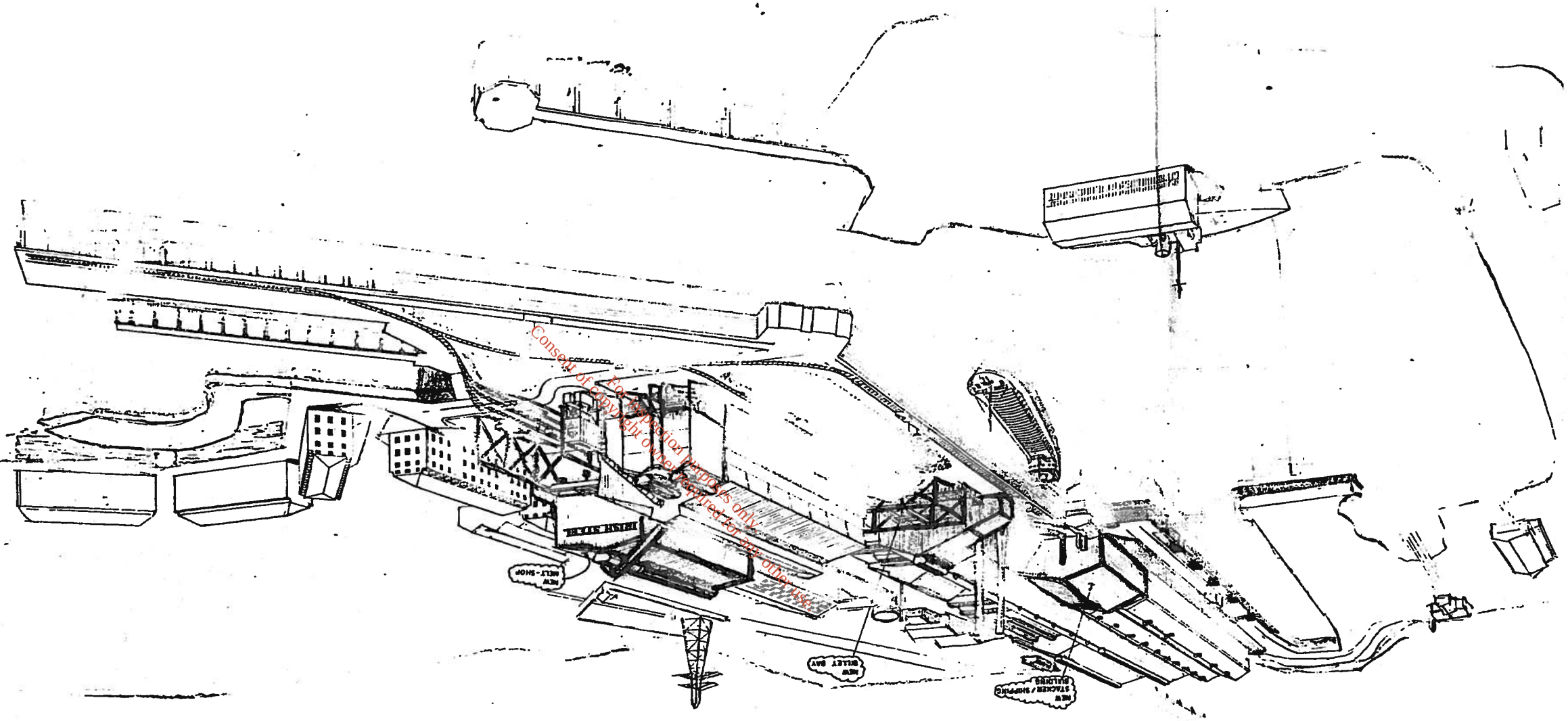
IRISH STEEL HOLDINGS

PERSPECTIVE
LOOKING FROM NORTH

DES. DR. DATE SCALE: 1 CLIENT'S PROJECT I.D.
CHK. APP. SCALE: 1 670 - 76
PROJECT NO. CLIENT DWG. NO.
CI -11

ISSUED
FERRCO ENGINEERING
APR 18 1977
LIMITED

COUNTY COUNCIL
County Hall, Cork
1907/77



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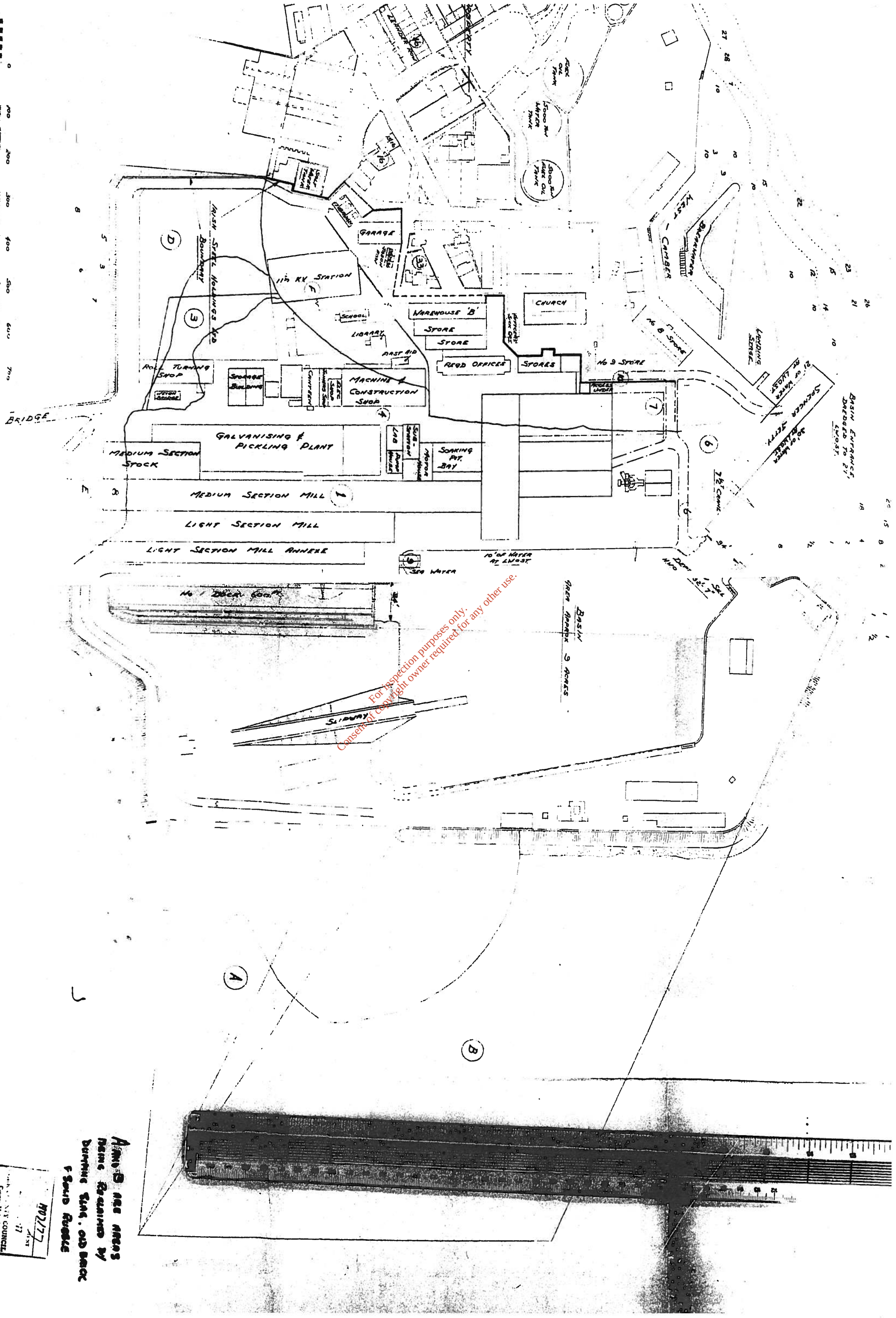


PI Reg. Ref. 97/4031

(1)

CORK COUNTY COUNCIL

Local Government (Planning & Development) Acts, 1963 - 1993

TO: IRISH ISPAT LTD
c/o Barry Kelleher &
Associates, 23 Sheraton
Court, GLASHEEN ROAD,
Cork

Planning
Register No: 8/97/4031

Application by IRISH ISPAT LTD

of c/o Barry Kelleher & Associates, 23 Sheraton Court, GLASHEEN ROAD, Cork

On 17/10/97 And as amended by Drawings on 18/11/97

for Construction of a rock armour faced sea wall on the north, south and east sides of the east tip

at HAULBOWLINE ISLAND,

Further to Notice dated 15/12/97 the Cork County Council hereby conveys a grant of PERMISSION for the application described above subject to the conditions set out in the schedule (if any) attached to the said Notice dated 15/12/97 of its intention to grant PERMISSION.

Signed on behalf of Cork County Council

Planning Dept.,
County Hall,
Cork

Date: 19/01/98

NOTE FOR GUIDANCE OF DEVELOPERS

A grant of Planning Permission or Approval does NOT of itself empower a person to carry out a development unless that person is otherwise legally entitled to do so. Unless otherwise stated or unless it is revoked a Permission is valid for a period of five years. Approval is valid only for the period of the Outline Permission to which it relates.

Any development which takes place prior to the payment of a financial contribution required by any of the conditions attached to a permission or approval will be unauthorised until compliance with the condition or conditions.

Please note that there is an onus on developers to ensure that there is no danger to the public as a result of the proposed development.

(2)

CORK COUNTY COUNCIL

LOCAL GOVERNMENT (PLANNING & DEVELOPMENT) ACTS, 1963-1993

NOTIFICATION OF DECISION TO GRANT PERMISSION (with conditions)

Reference No. in Planning Register
S/97/4031

IRISH ISPAT LTD
c/o Barry Kelleher &
Associates, 23 Sheraton
Court, GLASHEEN ROAD,
Cork

In pursuance of the powers conferred upon them by the above mentioned Acts the Council of the County of Cork have by Order dated 15 DEC 1997 decided to GRANT PERMISSION for the development of land namely;

Construction of a rock armour faced sea wall on the north, south and east sides of the east tip

AT: HAULBOWLINE ISLAND,

in accordance with the plans and particulars submitted by the applicant

On: 17/10/97
And as amended by Drawings on 18/11/97

and subject to the conditions (1 No.) set out in column 1 of the Schedule attached hereto. The reasons for the imposition of the said conditions are set out in column 2 of the Schedule.

An appeal against a decision of the Planning Authority may be made to An Bord Pleanala by any person before the EXPIRATION of the period of ONE MONTH beginning on the day of the giving (i.e. Date of Order) of the decision of the Planning Authority. (SEE NOTES ATTACHED)

If there is no appeal against the said decision, a grant of PERMISSION in accordance with the decision will be issued after the expiration of the period within which an appeal may be made to An Bord Pleanala.

It should be noted that until a grant of PERMISSION has been issued, the development in question is NOT AUTHORISED.

Planning Department,

County Hall,

Cork.

Signed on behalf of the said Council

DATE: 15 DEC 1997

SEE NOTES ATTACHED

SCHEDULE 3

Reference No. in Planning Register: 97/4031

Column 1 - Conditions	Column 2 - Reason
(1) The site shall be landscaped and planted in accordance with a comprehensive scheme to comprise predominantly native species and varieties and to include: [a] details of screen planting (which should not comprise of cupressocyparis leylandii nor grisellinia in rural situations) [b] species, variety, number and locations of trees and shrubs [c] programme for implementation of the scheme. (d) a wind protective fence shall be erected along the entire length of the sea wall/embankment to protect the shrubs and trees. Full details shall be submitted to and agreed with the Planning Authority prior to commencement of development.	In the interests of visual amenity.

PI Reg. Ref. 64/1246

CORK COUNTY COUNCIL

0587

Town and Regional Planning Acts 1934 and 1939 and Regulations

TO:— Messrs. O'Connell & Hurley,
Civil Engineers & Quantity Surveyors,
9, South Mall,
Cork.

Application Ref. No. T.P. 1246/64.

In pursuance of the powers conferred on them by the above-mentioned Acts the Council of the County of Cork, being the District Planning Authority for the SOUTH Cork Planning District hereby

GRANT SPECIAL PERMISSION for the erection of a bridge at Cork Harbour, Peckys Point

in accordance with the particulars submitted by you

and registered by the Council on the 21st August, 1964.

This Permission is granted by the Council subject to the CONDITIONS (if any) specified hereunder; and also subject to COMPLIANCE with the BUILDING BYE-LAWS, ORDERS, REGULATIONS, and general STATUTORY PROVISIONS in force in the area in which are situated the premises concerning which the application is made.

CONDITIONS:

None.

[redacted] and registered by the Council on [redacted]

This Permission is granted by the Council subject to the CONDITIONS (if any) specified hereunder; and also subject to COMPLIANCE with the BUILDING BYE-LAWS, ORDERS, REGULATIONS, and general STATUTORY PROVISIONS in force in the area in which are situated the premises concerning which the application is made.

CONDITIONS:

None.

SIGNED on behalf of the Council of the County of Cork.

Date 22 Sep 1964

.....
County Secretary.

NOTE 1: This notification does not constitute permission to commence any building operations to which the Local Bye-Laws are applicable unless and until the necessary STATUTORY BYE-LAW PERMISSION has been sought from and given by the Council.

NOTE 2: Any person aggrieved by the grant by a Planning Authority of a general or special permission or by any of the conditions attached thereto may, in accordance with Section 59 of the Act of 1934, appeal to the Minister for Local Government WITHIN ONE MONTH from the date on which such permission was granted.

The appeal should be addressed to The Secretary, Department of Local Government, Custom House, Dublin. It should state clearly the grounds on which appeal is based and the nature of the appellant's interest in the property to which it relates.

HB

SOUTH CHANNEL

PADDY'S POINT

ROCKY

Tide gauge [illegible] and Haulbowline
Zero on gau[illegible] O.D.
(Soundings rel[illegible] gauge)

Soundings taken at HW after dredging channel

Bridge Spans: Total = 650'-0"

NORTH CHANNEL

CKY ISLAND

SHEET MILL

HAULBOWLINE ISLAND

Note

All levels on this drwg are O.D. and were taken from a datum at (ie. copper pt) on steam house at Haulbowline which is [illegible] O.D.

From Admiralty chart No 3280:-
Mean High water spring [illegible]
Mean Low water spring [illegible]
Mean High water neap [illegible]
Mean Low water neap [illegible]

No.	Description	Date
	[illegible] STEEL HOUSE [illegible] STD	CONSULTING ENGINEERS CONNELL AND TIERNEY, CORK
Prepared [illegible]		Sheet [illegible]
[illegible]	[illegible]	No. 09/

1-2

C. Waste Licensing: Main Steelworks Complex

The following Licences were issued to the steelworks facility (west of the subject site):

1. Radiological Protection Act Licence

The Radiological Protection Institute of Ireland issued a Licence under the Radiological Protection Act 1991 for the storage of radioactive materials such as pipe sections.

2. Radiological Protection Act Licence

The Radiological Protection Institute of Ireland issued a Licence under the Radiological Protection Act 1991 for the custody, use and transportation of density gauges and level gauges.

3. Water Pollution Act Licence (WP(W) 11/83)

The Cork County Council issued a water pollution licence was issued to Irish Steel in 1983 to allow the discharge of cooling water and sewage to Lower Cork Harbour.

SCHEDULE C

EIS ADDENDUM 2: ADDENDUM TO CHAPTER 7 – FISHERIES IMPACT ASSESSMENT

East Tip Remediation Project

Addendum to Environmental Impact Statement: Impact Assessment on Fisheries

DOCUMENT CONTROL SHEET

Client:	**Cork County Council**					
Project Title:	**East Tip Remediation Project**					
Document Title:	**Addendum to Environmental Impact Statement: Impact Assessment on Fisheries**					
Document No:	**MCE0734RP0004A**					
This Document Comprises:	**DCS**	**TOC**	**Text**	**No. of Appendices**	**List of Figures**	**List of Tables**
	1	**1**	**12**	**0**	**1**	**0**

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F01	Final	JM	Michelle Bennett	L. O'Toole	Cork	14.02.14

TABLE OF CONTENTS

NON-TECHNICAL SUMMARY - ADDENDUM TO EIS CHAPTER 7

Introduction

This document is a Non-Technical Summary of a more detailed response to An Bord Pleanála's (ABP) Request for Further Information (RFI) dated 17th January 2014 in which they request that Chapter 7 of the EIS for the proposed East Tip Remediation be amended to include an assessment of the impacts of the proposed works to any commercial or leisure fisheries (including shellfish fisheries) within Cork Harbour.

The assessment focuses on the construction stage of the proposed development as the potential for impact lies predominantly within that phase.

Existing Environment

Commercial sea fishing for 33 species is carried out within Cork Harbour and fishing boats, including operators based in Cobh use the channel north of Haulbowline Island to transit to fishing grounds. The Inshore Fisheries Atlas identifies the area east of the island, along with the Outer Harbour and the south coast as a shrimp potting area. The entire Harbour area is identified for line fishing. An area to the east near Rostellan is identified for escallop dredging. However, there is no evidence of actively used inshore fisheries in the immediate area of the site which could interact directly with the project. Furthermore, while the channel between Haulbowline and Cobh is used for transit by fishing vessels, the use of static gear would not be permitted in this main shipping route.

No recreational fishing has been recorded at Haulbowline Island. Fishing from land occurs at Paddy's Point, Ringaskiddy (bass, dab, flounder and thornback ray etc.), Deepwater Quay, Ringaskiddy (whiting, codling, ray, coalfish, conger and three bearded rockling), Cobh, Deepwater Quay (flounder, dabs, whiting, codling, dogfish, strap conger eel, mackerel, pollock, garfish and mullet, and Cobh, Lynch's Quay (flounder, dogfish, whiting, codling, coalfish and bass). Recreational fishing boat companies operate from Cobh and around the Harbour; most activities occur in Outer Cork Harbour, or at sea. Interaction with the immediate area of the site is limited to transit.

No shellfish of commercial or artisan significance were identified during surveys of the site and surrounding area during EIS preparation. There are no records of shellfish collection in the site's vicinity; an advisory notice has been in place recommending shellfish are not eaten from the site. Oysters and mussels are grown in beds in the eastern side of the Outer Harbour (Rostellan area) and in the Belvelly Channel. There are Designated Shellfish Waters east of Haulbowline Island at Rostellan and in the Cork Great Island North Channel; the latter is separated from the East Tip by Great Island. The Rostellan area is subject to a licence renewal application for mussel culture. There are no existing aquaculture sites within the vicinity of Haulbowline Island. There is a current licence application for an aquaculture development, i.e. Oysters, on the Spit Bank and at other areas adjacent to Spike Island.

There are species that may be present in the vicinity of the site that are of commercial and recreational importance, however it is unlikely that these occur directly adjacent to and in the immediate vicinity of the East Tip given the predominantly intertidal and shallow waters. It is more likely that these fish transit the area to access more favourable locations.

Impact Assessment

The potential impacts to fisheries (commercial and recreational), which predominantly arise during the construction phase, are considered to be:-

- Interaction with or obstruction of fishing related vessels;
- Localised impacts on fish and shellfish as a result of release of sediment or contaminants, or impacts on water quality; and
- Localised effects on fish and shellfish as a result of noise; and cumulative impacts associated with other activities in the harbour.

As the proposed development does not involve significant vessel usage and works and mitigation measures (silt fencing) will be immediately adjacent to the island, no significant interaction with vessels is anticipated.

The works could result in disturbance of contaminants in the foreshore or cause additional airborne deposition in the sea, with implications for water quality, fish and shellfish and consequently fisheries and aquaculture. Potential impacts involve taints to fish or shellfish that could alter taste perceptions; taints would be below levels that would affect human health and regardless are associated predominantly associated with PAH and VOC contaminated sediments, which are not an identified issue in the East Tip foreshore. The issue of taint relates mainly to shellfish and no shellfish can be collected in the vicinity of the site; in the event of any impact this would be short-term and negligible.

Sediment control measures form part of the construction methodology (e.g. silt screens or turbidity curtains) and will be used where necessary. Additional mitigation is discussed in Chapter 14 of the EIS. A conservative coastal process model (Scenario A - see Appendix N of the EIS) that does not account for sediment mitigation measures during rock armour keystone trench excavation for example, predicts that sediment deposition would occur only in the immediate vicinity of the site. Also, increased suspended sediments are likely to be restricted to the area around the East Tip. Other simulations showed no significant impact on wave climate in the area and no effects on sediment transport within Cork Harbour. No impacts from sediments are expected to occur to fish stocks of commercial or recreational fisheries, or shellfish and aquaculture.

Chapter 13 ‘Soils, Geology and Hydrogeology’ of the EIS considers potential changes in water quality. In a ‘Do-Nothing’ Scenario, there are potential moderate adverse impacts to water quality based on current shellfish collection restrictions. With the preferred solution in place, residual impacts on water quality in the surrounding marine environment from construction due to dissolved phase contaminants are considered negligible. End-use impacts are predicted to be moderate and beneficial.

Noise may cause fish to avoid an area or exhibit behavioural changes, however this would be highly localised and short-term in duration in this case. While fish may avoid recreational fishing sites close by, stocks are likely to increase elsewhere. Given the lack of commercial fisheries within 0.14km^2 of the noise source, any behavioural changes are likely to be negligible. Furthermore, most fish species within the port can be assumed to have a level of acclimation to port activities; so most proposed construction activities are not anticipated to cause behavioural changes.

Piling however, if carried out, may have impacts (see Addendum to the Natura Impact Statement) although physical damage to fish is unlikely to occur during the proposed development as this occurs only in close proximity to piling. Piling will occur predominantly in dry intertidal sediments at low tide and although localised disturbance is predicted in a worst case scenario, piling will not be continuous.

Impacts to fish availability for recreational fisheries due to piling are considered minor and temporary. Due to the localised nature of disturbance, no impacts to commercial fishermen or upstream fishermen should arise.

Cumulative impacts on fish and shellfish could arise from the interaction of impacts associated with the remediation project with similar impacts from other marine developments/operations in the area (e.g. port activities, dredging, commercial navigations, commercial fishing, bridge remediation). As most species will have a level of acclimation to port noise, road noise etc., impacts are likely to be limited to behavioural responses to potential piling noise. Cumulative impacts, such as increased avoidance distances, may occur if activities such as dredging occur during the construction period. However, the avoidance periods in this case are likely to be similar to those referred to above.

During the end use phase, cumulative impacts may arise from loss of fish and shellfish habitat due to the presence of the PES and associated loss of intertidal habitat. Any changes in sedimentation or hydrology may also result in minor loss of habitat for fish and shellfish.

Mitigation

While limited impacts are predicted, additional mitigation is proposed to ensure no adverse impacts arise. This includes:-

- Adequate navigational warning measures should vessels be used;
- The use of Marine Notices to inform sea users of the works; and
- The appointment of a Fisheries Liaison Officer (FLO) to act as an independent liaison between the fisheries industries and the project.

The FLO will compile an initial report identifying relevant fisheries and fisheries organisations that may interact with the project to inform the site manager and Environmental Clerk of Works of fisheries usage, keep fishermen informed of the proposed construction activities and his/her contact details will be included in any contingency plans relating to events that may impact on fisheries.

Conclusion

Residual impacts are limited to highly localised avoidance of the site by fish due to noise generation, and temporary behavioural responses to piling noise, if piling is used. Residual impacts on fisheries and recreational fisheries from the construction phase will be negligible and temporary. In the long-term, a positive impact on fishing/shellfish harvesting in the area is predicted due to the predicted improvement in the quality of harbour waters.

ADDENDUM TO EIS CHAPTER 7 - COMMUNITY AND SOCIO-ECONOMICS: COMMERCIAL AND LEISURE FISHERIES IMPACT ASSESSMENT

1. INTRODUCTION

The East Tip Remediation Project Environmental Impact Statement (EIS) includes a socio-economic impact assessment within Chapter 7 'Community and Socio-Economics'. The EIS (in Chapter 14 'Ecology') also includes an assessment of impacts on fish.

An Bord Pleanála (ABP), in a Request for Further Information (RFI) dated 17th January 2014 with respect to the planning application for the proposed development (Ref. MT 04.MT0001), has requested that Chapter 7 be amended to include an assessment of the impacts of the proposed works to any commercial or leisure fisheries (including shellfish fisheries) within Cork Harbour.

2. METHODOLOGY

This impact assessment draws on information provided within Chapters 7 and 14 of the EIS and consolidates and supplements this to present a focussed assessment of impacts on commercial and leisure fisheries in a single document. Information provided within an impact assessment of piling operations on birds and cetaceans (provided in an Addendum to the Natura Impact Statement (NIS) also prepared in response to the ABP RFI) is also referenced as fish are considered therein as prey species. The assessment focuses on the construction stage of the proposed development; as the potential for impact lies predominantly within that phase.

3. EXISTING ENVIRONMENT

3.1 Commercial Fishing

There is a sizeable fishing fleet operating from Cobh. Approximately 13 sea fishing boats with polyvalent licences are registered to addresses in that area. Fishing and fish farming occur within Cork Harbour; Inland Fisheries Ireland (IFI) advises that 33 fish species are harvested commercially. Landings data for species reported under inshore fishing licences for Cork include sprat, herring, codling, and green crab. Table O1- 4 of the EIS (Appendix O1) identifies species potentially occurring in the vicinity of the site. Commercial value species are highlighted.

The Inshore Fisheries Atlas (produced by the Marine Institute), which provides details of fisheries waters up to 10 miles from the Irish coast, does not indicate commercial fishery sites in the proposed construction area. The area to the east of Haulbowline and the Outer Cork Harbour area and coastal regions are identified for shrimp potting, however the harbour is not currently in use for pots according to the Inshore Fisheries Atlas. The whole of the greater Cork Harbour area is identified for line caught fisheries including charter boats and recreational fisheries. An area to the east of the site in the Aghada – Rostellan embayment is identified for escallop dredging and has a licence application for extensive mussel culture. See Figure 1 for locations of commercial fisheries. There is no evidence of inshore fisheries in the immediate area of the site which could interact directly with the project.

The channel between Haulbowline and Cobh represents the shipping and navigation channel to the Outer Cork Harbour and marine fisheries grounds. It is anticipated that commercial fishing vessels, charter vessels, shellfisheries vessels and recreational vessels will use the immediate site area to transit. Given the significance of the channel for navigation, the static gear associated with most fisheries would not be permitted in the immediate vicinity.

3.2 Recreational Fishing

There has been no recorded activity for recreational fishing in the immediate vicinity of the East Tip. There are a number of local fishing points on the mainland however, where fishing from land occurs. The closest and one of the most popular of these is at Paddy's Point, Ringaskiddy, just to the east of Haulbowline Bridge. IFI report species fished at this site as bass, dab, flounder and thornback ray.

Three other sea angling sites are located on the mainland in the vicinity of the site:-

- Deepwater Quay, Ringaskiddy: Bottom fishing produces the Flatfish, Whiting and Codling in winter, Ray in summer, Coalfish and Conger all year round, and specimen Three Bearded Rockling.
- Cobh, Deepwater Quay: Bottom fishing produces Flounder, Dabs, Whiting and Codling in winter. Dogfish colonise the sand on occasion, strap Conger Eels and occasional bigger fish can be caught under the pilings and in summer spinning for mackerel occurs. Pollock, Garfish and mullet can also be caught here.
- Cobh, Lynch's Quay: Bottom fishing produces Flounder and Dogfish with Whiting and Codling in winter. Coalfish and Bass have been reported here.

In terms of recreational fishing from boats and sea fishing as a tourism or recreational activity, there are operators in Cobh and other sites along Cork Harbour. As with commercial fishing, these activities are targeted at other sites in the Outer Cork Harbour or at sea and therefore interaction is limited to transiting the area in the immediate vicinity of East Tip.

3.3 Shellfish and Aquaculture

There were no shellfish of commercial or artisan significance identified during the baseline Benthic Fauna survey of the site and surrounding area carried out during EIS preparation.

There are no records of shellfish collection in the vicinity; an advisory notice has been in place recommending shellfish are not eaten from the site. Oysters and mussels are grown in beds in the eastern side of the Outer Harbour (Rostellan area) and in the Belvelly Channel. See extract from Inshore Fisheries Atlas attached as Figure 2.

A submission from Bord Iascaigh Mhara (BIM) received during the EIS consultation process refers to Designated Shellfish Waters east of Haulbowline Island; these are located in the Rostellan area:-

- Rostellan North (Map 38a as referred to by the European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2009);
- Rostellan South (Map 38b as referred to by the European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2009); and

- Rostellan West (Map 38c as included in the European Communities (Quality of Shellfish Waters) (Amendment) (No. 2) Regulations 2009).

There are also Designated Shellfish Waters in the Cork Great Island North Channel (Map 39 as referred to by the European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2009), however, these are separated from the subject site by Great Island. The area to the east of the site in the Aghada-Rostellan area has a licence application for extensive mussel culture. The licence is a renewal of a historic licence for the area, and is shown as an application.

The BIM submission also confirms that while licensed aquaculture does take place within Cork Harbour, there are no existing aquaculture sites within the vicinity of Haulbowline Island. The submission refers to a licence application for an aquaculture development, i.e., Oyster cultivation, on the Spit Bank and at other areas adjacent to Spike Island.[1] The locations pertinent to the licence application are identified in Appendix E.6 of the EIS; for ease of reference however an extract from the BIM submission is attached to this report.

3.4 Fish

Table O1-4 of the EIS (Appendix O1) presents details of the fish species likely to occur at the site based on relevant literature. In terms of potential fishing activity and the area as a resource for other areas of the harbour, there are species that may be present in the vicinity of the site that are of commercial and recreational importance. Their occurrence directly adjacent to the East Tip and in the immediate vicinity is unlikely given the predominantly intertidal and shallow waters, which are of limited value to fish species. However, these species may transit the area to more favourable locations within the bay.

4. IMPACT ASSESSMENT

The potential impacts to fisheries (commercial and recreational), which will predominantly arise during the construction phase, are considered to be as follows:-

- Interaction with or obstruction of commercial fishing vessels, fishing charter or recreational fishing vessels or vessels associated with shellfisheries or aquaculture in the vicinity of the site;
- Localised impacts on fish and shellfish in the area as a result of release of sediment or contaminants or effects on water quality;
- Localised effects on fish and shellfish in the area as a result of noise impacts; and
- Cumulative impacts.

[1] The application is still pending at this time (February 2014).

4.1 Navigation and Interaction with Vessels

The construction activities proposed do not include for significant vessel usage, however, support and survey vessels will be required for the operations at the site. The construction work and mitigation measures (silt fencing) proposed are to be carried out immediately adjacent to Haulbowline Island and do not encroach into the navigable channels around the island. Therefore, the construction operations and any structures or vessels associated with same should not interact significantly with fisheries vessels (either commercial or leisure).

As there are no shellfish fisheries or aquaculture activities in the vicinity of the site, physical impacts in the form or interaction with or obstruction of such vessels are not anticipated.

4.2 Localised Potential Impacts on Fish and Shellfish in the Area Due to Release of Sediments or Contaminants or Effects on Water Quality

Construction work in the foreshore and on-site waste profiling could generate movements of contaminated material within the foreshore or additional airborne deposition in the sea. This in turn, could have implications for water standards and consequently, the fishing industry. Suspended sediments or contaminants released from the site in minor volumes could cause taints to fish or shellfish. While these would be below any levels that would affect human health, taste perceptions could be altered. This effect is however, predominantly associated with PAH and VOC contaminated sediments, which were not identified in significant quantities during site investigation. The issue of taint relates mainly to shellfish. As no shellfish can be collected in the vicinity of the site, should any impact arise it would be limited to a short-term, negligible impact.

Sediment control measures are proposed to form an integral part of the construction process (See Chapter 6 'Project Construction' of the EIS and particularly Section 6.3.7) which refers to the use of silt screens and turbidity curtains where necessary to prevent the release of sediment into Cork Harbour and other potential abatement measures against sediment re-suspension (e.g. geotextile tubes or sheet piling). Chapter 14 'Ecology' of the EIS elaborates with respect to recommended mitigation measures.

Furthermore, it should be noted from coastal process modelling carried out as part of the Coastal Processes Study (RPS 2013), which has been provided as Appendix N of the EIS, that predicted sediment deposition for the conservative Model Scenario A will be restricted to the immediate vicinity of the East Tip, with a maximum deposition of approximately 50mm in the immediate vicinity of the proposed perimeter area. In addition, increased suspended sediments are likely to be restricted to the area around the East Tip, with maximum increases of 500mg/l extending 0.1km and 0.17km to the north and east of the area respectively.[2] Hydraulic flow model simulations showed no significant impact on the wave climate in the area and no effects on the overall sediment transport regime in Cork Harbour. Thus no impacts from sediments are expected to occur to fish stocks of commercial or recreational fisheries or shellfish and aquaculture.

[2] Model Scenario A did not include any additional sediment abatement measures with respect to excavation of the rock armour keystone trench. In addition Scenario A is considered a conservative model as it has assumed that all works in the foreshore are executed over a 1 month tidal cycle as opposed to predicted 9 month period (as per Chapter 6 'Project Construction' , EIS).

In terms of potential changes in water quality, that could interact with shellfish, Chapter 13 'Soils, Geology and Hydrogeology' of the EIS refers. In a Do-Nothing Scenario, there are potential moderate adverse impacts to water quality based on current shellfish collection restrictions[3]. With respect to the proposed development, residual construction phase impacts on water quality in the surrounding marine environment from dissolved phase contaminants in seepages are considered negligible and end-use, aftercare and maintenance impacts are predicted to be moderate and beneficial.

4.3 Localised Effects on Fish and Shellfish in the Area as a Result of Noise Impacts

Potential impacts on fisheries include avoidance of the area or behavioural changes as a result of construction noise, however this would be highly localised and short-term in duration.

For recreational fishing in the immediate vicinity of the site, behavioural changes could lead to a reduction in stocks available for fishing at sites in the immediate vicinity, but may mean these fish are available at other sites. For commercial fisheries, given the highly localised potential behavioural impact (within 0.14km^2 of the source) and the lack of commercial fisheries within this area, any behavioural changes are likely to be negligible.

Most fish species within the port can be assumed to have a level of acclimation to operations, traffic and other port noise. The construction operations (except piling) and the future use of the site are comparable to the existing noise environment. No behavioural changes are anticipated as a result.

The primary significant noise generating activity will be piling, if it is required to be carried out on site. The Addendum to the NIS includes an assessment of the potential impacts of piling on fish species, in the context of fish as prey for marine mammals and birds.

Fish injury thresholds, based on the worst case scenario assessment in Table 1 below, occur only in close proximity to piling. Due to the use of sediment screening in these areas, which will exclude fish species, physical damage is highly unlikely.

[3] In a Do-Nothing Scenario there are potential moderate adverse impacts to water quality based on the existing restriction to shellfish collection. Table 13.20 of Chapter 13 states: "Although low levels of a small number of dissolved phase contaminants have been detected in low tide seepages from the site in the foreshore area and the DQRA (WYG 2013a) has predicted a potential discharge of dissolved phase contaminants, measured water quality in the marine water surrounding the site has not measured contaminants above the wider background concentrations of marine water in Cork Harbour. However, the site is currently a source of contaminated sediment material as a result of erosion and a potential source of dissolved contamination due to inundation. The area currently has a shellfish collection ban in force."

Table 1: Calculated Distance and Area Based on Fish Noise Thresholds During Sheet Pile Installation – Assumes Driving in Water with Low Attenuation Which Represents Worst Case Scenario

Pile Driving Type	Threshold (dB re 1µPa rms)	Distance(m)[1]	Area in (km2)
Vibration installation	Level A (injury threshold) 180	0.74	0
	Level B (behavioural threshold(all):150 dB re 1 µPa rms	73.6	0.011
Impact	Injury (all): 206 dB re 1 µPa rms	8.6	0.00058
	Injury (≥ 2g): 187 dB re 1 µPa2sec SEL	21.6	0.00019
	Injury (< 2g): 183 dB re 1 µPa2sec SEL	39.9	0.0045
	Behavioural (all):150 dB re 1 µPa rms	398.1	0.14

Notes: All sound levels expressed in dB re 1 µPa rms. dB=decibel; rms=root-mean-square; µPa=microPascal;
Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations which represents worst case in shallow water ; and
[1]Sound pressure levels used for calculations are given in NIS Addendum.

In the case of behavioural changes and avoidance, the effects from pile driving are only likely within close proximity to the site. A conservative threshold for behavioural change of 150dB has been assessed and due to the frequency of the noise and the variability of fish receptors, this represents a worst case scenario for many fish species. In addition, any piling will predominantly occur in dry intertidal sediments at low tide, meaning a greater reduction in likely noise propagation and the distances at which sound occurs at the behavioural disturbance threshold may be shorter than estimated.

Behavioural effects in fish are predominantly exhibited as startle and avoidance responses. Richardson (1995) recorded behavioural avoidance due to seismic operations for approximately 24hrs with a maximum avoidance of 5 days for fish density to return to normal, Knudsen (1992)[4] records similar effects in salmon. Robertis and Handegard (2013) [5] record highly localised displacement as a result of low frequency noise (>1000 Hz) disturbance lasting only for the duration of the noise.

Assuming a worst case, there may be localised disturbance of fish species during piling operations. Piling installation, if required, is estimated at a total of 70 days operation (including 20 days contingency) and not continuous, therefore impacts to fish availability for recreational fishermen are minor and of short duration. Piling is expected to be carried out in a phased manner.

Due to the localised nature of the disturbance no impact to commercial fishermen or upstream fishermen should arise.

[4] Knudsen F. R., Enger P. S., Sand O. Awareness reactions and avoidance responses to sound in juvenile Atlantic salmon. Salmo salar L. Journal of Fish Biology 1992;40:523-534.
[5] Robertis A and Handegard N 2013 Fish avoidance of research vessels and the efficacy of noise-reduced vessels: a review ICES J. Mar. Sci. (2013) 70 (1): 34-45. doi: 10.1093/icesjms/fss155

4.4 Cumulative Impacts

Cumulative impacts on fish and shellfish may arise from the interaction of impacts originating from the construction or end use, aftercare and maintenance works with similar impacts arising from other marine developments and operations in the wider region, including port and harbour dredging, commercial navigations and commercial fishing and the proposed bridge rehabilitations works.

Most species will have a level of acclimation to port noise, road noise etc. and impacts are only likely to be associated with behavioural responses to piling noise. Cumulative impacts may occur if major port operations such as dredging occur during the construction period. In this case there may be an increased distance in avoidance of the site due to cumulative impacts. Even in these cases studies of gadoid species show a return to normal distribution and behavioural patterns within five days of major noise disruption, (Richardson, 2005, see Addendum to NIS) and a much shorter period for low frequency noise disturbance (Robertis et al 2013).

During the end use, aftercare and maintenance phase, cumulative impacts may arise from loss of fish and shellfish habitat due to the presence of the PES and associated loss of intertidal habitat. Any changes in sedimentation or hydrology may also result in minor loss of habitat for fish and shellfish.

5. MITIGATION

Due to the low occurrence of fisheries and recreational fisheries in the immediate area of the proposed works, the distances to fisheries and the limited potential for sediment transport within the Harbour, limited interaction with commercial and recreational fisheries (including shellfish fisheries) is expected and therefore limited mitigation is required.

At the outset, it should be noted that control measures will be put in place during construction to mitigate sediment release during the construction phase (See Chapter 6 ‘Project Construction’ of the EIS and also Section 14.5 Mitigation of Chapter 14 ‘Ecology’ of the EIS). Proposals for water quality monitoring have also been provided (See Chapter 13 ‘Soils, Geology and Hydrogeology of the EIS).

The main potential for interaction relates to transit across the area by recreational and commercial fisheries vessels and shellfishery and aquaculture vessels.

During construction, should vessels need to be used, adequate navigational warning measures should be ensured to be in place.

Mitigation will be in line with marine navigation best practice. Details of the proposed construction works will be announced via Marine Notice to inform all sea users of the operation.

To ensure minimisation of any disruption to vessels transiting the site or selection of fishing points, Marine Notices will be sent to organisations such as www.seaanglers.ie and advertised in the Marine Times and Fisheries Journal.

Notwithstanding the limited potential for impacts, in order to mitigate any impacts arising from the proposed construction activities it is proposed to appoint a Fisheries Liaison Officer (additional detail is provided below in section 5.1).

No fisheries or shellfisheries will be affected in the long-term.

5.1 Appointment of a Fisheries Liaison Officer

A Fisheries Liaison Officer (FLO) will be appointed. The FLO will act as an independent mediator and contact between the Fisheries industries and the project.

The initial role of the FLO will be to contact relevant fisheries organisations and compile a Fisheries Liaison report which identifies fisheries and fisheries industries that may interact with the project, including seasonal variability and target species.

This will be done through consultation with fishermans' associations and fishermans' co-operatives, individual operators and the recreational industry.

The FLO report will inform the site manager and Environmental Clerk of Works of the fisheries usage of the area.

The report will outline the proposed fisheries activity that will occur during the construction period and the need for area usage, the gear to be deployed on the sea bed, the location of the gear and landing ports, the type of gear, and any other pertinent matters such as seasonality.

During construction the FLO will act as a point of contact between the project and fishermen, keeping the latter informed of the proposed construction activities and acting as a mediator in the case of issues.

In the event of issues on site such as breach of the sediment barrier or other actions that may impact fisheries quality, the FLO contact details will form part of a contingency plan to ensure commercial and recreational fisheries are kept informed of any issues and more general issues such as any changes in timings and operations.

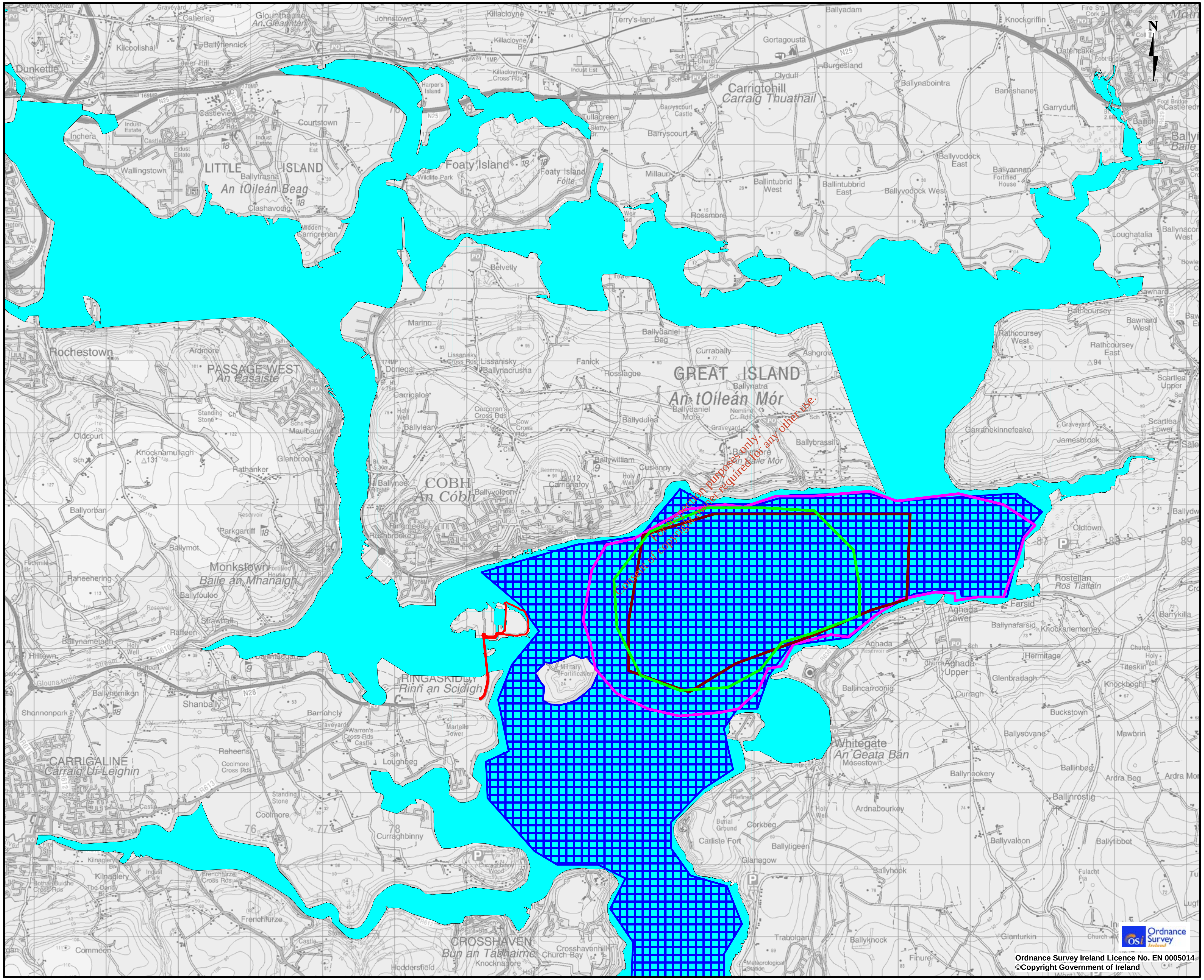
The terms of reference for an FLO are outlined by the offshore fishing industry and are available via the Irish Offshore Operators Association as published by the UKOOA.

6. RESIDUAL IMPACTS AND CONCLUSION

There is the potential for highly localised avoidance of the site by fish due to noise generation, but any such effects will be short term. There may be temporary behavioural responses to piling noise, if piling is used on site.

The potential impacts on fisheries and recreational fisheries from the construction phase are of minor significance and negligible impact and of a temporary nature.

In the long-term, a positive impact on fishing/shellfish harvesting in the area is predicted due to the predicted improvement in the quality of harbour waters.



Legend

- Study Area Boundary / Extent of works
- Trawl
- Dredge
- Draft Nets
- Crustacean Pot
- Line Caught Fishing Incl. Charter Boats and Recreational Fisheries

Title

LOCATION OF INSHORE FISHERIES AREAS

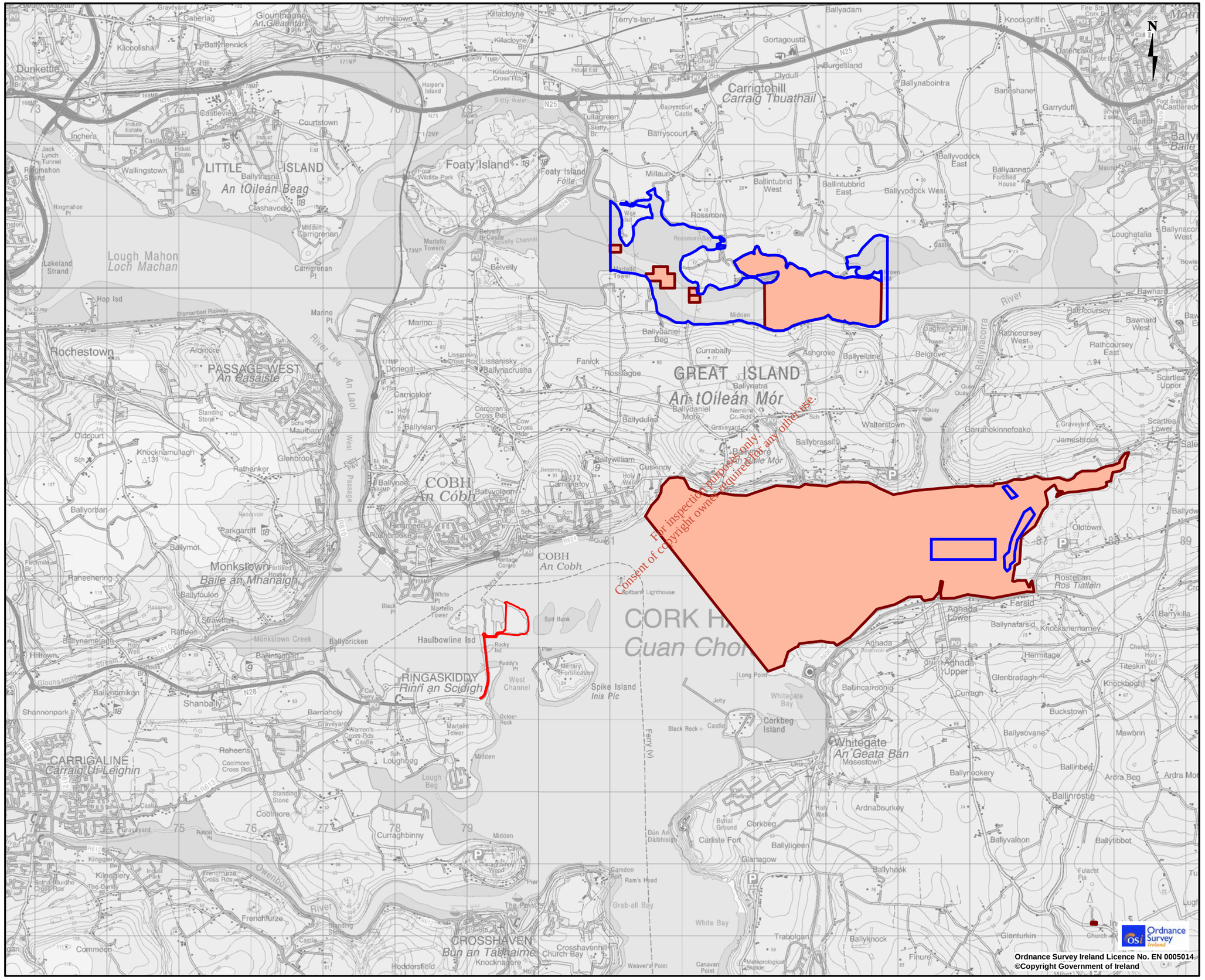
Figure 1.0

File Ref: MCE0734MI0036F01
Date: February 2014
Rev : F01

East Tip Remediation Project

EAST TIP REMEDIATION PROJECT

RPS



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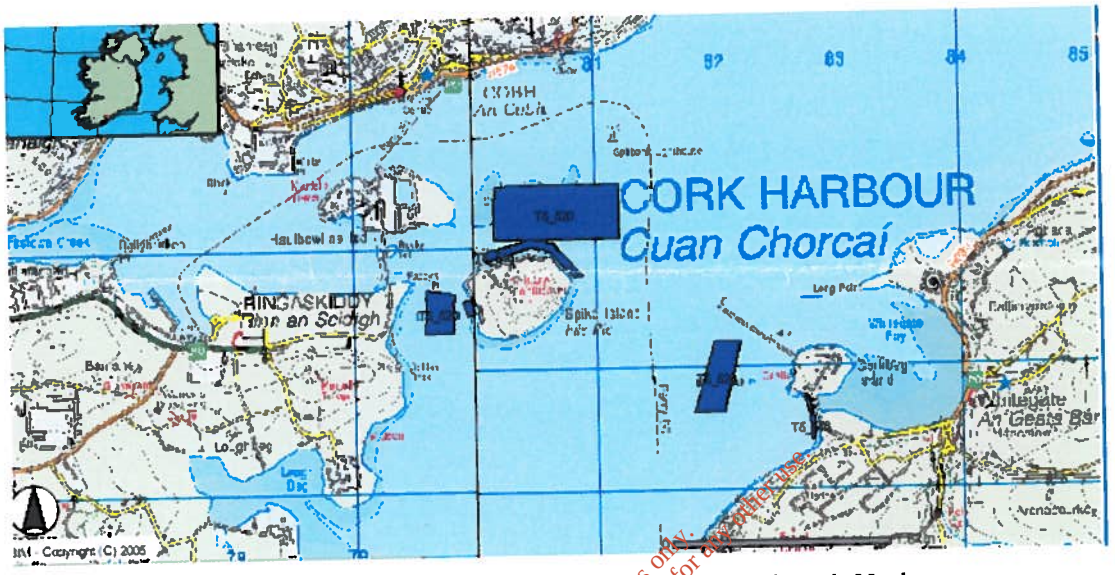
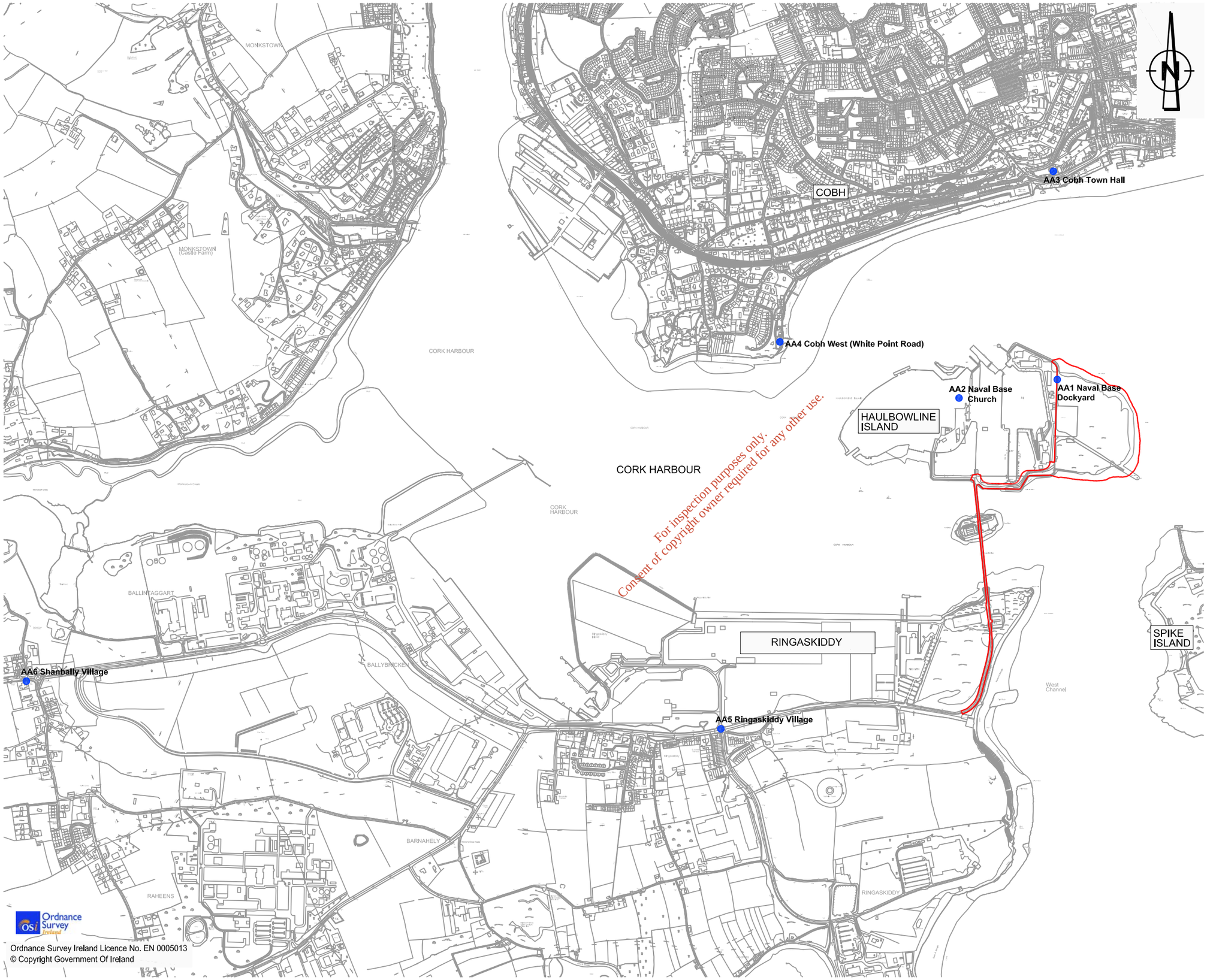
Bord Iascaigh Mhara
Irish Sea Fisheries Board



Aquaculture Licence applications in the Hawbowline Area of Cork Harbour.

SCHEDULE D

REVISED EIS FIGURE 9.2



LEGEND:

Site Works Boundary

Proposed Air Monitoring Locations

Title
PROPOSED REMEDIATION AIR MODELLING LOCATIONS

Figure 9.2

File Ref : MCE0734 Figure 9.2
Date : Feb 2014 Rev : F02

East Tip Remediation Project

EAST TIP REMEDIATION PROJECT

RPS

SCHEDULE E

EIS ADDENDUM 3: CONSTRUCTION SEDIMENT SAMPLING PROGRAMME

Before and After Construction Sediment Sampling Programme

	Pre construction	During Construction	Post Construction			Relevant	
	1 year	18months (approx.)	1st Year	2nd year	Year 3-5	Guidance/Regulations/References/	Locations
Marine Sediments	Pre-construction assessment has been carried out for the EIS and includes on site and marine sediment quality monitoring points (see Section 14.3 of the EIS). No further pre-construction surveys are proposed.	Six monthly sediment sampling will be undertaken at the 6 monitoring sites for marine sediment quality identified as showing exceedances in Figure 15 of the "Environmental Assessment of the East Tip area of Haulbowline Island" by White Young Green (2008) and reported on in the in the DQRA (WYG, 2013) report. Sampling will consist of a 0.1m Grab or Hammon Grab and adhere to the 2008 Project Site Sampling Protocols. Samples will be assessed for parameters of concern at the site (see Table 13.24 of the EIS). The residue will be retained (frozen as per the sampling protocol) for the construction period in the event further analysis is required. Visual inspections by ECoW will be undertaken of all sediment screens during the construction stage.	6 monthly basis for 12 months post construction	Annually	A sampling event will occur in year 3 and year 5 post construction.	Project sampling protocol as used previously and included in "Environmental Assessment of the East Tip area of Haulbowline Island" by White Young Green for the Department of the Environment, Heritage and Local Government	Sediment sampling locations M01, M02, M04, M09, M011 , MO15 as identified in Figure 15 of "Environmental Assessment of the East Tip area of Haulbowline Island" by White Young Green for the Department of the Environment, Heritage and Local Government

SCHEDULE F

FLOOD RISK ZONES

NOTES

1. This drawing is the property of RPS Group PLC, it is a confidential document and must not be copied, used, or its content divulged without prior written consent.
2. Verifying Dimensions.
   The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
3. Existing Services.
   Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
4. Issue of Drawings.
   Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.
5. Datum: Ordnance Survey Datum, Malin Head

LEGEND:

- Flood Zone A
- Flood Zone B
- Flood Zone C

No.	Date	Dr. / Ch.	Amendment / Issue	App
P02	05.02.14	TH / BB	Planning Issue	FM
P01	03.02.14	TH / BB	Not Issued	FM

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Client: Cork County Council

Project: Haulbowline East Tip
Planning Application

Title: Flood Zone Map - Existing

Drawing Status	Sheet Size	Drawing Scale
Planning	A1	1:1000 @ A1

Drawing Number	Rev
MCE0734/Dg 0018	P01

Drawn By	Checked By	Approved By	Date
TH	BB	FM	03-02-14

MCE0734DWG0018 (Flood Zoning).dwg
EPA Export 23-05-2014:23:42:24

SCHEDULE F

GREENFIELD RUNOFF CALCULATIONS

HR Wallingford
Working with water

Greenfield runoff estimation for sites

Site name:

Site location:

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Site coordinates

Latitude:	51.82786° N
Longitude:	8.31133° W

Reference:	undefinedundefined / 6
Date:	4 Feb 2014

Site characteristics

Total site area	6	ha
Significant public open space	0	ha
Area positively drained	6	ha

Methodology

Greenfield runoff method	IH124

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type
SOIL type	2
HOST class	N/A
SPR	0.30

Hydrological characteristics

	Default	Edited	
SAAR	1030	1030	mm
M5-60 Rainfall Depth	17	17	mm
'r' Ratio M5-60/M5-2 day	0.3	0.3	
FEH/FSR conversion factor	1	1	
Hydrological region	13	13	
Growth curve factor: 1 year	0.85	0.85	
Growth curve factor: 10 year	1.4	1.4	
Growth curve factor: 30 year	1.65	1.65	
Growth curve factor: 100 year	1.95	1.95	

Greenfield runoff rates

	Default	Edited	
Qbar	17.18	17.18	l/s
1 in 1 year	14.60	14.60	l/s
1 in 30 years	28.35	28.35	l/s
1 in 100 years	33.50	33.50	l/s

Please note that a minimum flow of 5 l/s applies to any site

HR Wallingford
Working with water

Greenfield runoff estimation for sites

Site name:

Site location:

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

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Longitude:	8.31133° W

Reference:	undefinedundefined / 6
Date:	4 Feb 2014

Site characteristics

Total site area	6	ha
Significant public open space	0	ha
Area positively drained	6	ha

Methodology

Greenfield runoff method	FEH

Qmed estimation method	Calculate from BFI and SAAR	
BFI and SPR estimation method	Calculate from dominant HOST	
HOST class	N/A	
BFI / BFIHOST	0.00	
Qmed	N/A	l/s
Qbar / Qmed Conversion Factor	N/A	

Hydrological characteristics

	Default	Edited	
SAAR	1030	1030	mm
M5-60 Rainfall Depth	17	17	mm
'r' Ratio M5-60/M5-2 day	0.3	0.3	
FEH/FSR conversion factor	1	1	
Hydrological region	13	13	
Growth curve factor: 1 year	0.85	0.85	
Growth curve factor: 10 year	1.4	1.4	
Growth curve factor: 30 year	1.65	1.65	
Growth curve factor: 100 year	1.95	1.95	

Greenfield runoff rates

	Default	Edited	
Qbar	---	---	l/s
1 in 1 year	---	---	l/s
1 in 30 years	---	---	l/s
1 in 100 years	---	---	l/s

Please note that a minimum flow of 5 l/s applies to any site

HR Wallingford Ltd, the Environment Agency and any local authority are not liable for the performance of a drainage scheme which is based upon the output of this report.