11 MATERIAL ASSETS

11.1 INTRODUCTION

This chapter of the EIAR provides an assessment of the likely impacts of the proposed dredging and land reclamation works on material assets at Howth Fishery Harbour Centre. Material assets are defined in the EPA 'Advice Notes For Preparing Environmental Impact Statements' (draft 2015) as 'resources that are valued and that are intrinsic to specific places, they may be either of human or natural origin and the value may arise for either economic or cultural reasons'. The facility's utilisation of the area's material assets, or proximity to these material assets, can lead directly and indirectly to potential environmental impacts. The purpose of this assessment is thus to identify these assets, determine the impact, if any, on these resources, and propose mitigation where necessary to ensure that they are used in a sustainable manner.

This chapter considers physical resources in the environment which may be of human origin, as those of a natural origin are addressed elsewhere in the EIAR. The objective of the assessment is to ensure that these assets are used in a sustainable manner, so that they will be available for future generations, after the delivery of the proposed development.

11.1.1 Scope of Assessment

The proposed development involves dredging and land reclamation works at the Howth FHC consisting of the following main elements:

- Dredging the harbour;
- Reclaiming land on the west side of the West Pier using dredge material;
- Coastal protection works to the perimeter of the reclaimed area;
- Landscaping on the reclaimed area;
- Provision of pavements e.g. footways, roadways and parking areas;
- Construction of slipway for access to the water;
- Provision of storage areas for harbour activities; and
- Provision of services.

Please refer to **Figure 11.1** below which illustrates the main features of the proposed development.

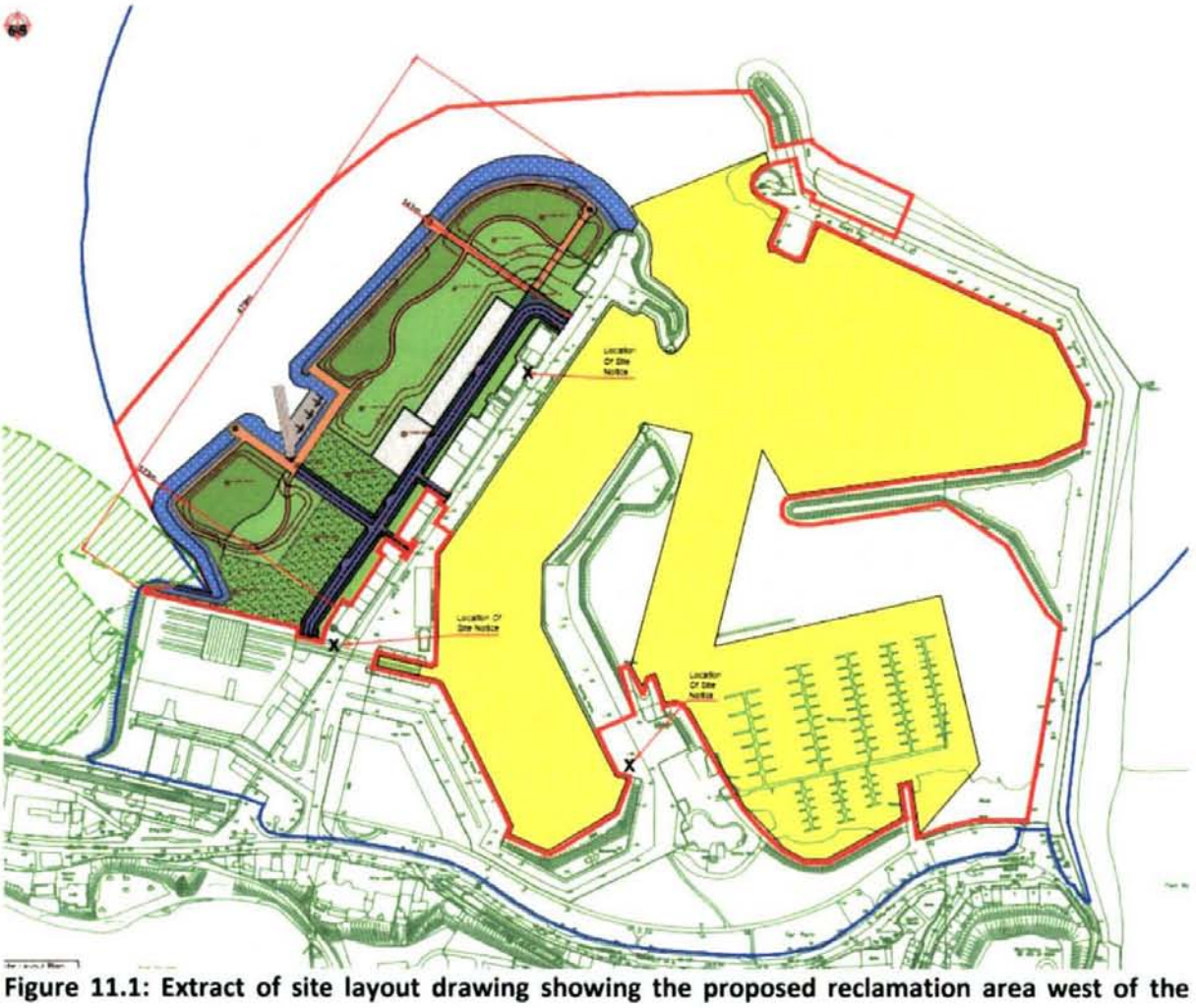


Figure 11.1: Extract of site layout drawing showing the proposed reclamation area west of the West Pier and the dredge area in yellow (Drawing no. 19934-5002 Site Layout Plan, Appendix 13 Volume 3 of this EIAR).

11.1.2 Methodology

The methodology used for the study included desk based research and site visits. The desk study and assessment was carried out in accordance with the following regulations and guidelines:

- The requirements of EC Directives and Irish Regulations regarding Environmental Impact Assessment;
- Guidelines on the Information to be Contained in Environmental Impact Statements (Draft) (Environmental Protection Agency, August 2017);
- Advice Notes For Preparing Environmental Impact Statements' (draft EPA 2015 Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of the Environment, Community and Local Government [DoECLG], 2013).

The methodology recommended in the aforementioned 2017 EPA Draft Guidelines has been followed. This chapter is based on the data gathered during the assessment process. The chapter applies accepted methodologies in determining if impacts will be significant and recommends mitigation measures to reduce or avoid impacts where possible. Any likely impact the proposed

development may have on assets is assessed with the aim of ensuring reasonable and sustainable use of resources.

Based on a desktop review of the proposed development and the suggested topic areas, material assets which may potentially be affected by the proposed development have been identified below and are divided into the following sub-sections:

Material Asset	Topics to be Covered
Built Services	Electricity Gas Water Supply Infrastructure Sewerage
Waste Management	Waste Infrastructure Waste Handling, Collection & Disposal Arrangements

The majority of the topic areas identified for assessment under Material Assets are closely related to other sections of this EIAR and therefore reference should also be made to the associated chapter as follows:

- An assessment on the water resources is provided in **Chapter 7, Water.**
- The assessment on the soils resource is presented **in Chapter 6, Land and Soils.**
- Chapter **8, Air Quality and Climate** provides an assessment on air as a resource. No further assessment on this topic is included in this chapter.
- The assessment on the road users of local road infrastructure is provided in **Chapter 13, Traffic & Transportation.**
- The assessment on Archaeological and Cultural Assets is provided in **Chapter, 10 Archaeology and Cultural Heritage.** No further assessment on this topic is included in this chapter.
- Impacts on landscape, people and amenities are addressed in **Chapter 9 Landscape/Seascape and Visual Assessment** and **Chapter 4 Population and Human Health**.

The consideration of the projects impact on material assets provided within this Chapter is discussed in the context of built services and waste management, e.g.:

- Electricity;
- Water Supply, Wastewater and Gas Infrastructure
- Resource Use and Waste Management

11.2 EXISTING ENVIRONMENT

The following section discusses the material assets outlined above in the existing environment relevant to the development.

11.2.1 Electricity, Water Supply, Wastewater and Gas Infrastructure

The proposed development is mostly over water and there are no existing utilities within the area of the land reclamation or the dredge footprint within the harbour. The two proposed construction compound areas are on the Middle Pier and the West Pier. Both the Middle Pier and the West Pier have electricity which is supplied by the local ESB network. The West Pier has a gas line for use by the existing premises if required. There is a water main line on both the Middle and West Pier and a foul water line on the West Pier.

11.3 LIKELY SIGNIFICANT IMPACTS

11.3.1 Electricity

A new electrical network will be created for the land reclamation area and will be supplied by connection to the mains. The proposal will not require any modification to the overall local ESB infrastructure. During the construction phase of the proposed project, connections will be made to the mains and generators may also be used where required. Electrical ducting will be installed to facilitate low level lighting along footpaths and to enable future electrical connections. There will be no impact on electricity from the proposed works.

11.3.2 Water Supply

Water Supply

There is a water requirement for the treatment process, welfare facilities and cleaning. During the construction phase, approximately 500m^3/day of water will be used for mixing during the dredge spoil treatment process. The majority of this water will be sea water, however there will be a need for circa 10% freshwater supplied by the mains water system at a rate sufficient to create a homogeneous and pumpable slurry. Up to 100 m^3/day of mains water may be required for welfare facilities and other uses during the construction phase. During the operational phase, outdoor showers and taps will be provided which will be connected to the mains water on the west pier. Water connection and usage during the construction and operational phases will be in accordance with necessary permissions obtained from Irish Water. The impact on the public water system will not be short term and not significant.

Wastewater

During construction the wastewater from the welfare facilities within the construction compounds will be collected and disposed of off site at a suitably licensed wastewater facility.

During reclamation works, excess water will rise to the surface of the stabilised mass. This water will be contained within the impermeable perimeter bund of the reclaimed land area. The excess water will be re-circulated by pump back into the treatment plant for re-use in mixing the dredge material and binder. Disposal or discharge of excess water that is not needed for re-circulation purposes may

be required. The excess water will be treated onsite and discharged to the sewer/stormwater system as a treated trade effluent. All discharge of the treated excess water or trade effluent will be carried out under applicable consents from Irish Water, Fingal County Council and/or the EPA.

The current wastewater system will have an increase in load due to this trade effluent. The increase in load on the wastewater system will be short term as it will only last for the duration of the dredging works. Any discharge of trade effluent will be within the capacity limits and permission of Irish Water. Due to the discharge only taking place if Irish Water can accommodate it, the impact on the wastewater system is short term and not significant.

There will be no operational phase generated wastewater from the project.

11.3.3 Resource Use and Waste Management

Approximately 500m^3 of dredge spoil will be dredged, treated and deposited per day. The dredge material will be placed into floating dump barges before eventually being treated into a wet mix for the land reclamation area. All excavated dredged material will be re-used in the development of the reclaimed area. The treatment and reuse of the dredge material will be undertaken in accordance with an appropriate waste or Industrial Emissions licence from the EPA. The avoidance of waste production by the beneficial reuse of circa 240,000m^3 of dredged material for the benefit of land reclamation is considered a significant permanent positive effect on resource use and waste management.

It is envisaged that the waste generated will be minimal and will also be strictly controlled. Good site practice and careful management on site will ensure efficient resource management and a reduction in waste. Any waste generated on site will be segregated at source and will be taken off site to an appropriate facility by an authorised contractor. All waste streams will be identified within the contractors waste management plan at the outset and a defined area will be identified for the segregation and storage of waste. Adequate signage and notices will be provided on site along with training and supervision of staff to ensure compliance with sound waste management practice.

Tight site controls as part of the contractors Waste Management Plan and Construction and Environmental Management Plan will ensure minimal waste is generated and minimise the risk of pollution.

11.4 MITIGATION

Mitigation in relation to material assets such as roads, natural resources and cultural assets have been addressed in the relevant chapters of the EIAR.

The contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services unless this has been agreed in advance with the relevant service provider. In addition the contractor will ensure that all the measures outlined in the CEMP are implemented.

11.4.1 Resource Use and Waste Management

Good site practice and careful management on site will ensure efficient resource management and a reduction in waste. Any waste generated on site will be segregated at source and will be taken off

site to an appropriate facility by an authorised contractor. All waste streams will be identified within the contractor's waste management plan at the outset and a defined area will be identified for the segregation and storage of waste. Adequate signage and notices will be provided on site along with training and supervision of staff to ensure compliance with sound waste management practice.

The waste treatment activity and placement of the treated material will be undertaken in accordance with the conditions of a waste or IE licence from the EPA.

Controls as part of the contractor's Construction and Environmental Management Plan will ensure minimal waste being generated and minimise the risk of pollution. Fully registered waste management companies will only be used to remove waste from the site. Standard good practice of only ordering the required amount of materials will be implemented.

The small quantities of solid waste (packaging, surplus construction materials, etc) generated during the construction stage of the project will be sorted on site prior to disposal/recycling as appropriate off site by a licensed waste contractor.

11.5 RESIDUAL IMPACTS

The impact of the proposed project on resource use is a permanent significant positive effect. The impact of the proposed project on other material assets will be a short term not significant effect.

11.6 REFERENCES

Environmental Protection Agency (EPA), 2003. *Advice Notes on Current Practice in the Preparation of Environmental impact Statements*

Environmental Protection Agency (EPA), 2017. *Guidelines on the Information to be Contained in Environmental impact Assessment Reports (Draft)*

Environmental Protection Agency (EPA), 2002. *Guidelines on the Information to be contained in Environmental Impact Statements*

Environmental Protection Agency (EPA), 2015. *Revised Advice Notes for Preparing Environmental Impact Statements (Draft)*

12 NOISE AND VIBRATION

12.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) describes the potential noise and vibration impact from the proposed Howth Harbour Dredge Project on the receiving environment. A detailed description of the proposed development is provided in **Chapter 2** of this EIAR.

Howth Fishery Harbour Centre (FHC) was last dredged in the 1980s, and due to build-up of siltation, it is necessary to dredge the existing basins & approach channels in Howth Harbour in order to provide safe access, navigation and berthing to the vessels currently using the harbour. The dredge material will be used as infill for the land reclamation and revetment construction works.

12.1.1 Potential Noise Sources

There will be noise and vibration from the plant and machinery employed to undertake the works. The main items of plant will include a long reach excavator, a smaller excavator, and the pumps to transfer material to the treatment plant and processes the material. The plant and machinery will typically include (see also Chapter 2):

- Long reach excavators
- Floating pontoon barge/ Floating dump barge
- Working and Safety boats
- Excavators
- Dump and Delivery trucks
- Soil treatment plant
- Rollers/ Pavers for the finishing phase of the infill works.

There will be underwater rock breaking and 10% of the dredge material will be rock broken out under water (approx. 24,000 tonnes). Breaking will be carried out by a long reach excavator using a rock breaker attachment such as a Sandvik G130. The broken rock will then be excavated from the bed by the long reach excavator with a bucket attachment. As the breaking takes place underwater the impact on land will not be significant.

Not all equipment will not be in operation continuously or simultaneously and works will take place at different locations around the works area. The works will be temporary and will be complete in approximately 24 months.

Once complete, space will be provided for harbour business and operations. This may include some light industrial and commercial activities. The nature of these activities is unknown at this stage and will be subject to separate planning applications. Any potential noise impact from future occupiers of these buildings will be fully assessed at that stage.

12.1.2 Fundamentals of Noise

Fundamentally, noise is vibrations of the air which are detectable by the ear. Sound waves radiate out spherically from a sound source in three dimensions. The human ear can detect a very wide range of pressure variations. In order to cope with this wide range, a logarithmic scale (decibel (dB) scale) is used to translate pressure values into manageable numbers from 0dB to 140 dB. 0 dB is the threshold of hearing and 120 dB is the threshold of pain.

Measuring in decibels means that a 3 dB increase is equivalent to a doubling of the sound energy and a 10 dB increase in a tenfold increase in energy. For broadband sounds which are very similar in all but magnitude, a change or difference in noise level of 1 dB is just perceptible under laboratory conditions, 3 dB is perceptible under most normal conditions and a 10 dB increase generally appears twice as loud. A healthy human ear is also sensitive to a large range of frequencies (approximately 20 Hz to 20,000 Hz) and varies in sensitivity depending on the frequency.

The human ear is not equally sensitive to sound at all frequencies and is less sensitive to sound at low frequencies and high frequencies. A -weighting (dB A) is the main way of adjusting measured sound pressure levels (noise) to take account of the uneven human response to frequencies.

Figure 12-1 illustrates some everyday sounds on the dB(A) scale. A quiet bedroom is around 35 dB(A), a busy office around 60dB(A) and a rock concert around 100 dB(A). The illustration is extracted from draft Wind Energy Development Guidelines 2019.

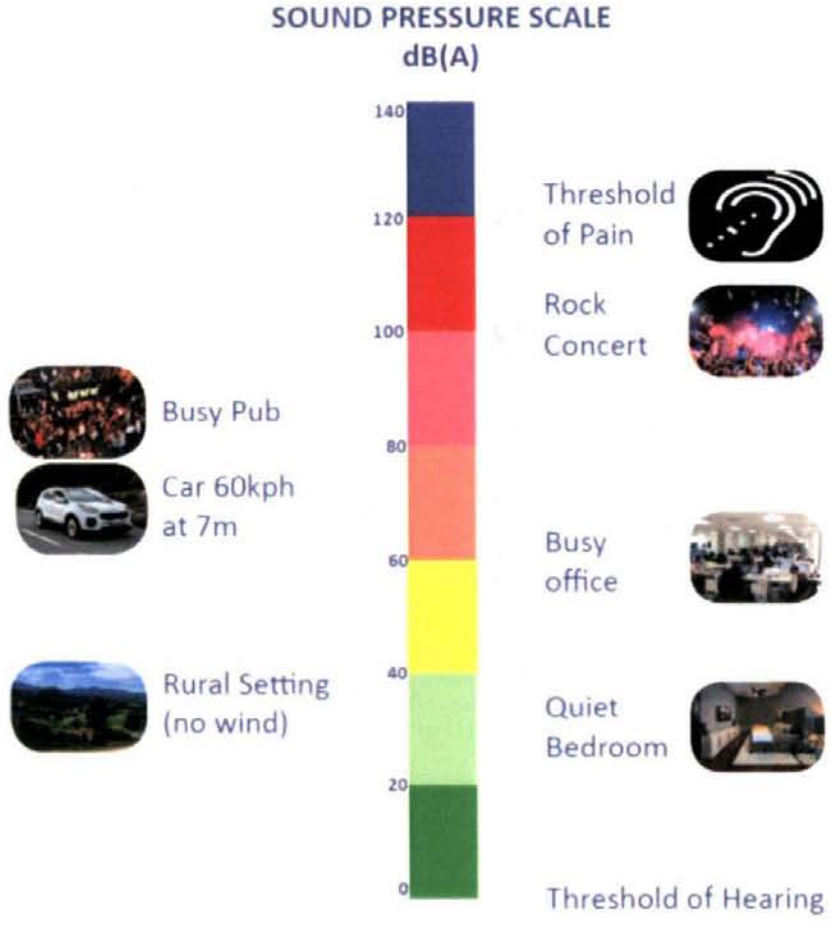


Figure 12-1 The Level of Typical Common Sounds on the dB(A) Scale

12.1.3 Author Competency

This report was written by Peter Barry (BSc MSc). Peter is an environmental scientist and environmental impact assessment practitioner. Peter has 20 years' experience in the measurement, assessment, prediction and control of environmental noise. Peter is a member of the Institute of Acoustics (IOA) and has successfully completed the IOA Diploma in Acoustics and Noise Control.

Peter has prepared numerous noise impact assessment reports for various developments including major infrastructural developments, mixed use developments and wind energy development projects. Peter has presented evidence as expert witness on noise at oral hearings and in court.

12.1.4 Scope of the Assessment

The assessment is primarily concerned with the temporary dredging and construction works and the finishing works. The noise impact assessment described herein includes the characterisation of existing noise levels, the identification of the nearest noise sensitive receptors (NSRs), a calculation of the expected noise levels across the site generated by the working plant and equipment, a comparison against typical noise emission thresholds, an assessment of the potential impact and recommendations to minimise the potential noise nuisance of the works.

12.1.5 Difficulties Encountered

This chapter was prepared during which time Ireland was experiencing travel restrictions due to Covid-19 (Coronavirus). Schools, third-level education and childcare facilities were not operating, and all businesses were encouraging employees to work from home. This meant that typical baseline noise levels were not representative primarily because traffic volumes in the Howth area were significantly reduced.

A search of recent planning applications in the area was undertaken and an EIS for a mixed used (200 residential units and 6 commercial units) development at Howth Road was reviewed (planning ref (F15A/0362). It contained a baseline noise survey at locations in proximity to the harbour. The baseline noise survey was undertaken in 2015 and having reviewed the locations and results it is considered that they are representative of the closest noise sensitive receptors to the proposed dredge works and suitable for use as baseline data for this noise impact assessment.

The results of the baseline survey from that assessment have been extracted from that EIS (accessed via www.fingalcoco.ie) and are described in **Section 12.2.**

12.1.6 Methodology

12.1.6.1 Criteria for Evaluating Construction Noise Effects

There is no statutory guidance in Ireland relating to the maximum noise levels permitted during construction works, and in the absence of statutory guidance or other specific limits prescribed by local authorities, the thresholds outlined in the *British Standard 5228-12009+A1:2009, Code of*

Practice for Noise and Vibration Control on Construction and Open Sites - Noise has been adopted in this assessment. The noise levels, which are reproduced in **Table 12-1**, are typically deemed acceptable.

Table 12-1: Construction Stage Noise Level Thresholds

Assessment category and threshold value period (T)	Threshold values, L_{AeqT} dB		
	Category A [Note A]	Category B [Note B]	Category C [Note C]
Night-time (23:00 to 07:00hrs)	45	50	55
Evening and Weekends [Note D]	55	60	65
Daytime (07:00 – 19:00hrs) and Saturdays (07:00 -13:00hrs)	65	70	75

Note A: Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B: Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C: Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

Based on the characterisation of the noise levels at the site (see **Section 12.2**) the area is classed as a Category A area for daytime and evening time. Therefore, the noise limits for evening time works are L_{Aeq} 55dB and daytime works are L_{Aeq} 65dB. There will be no night-time works.

Dredging and treatment activities will be carried out from 7am to 9pm (Monday to Friday) and 7am to 5pm (Saturday) with no work on Sundays. All other activities such as construction of the perimeter embankment, rock armour protection, landscaping and drainage will be undertaken during normal working hours i.e. 7am to 7pm (Monday to Friday) and 7am to 5pm (Saturday) with no work on Sundays.

Underwater rock breaking will be carried out during normal working hours i.e. 7am to 7pm.

12.1.6.2 Criteria for Evaluating Construction & Operational Vibration Effects

According to *NRA's 2014 Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes,* there are two separate considerations for vibration during the construction phase namely 1) that which affects human comfort and 2) that which affects cosmetic or structural damage to buildings.

The guidelines suggest that human tolerance for daytime blasting and piling, two of the primary sources of construction vibration, limits vibration levels to a peak particle velocity (ppv) of 12mm/s and 2.5mm/s respectively. Onshore piling is not required, however underwater piling may be required.

To avoid the risk of even cosmetic damage to buildings, the guidelines suggest that vibration levels should be limited to 8mm/s at frequencies of less than 10Hz, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above.

There will be no significant sources (i.e. piling or blasting) of vibration during the Harbour works.

12.1.6.2.1 Criteria for Evaluating Operational Noise Effects

Following the construction phase, space will be provided for harbour business and operations. This may include some light industrial and commercial activities. The nature of these activities is unknown at this stage and will be subject to separate planning applications. Any potential noise impact from future occupiers of these buildings will be fully assessed at that stage.

A water sports area is also provided. Any noise emissions from this area will be characteristic of existing maritime activities in the harbour and are not considered significant.

12.2 EXISTING ENVIRONMENT

Howth harbour is situated on the north side of Howth peninsula, to the north of Dublin Bay (**Figure 12.2**). The harbour itself comprises of three main areas; a trawler basin entered between two bull-noses to the north, swing moorings area to the east and the yacht club marina.

Howth harbour operates as a Fishery Harbour Centre under the Department of Agriculture, Food and the Marine. The core fishing fleet is in the order of 50 vessels, and there is significant marine leisure activity including the Howth Yacht Club and the Howth Sailing and Boating Club. There are also a number of restaurants and shops along the West Pier. Fish processing and boat repair works are also undertaken on the harbour.

Figure 12-2 Site location map showing proposed site location

12.2.1 Existing Noise Environment

The existing noise environment is robust. There is a constant flow of patrons to the piers, restaurants, cafes and retail outlets. Tourists come to Howth to walk on the piers and hill and also to take boat trips from the harbour. Car parks facilitate patrons and tourists at the pedestrian entrance to the harbour piers. A passenger ferry pontoon is located on the West Pier. Howth Yacht Club marina is a private member sailing club with a 250 berth marina. Many of these vessels have noise generating inboard and outboard motors louder than the plant and machinery proposed for the works. The DART terminates at the entrance to the harbour. There is a functioning shipyard for use to all types of vessels where noisy work takes place including cutting and welding metal.

12.2.2 Existing Noise Levels

Due to the COVID 19 restrictions it was not possible to carry out meaningful baseline noise measurements in the environs of the marina. Between March and July 2020 commercial and traffic (and associated noise) activity was significantly down on what would be considered representative of previous years. Non-essential nationwide traffic was also prohibited. In the absence of baseline measurements a review of existing noise data was undertaken.

As part of planning application F15A/0362, Day, Evening and Night time measurements were undertaken between the 3rd and 6th February 2015 at three residential locations in proximity to the works area. The measurement locations and results are considered representative of the noise climate in the locality of the proposed development and are described in the following sections.

12.2.2.1 Representative Noise Monitoring Locations

Table 12-2 Baseline Noise Monitoring Locations

Noise Location Measurement	Description
Location N1	Location N1 is located off the Howth Road, outside the gates to Deer park golf club approx. 750 m from the middle pier and approx. 580m from the infill area.
Location N2	Location N2 is located off the Howth Road at residential properties approximately 500m from the middle pier and approx. 300m from the infill area.
Location N3	Location N3 is located beside St Mary's church approx. 700m from the middle pier and approx. 500m from the infill area.

12.2.2.2 Results

The results of the unattended noise monitoring at the Locations N1 to N3 (Chapter 5.5 of EIS supporting planning ref F15A/0362) are summarised in the following tables.

Location N1 – Located at Entrance to Deer Park Golf Club

Table 12-3 Summary of Average Noise Measurements at N1

Date	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			Main Noise Sources
		L_{Aeq}	L_{A10}	L_{A90}	
Thursday 5th February 2015	Day	54.4	56.8	49.7	Traffic on Howth Road. Traffic accessing
	Evening	53.0	55.6	47.6	
	Night	46.3	49.6	38.7	
Friday 6th	Day	54.3	56.9	48.6	

February 2015	Evening	53.0	55.0	46.2	Deer Park golf course. Distant train noise from D.A.R.T line
	Night	47.2	50.4	40.9	
Average	Day	54.4	56.9	49.2	
	Evening	53.0	55.3	46.9	
	Night	46.8	50.0	39.8	

Ambient noise levels for day time at N1 measured 54.4 dB L_{Aeq} and background noise levels measured 49.2 dB L_{A90}.

Ambient noise levels for evening time at N1 measured 53 dB L_{Aeq} and background noise levels measured 46.9 dB L_{A90}.

Ambient noise levels for night time at N1 measured 46.8 dB L_{Aeq} and background noise levels measured 39.8 dB L_{A90}.

Location N2 – Residential Properties on Howth Road

Table 12-4 Summary of Average Noise Measurements at N2

Date	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			Main Noise Source
		L_{Aeq}	L_{A10}	L_{A90}	
Tuesday 3rd February 2015	Day	54.2	56.5	49.9	Traffic on the Howth road. Traffic associated with Beshoff motors.
	Evening	53.0	55.7	47.7	
	Night	48.6	52.3	41.2	
Wednesday 4th February 2015	Day	52.4	55.9	48.0	
	Evening	51.6	54.9	44.0	
	Night	45.9	49.7	40.1	
Average	Day	53.8	55.2	49.0	
	Evening	52.3	55.3	45.9	
	Night	47.3	51.0	40.7	

Ambient noise levels for day time at N2 measured 53.8 dB L_{Aeq} and background noise levels measured 49 dB L_{A90}.

Ambient noise levels for evening time at N2 measured 52.3 dB L_{Aeq} and background noise levels measured 45.9 dB L_{A90}.

Ambient noise levels for night time at N2 measured 47.3 dB L_{Aeq} and background noise levels measured 40.7 dB L_{A90}.

Location N3 – St Mary's Church Howth Road

Table 12-5 Summary of Average Noise Measurements at N3

Date	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			Main Noise Sources
		L_{Aeq}	L_{A10}	L_{A90}	
Thursday 5th February 2015	Day	51.3	52.4	46.9	Traffic on Howth Road
	Evening	50.5	51.4	46.4	
	Night	45.8	47.9	41.6	
Friday 6th February 2015	Day	51.6	53.6	45.1	
	Evening	49.1	49.8	43.0	
	Night	44.8	46.4	42	
Average	Day	51.5	53.0	46.0	
	Evening	49.8	50.6	44.7	
	Night	45.3	47.2	41.8	

Ambient noise levels for day time at N3 measured 51.5 dB L_{Aeq} and background noise levels measured 46 dB L_{A90}.

Ambient noise levels for evening time at N3 measured 49.8 dB L_{Aeq} and background noise levels measured 44.7 dB L_{A90}.

Ambient noise levels for night time at N3 measured 45.3 dB L_{Aeq} and background noise levels measured 41.8 dB L_{A90}.

At all locations traffic on the Howth road was the dominant noise source and the main influence on noise levels at these locations. Noise levels gradually decrease from day to evening to night as the traffic volumes decrease.

12.2.2.3 Noise Sensitive Receptors

Noise Sensitive Receptors (NSRs) are defined as *any dwelling house, hotel or hostel, health building, educational facility, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels*[1].

In general, two NSR types were considered. These include the east, middle and west piers within the harbour as these are areas of high amenity. Dwellings along the R105 close to the harbour were considered as the nearest residential NSRs.

While the piers and marina are considered as NSRs, their success is largely dependent on a functional harbour with enough depth to allow fishing, pleasure and tourist boats to navigate and berth safely within. These works are likely to be perceived as a benefit and necessity rather than a

[1] Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4, January 2016)

nuisance by those who use and depend on the harbour. That is not to say, they will not be disturbing from time to time.

The potential noise impact on the harbour area, i.e. the piers is difficult to accurately quantify. This is because the barge with mounted long reach excavator will be continually moving around the harbour as different areas are dredged. Additionally, people on the piers (who are the actual receptors) will generally only be exposed for short periods of time. The number of people on any pier will vary considerably from hour to hour and day to day.

There are also three piers to choose from, if dredge works are taking place close to any particular pier, a further and quieter of the three piers can be utilised. The West Pier, with cafes and restaurants is likely to be the most sensitive when dredge works are taking place nearby. However, the works will be temporary and of short duration. There is usually a higher tolerance for elevated noise levels that are known to be temporary.

The residential NSRs are likely to be more sensitive to the proposed works. During the daytime, the works are unlikely to be distinguishable over existing traffic and rail noise and harbour activities. There is potential for disturbance in the late evening when these noise sources reduce. However, given the location, there will always be some level of background traffic noise.

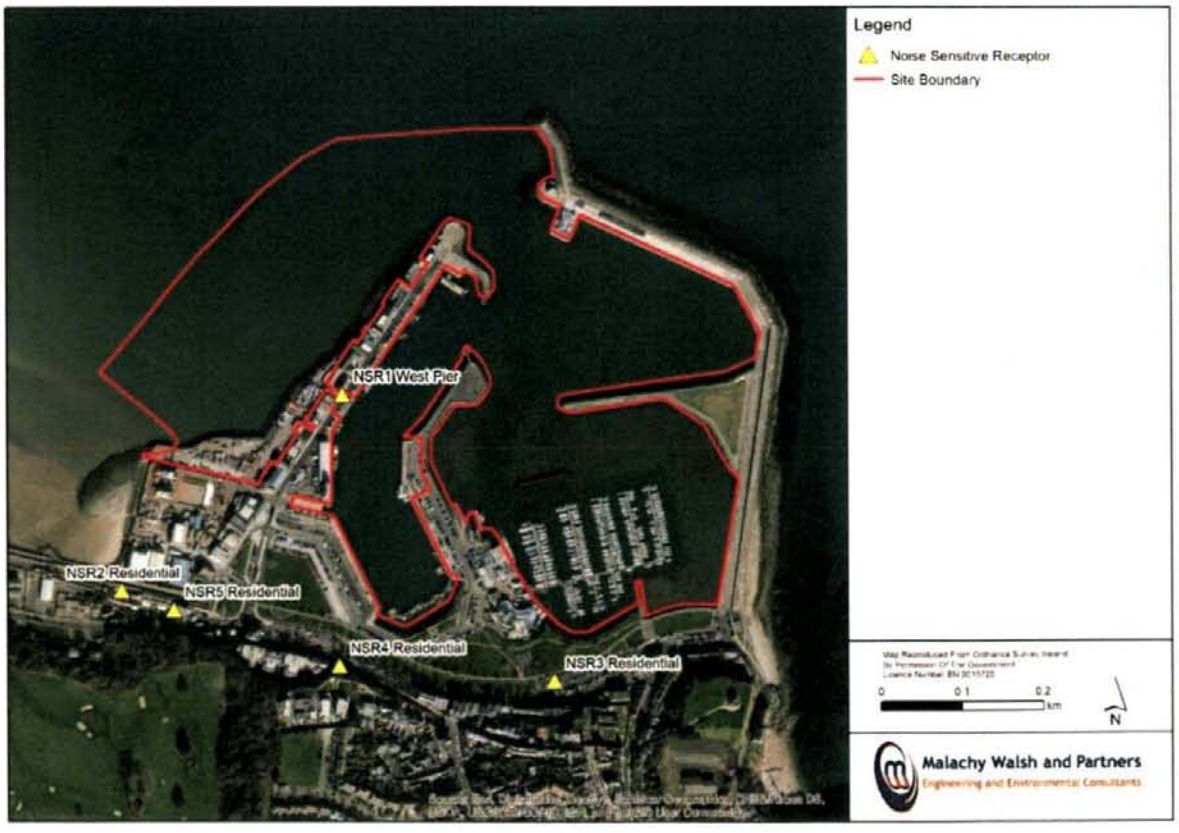


Figure 12-3 Noise Sensitive Receptors (source Google Earth)

12.3 LIKELY SIGNIFICANT IMPACTS

The land reclamation construction phase and dredging works noise predictions were undertaken using quality assured noise prediction software, specifically Bruel & Kjaer's iNoise software. The software calculations are based on ISO 9613, Attenuation of sound during propagation outdoors, Part 2, General Method of Calculation. The ISO 9613-2 model can take account of the following factors that influence sound propagation outdoors:

- Geometric divergence
- Air Absorption
- Reflecting obstacles
- Screening
- Vegetation; and
- Ground reflections

The sound power levels were sourced from *British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise* and are provided in **Tables 12-6, 7 and 8.**

Table 12-6 Typical Plant Noise Emissions (Daytime) – Infill Construction Works

Item	BS 5228 Ref:	dB Lw Octave band (Hz)								Lw Total dB(A) at 10m
		63	125	250	500	1k	2k	4k	8k	
Long reach tracked excavator	C7.1	74	83	76	75	70	71	63	57	78
Tracked excavator	C4.65	76	74	68	70	65	63	59	55	71
Dump truck	C4. 2	85	80	77	72	74	70	65	58	78

Table 12-7 Typical Plant Noise Emissions (Day and Evening-time) - Dredging and Dredge Treatment

Item	BS 5228 Ref:	dB Lw Octave band (Hz)								Lw Total dB(A) at 10m
		63	125	250	500	1k	2k	4k	8k	
Long reach tracked excavator	C7.1	74	83	76	75	70	71	63	57	78
Tracked excavator	C4.65	76	74	68	70	65	63	59	55	71
Pumps x 3	T3 25 [2]	82	82	72	71	69	68	62	54	75

[2] DEFRA Update of Noise Database for Prediction of Noise on Construction and Open Sites 2005

Table 12-8 Typical Plant Noise Emissions (Day and Evening-time) – Finishing Phase

Item	BS 5228 Ref:	dB Lw Octave band (Hz)								Lw Total dB(A) at 10m
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Vibratory Roller	C5.20	90	82	73	72	70	65	59	54	75
Vibratory Compactor	C5.29	76	78	74	77	77	77	73	70	82
Asphalt Paver	C5.33	82	82	78	72	69	69	61	54	75
Tracked excavator	C4.65	76	74	68	70	65	63	59	55	71
Dump truck	C4. 2	85	80	77	72	74	70	65	58	78

12.3.1 Results

12.3.1.1 Daytime Land Reclamation and Dredging Construction Works

The predicted results are shown in **Table 12-9** below and illustrated in **Figure 12-4**. The predicted results show that the daytime infill construction noise threshold criteria can be achieved at the nearest noise sensitive receptors. As can be seen from the illustration below, the existing buildings on the West Pier will act as a barrier to noise propagation from the infill construction works.

The soil treatment area has been located in the middle of the middle pier. The dredging barge is modelled in the harbour channel between middle and west piers. This represents a relatively worst case scenario. When the dredge barge is elsewhere in the harbour noise levels on the West Pier will be lower.

Table 12-9 Predicted daytime results

Receptor Location	Description	Predicted Noise Level (dB $L_{Aeq\ 1hr}$)	Assessment Criteria
NSR 1	West Pier	59	65
NSR 2	Residential	48	65
NSR 3	Residential	51	65
NSR 4	Residential	52	65
NSR 5	Residential	51	65

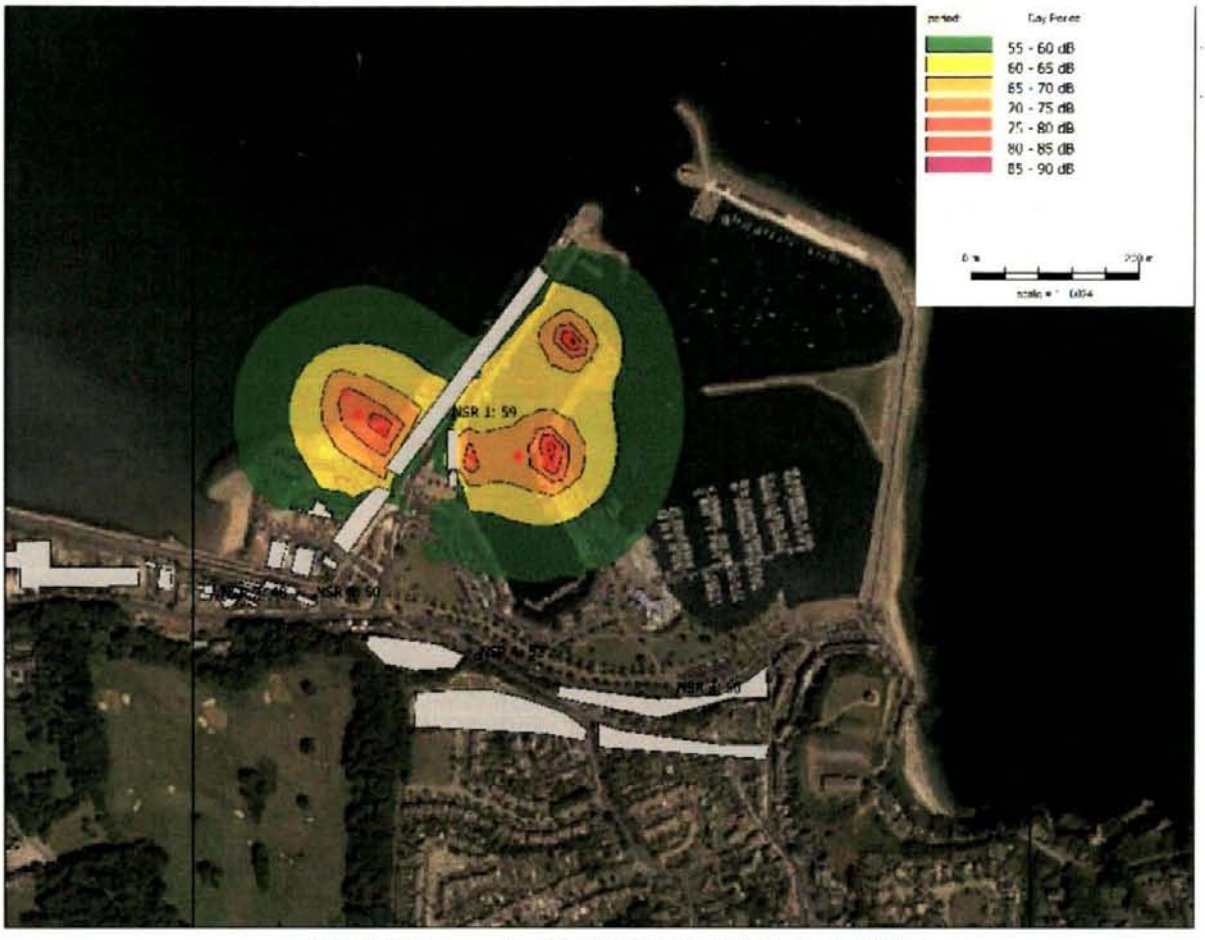


Figure 12-4 Daytime Noise Prediction Contour Map

The results show that the noise limit criteria will not be exceeded. Noise levels in the order of 59 dB(A) are expected along the West Pier. This may vary to some extent depending on the proximity of the barge to the pier, however noise levels are unlikely to exceed the daytime noise limit criteria.

12.3.1.2 Evening Time Dredging Works

The predicted results are shown in **Table 12-10** below and illustrated in **Figure 12-5**. The predicted results show that the evening-time construction noise threshold criteria can be achieved at the nearest noise sensitive receptors.

The dredge barge was modelled in the channel between the west and middle pier close to the mainland to represent a worst case scenario. When the barge is further away from the shore, noise emissions from the barge will be lower.

Table 12-10 Predicted evening time results

Receptor Location	Description	Predicted Noise Level (dB $L_{Aeq\ 1hr}$)	Assessment Criteria
NSR 1	West Pier	61	55
NSR 2	Residential	39	55
NSR 3	Residential	47	55
NSR 4	Residential	49	55
NSR 5	Residential	47	55

The results indicate that the noise limit criteria will not be exceeded at any of the residential properties south of the harbour on the R105. A range of 40 to 50 dB(A) is expected. This is below the evening limit criteria of 55dB(A).

There is a potential predicted exceedance of the evening limit criteria at NSR 1 the West Pier. The exceedance is predicted to be in the evening hours between 7pm and 9pm when dredging and treatment activities will be continuing until 9pm. The potential exceedance depends on what businesses are open after 7pm, where they are located and the location of the dredging barge at that time. It is assumed that there will be an amount of tolerance from the businesses on West Pier to noise as the project will have a beneficial impact on the businesses on the West Pier. This will have a short term slight effect on businesses the West Pier in the evening. Mitigations outlined in **Section 12.4** will reduce this impact.

The noise exceedance at NSR 1 will also impact on visitors who are walking the pier, once they are past the construction works and reach an area on the pier that is within the noise limit they will not be effected any longer. The effect will only last minutes as the person walks on past the construction works. This will have a momentary not significant effect on visitors walking the West Pier in the evening. Mitigations outlined in **Section 12.4** will reduce this impact.

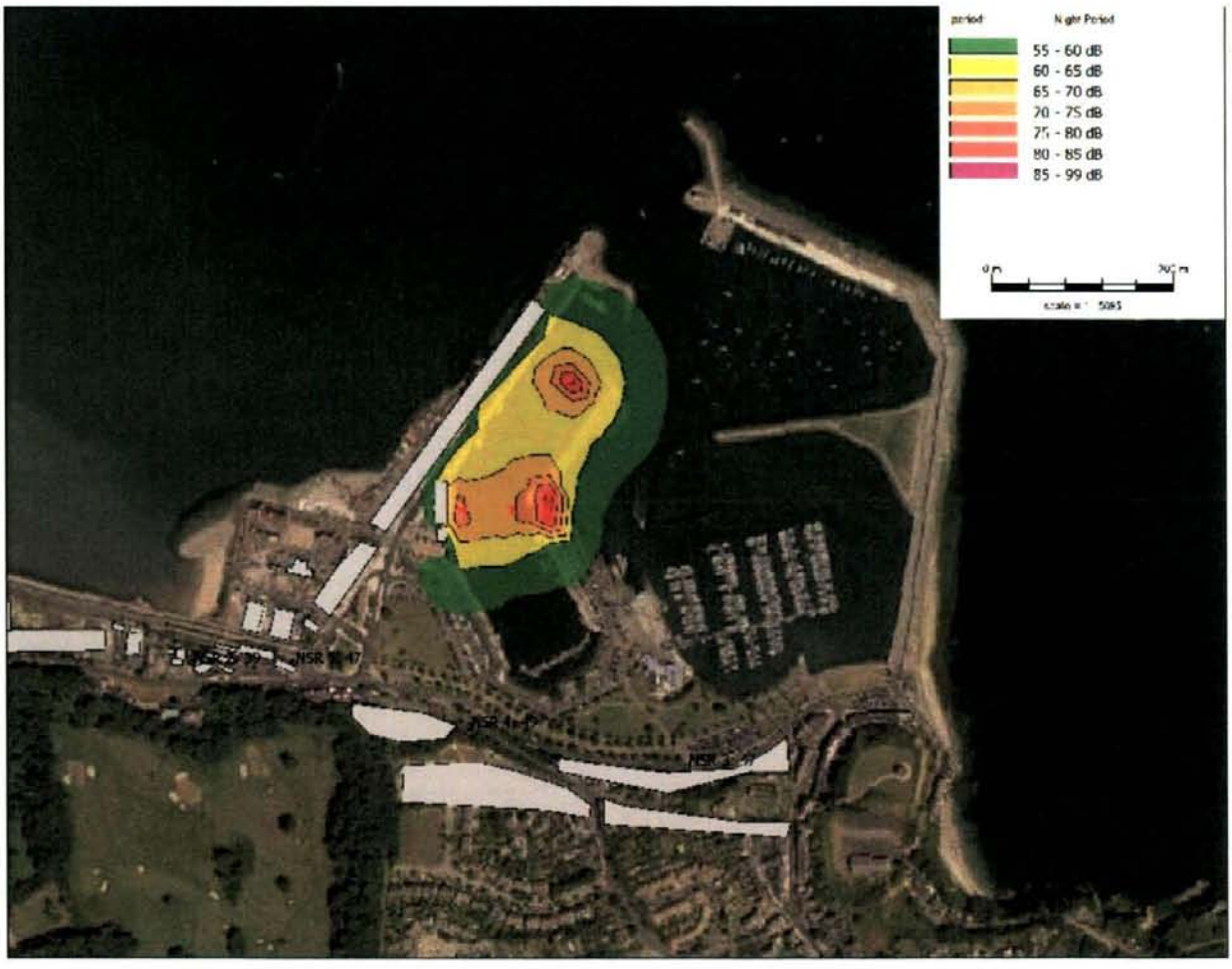


Figure 12-5 Evening Noise Prediction Contour Map

12.3.1.3 Finishing Phase

The predicted results are shown in **Table 12-11** below and illustrated in **Figure 12-6**. The predicted results show that the construction noise threshold criteria can be achieved at the nearest noise sensitive receptors.

All items of plant and machinery employed in the finishing phase are modelled as operating simultaneously. In reality this will not be the case and therefore the predicted results in **Table 12-11** are an overestimate and unlikely to be distinguishable over existing noise levels.

Table 12-11 Predicted results – Finishing Phase

Receptor Location	Description	Predicted Noise Level (dB $L_{Aeq\ 1hr}$)	Assessment Criteria
NSR 1	West Pier	61	65
NSR 2	Residential	55	65
NSR 3	Residential	53	65
NSR 4	Residential	55	65
NSR 5	Residential	56	65

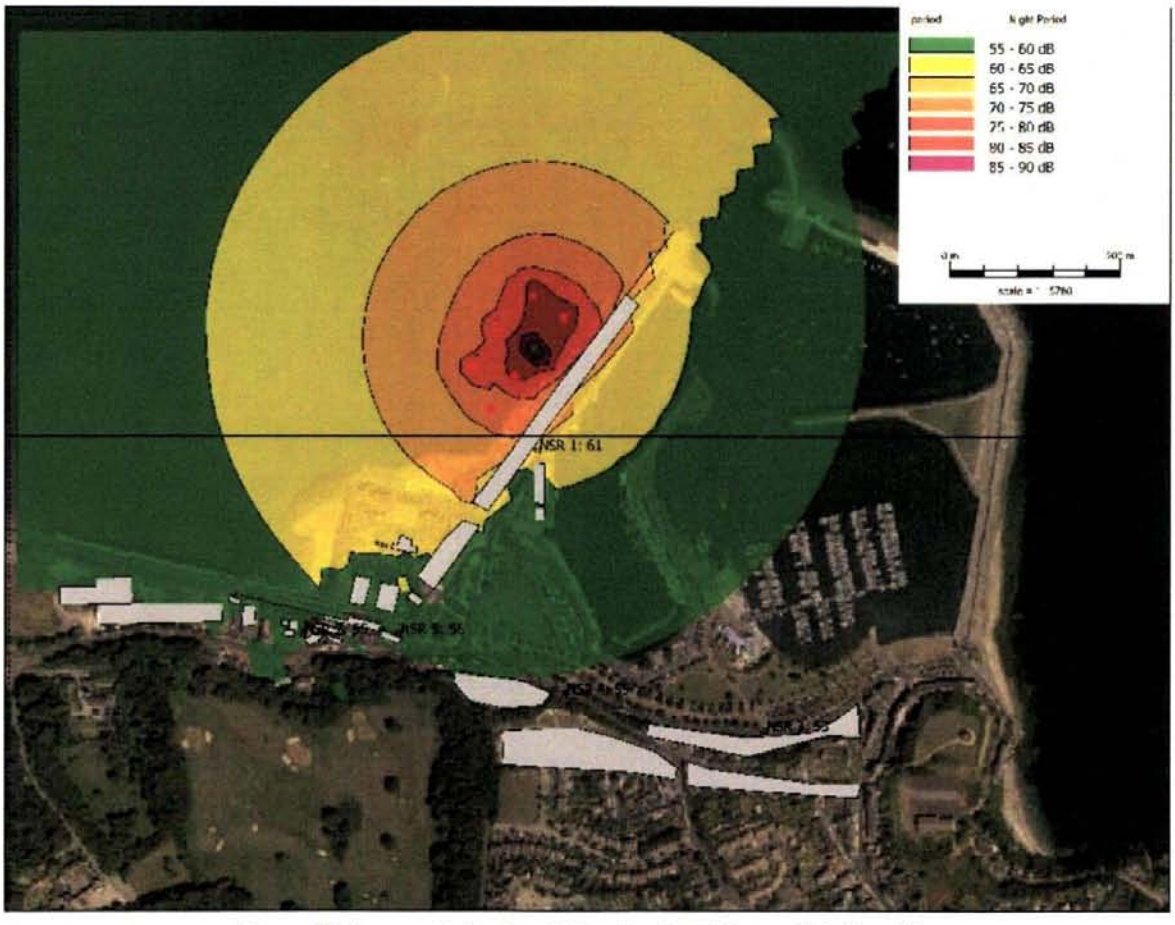


Figure 12-6 Noise Prediction Contour Map – Finishing Phase

The results indicate that the noise limit criteria will not be exceeded at any of the residential properties south of the harbour on the R105. A range of 50 to 55 dB(A) is expected. This is below the evening limit criteria of 55dB(A) and likely to be masked by existing noise levels.

12.3.2 Operational Phase Noise

No significant noise sources are proposed for the finished phase. The nature of these activities is unknown at this stage and will be subject to separate planning applications. Any potential noise impact from future occupiers of these buildings will be fully assessed at that stage.

A water sports area is also provided. Any noise emissions from this area will be characteristic of existing maritime activities in the harbour and are not considered significant.

12.4 MITIGATION MEASURES

To address potential predicted exceedances of evening time noise limits on West Pier businesses and visitors, the mitigations are as follows;

- Onsite noise monitoring will be undertaken once the works have started. This will assess the level of noise impacting on the West Pier. This will occur at different times depending on the location of the dredging barge. The results of this monitoring will define a working area between the hours of 7pm and 9pm in order to comply with the evening time noise limit.
- Liaison with the businesses on the West Pier to let them know what works are taking place when and to get feed back on the noise impacts will take place.
- Solid hording will be put up around the pump compound on West Pier in order to reduce noise impact coming from equipment.

During the works, best practice noise reduction measures described in *British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites* will be incorporated into the Construction and Environmental Management Plan.

12.5 RESIDUAL IMPACTS

Given the nature of the works it is difficult to quantify exactly the noise impact at each noise sensitive receptor as it will vary from day to day as the works progress. The model predicts no daytime exceedance of the limit criteria. There is a predicted exceedance of the limit criteria during evening hours on West Pier. Once mitigation measures are implemented there will be a short term not significant effect on businesses and visitors at West Pier.

The works are short term and once completed there will be no significant residual noise.

12.6 REFERENCES

British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites

Environmental Protection Agency, *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4, January 2016)

Environmental Impact Statement for Mixed Use Development on Lands at Howth Road, Glenkerrin Homes, McGill Planning, August 2015.

http://dublincitynoise.sonitussystems.com

13 TRAFFIC AND TRANSPORTATION

13.1 INTRODUCTION

This EIAR Traffic and Transportation Chapter quantifies and assesses the impact of construction and operational traffic generated by the proposed development on the existing local road network, and recommends mitigation measures, as appropriate.

13.1.1 Scope of Assessment

The scope of the Assessment in this Chapter includes consideration of the following:

- Existing and expected future road and transport network;
- Existing and predicted future baseline traffic volumes on the surrounding local road network;
- Predicted construction and operational traffic volumes and likely impacts; and
- Proposed mitigation measures.

13.1.2 Methodology

This Traffic and Transportation Chapter has been prepared in the context of the following:

- Fingal Development Plan 2017 – 2024 (As varied);
- Dublin City Development 2016-2022 (As varied);
- The Transport Infrastructure Ireland (TII) Traffic and Transport Assessment (TTA) Guidelines PE-PDV-02045 May 2014;
- TII's Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections PE-PAG-02017-02 May 2019;
- The Department of Transport Tourism and Sport (DoTTS) Design Manual for Urban Roads and Streets (DMURS) Version 1.1 May 2019; and
- The Environmental Protection Agency (EPA) Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports Draft August 2017 (EPA EIAR Guidelines).

13.1.3 Assessment Criteria

Baseline traffic volumes on the surrounding local road network have been established on the basis of previous on-site traffic surveys from 2017 and 2019 for planning applications to Fingal County Council and An Bord Pleanála. Annual Average Daily Traffic (AADT) volumes have been estimated on the basis of TII automatic traffic counter data.

The significance and duration of predicted impacts have been defined in accordance with the EPA EIAR Guidelines.

13.1.4 Statement of Limitations and Difficulties Encountered

This Traffic and Transportation chapter was prepared in early spring 2021, during which time Ireland was experiencing travel restrictions due to Covid-19 (Coronavirus). Schools, third-level education and childcare facilities were not operating, and all businesses were encouraging employees to work from

home. This meant that typical baseline traffic volumes in the Howth area and along haul routes could not be established. Accordingly, existing baseline traffic volumes have been determined on the basis of previous on-site traffic surveys carried out in 2017 and 2019 as part of planning applications to An Bord Pleanála and Fingal County Council.

13.1.5 Competency of Assessor

This Traffic and Transportation Assessment was prepared by Karen Concannon BE MSc CEng MIEI of Malachy Walsh and Partners, under the supervision of Seamus Quigley BE CEng MIEI MCIHT of Malachy Walsh and Partners.

Karen Concannon has 8 years' experience in traffic engineering projects, traffic management studies, feasibility studies and road safety audits. She is a Chartered Engineer with Engineers Ireland and joined Malachy Walsh and Partners in 2019, after 6 years with AECOM. Seamus Quigley has 29 years' experience in transport planning and traffic engineering projects, including EIS/EIAR traffic and transportation chapters, traffic impact assessments, traffic management studies, mobility management plans, traffic modelling studies, feasibility studies and road safety audits. He is a Chartered Engineer with Engineers Ireland, and a member of the Chartered Institution of Highways and Transportation. He joined Malachy Walsh and Partners in 2007, having spent over sixteen years with Atkins.

13.2 EXISTING ENVIRONMENT

Howth Harbour is situated on the north side of Howth Peninsula, to the north of Dublin Bay. It is accessed via the R105 Howth Road Regional Road, as shown in **Figure 13.1**.

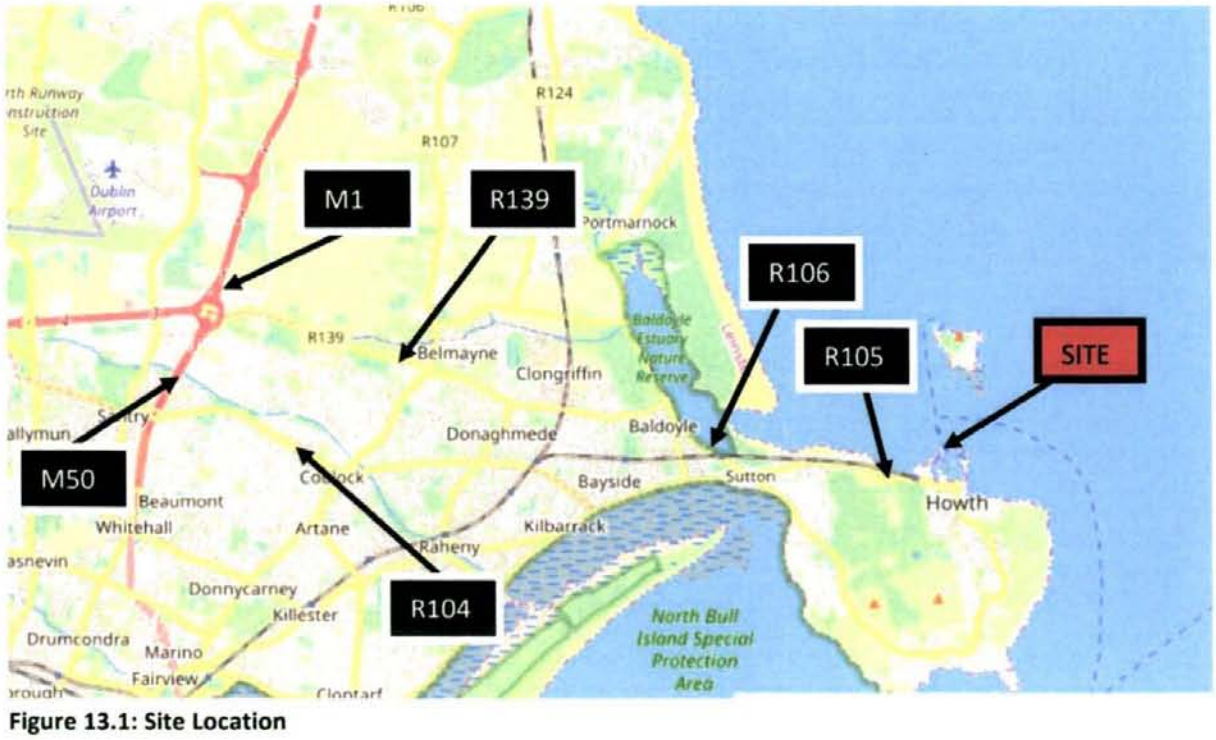


Figure 13.1: Site Location

The proposed project is located in Howth Harbour FHC (see **figure 13.2** below location map)

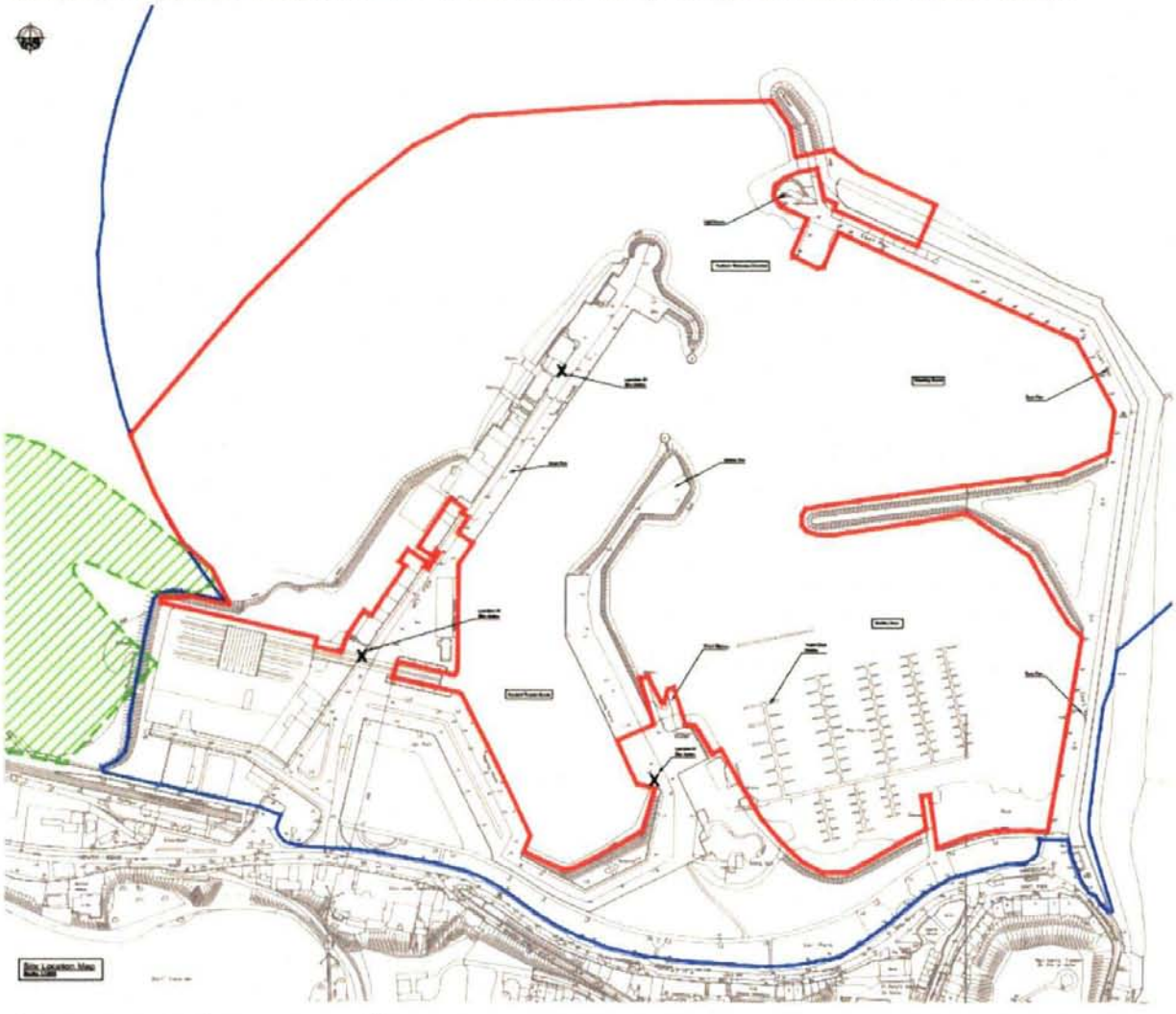


Figure 13.2: Site location map (drawing no. 19934-5001, Appendix 13 volume 3 of this EIAR)

The site is located adjacent to and on the West Pier, which provides several retail and leisure outlets, as shown in **Figure 13.3**. There is also a car park, which provides 106 car parking spaces. West Pier is a single carriageway local road, with a typical width of approximately 10m. West Pier has an urban speed limit of 30 km/hour. A right turn filter lane is present southbound to provide access to car parking spaces. A paved central reservation is also present. On-street perpendicular parking is present on the west side of the carriageway.

West Pier continues north to form a four-arm mini roundabout with local access roads. Car parking is present on the east arm, which also provides access to Howth Tourist Information Centre. The local road continues onto the Middle Pier, and provides access to Howth Yacht Club and marina, the RNLI Howth Lifeboat Station and further car parking. Middle pier is also situated within the site and consists of a working dock and parking for approximately 90 cars.

Figure 13.3: Local road network map

At the West Pier, car parking and retail units are accessed via the west arm of the mini roundabout. The Shipyard is present on the West Pier and can be accessed from the north arm of the mini roundabout.

North of the mini roundabout the carriageway width reduces to approximately 7m, with a footway on the west side and perpendicular parking on the east side. West Pier continues north to where a passenger ferry pontoon is located, along with additional car parking. Turning for vehicles is facilitated with a large turning circle at the end of the pier.

West Pier Local Road forms a priority T- junction with the R105 Regional Road. West Pier has a right and left turn filter lane at the junction. An uncontrolled pedestrian crossing is present on West Pier at the junction, with a traffic island at the centre.

The R105 Regional Road has a 50 km/hour urban speed limit, with a typical carriageway width of 7.3m. A yellow box junction is provided at the junction of the R105 and West Pier. Immediately east of the junction, a zebra crossing is present on the R105. There is an amenity green area with pedestrian footpaths between the R105 and the pier. Parallel on-street parking is provided on both sides on the R105.

East of the West Pier is Howth Railway station. Access is provided from the R105. There is a signalised pedestrian crossing on the R105 outside the Railway station, as well as bus stops located on both sides of the carriageway. The R105 continues towards Sutton, with a cycle track provided in both the eastbound and westbound direction.

At the Sutton Cross, the R105 Regional Road joins the R106 Regional Road at a signalised junction. Pedestrian crossings are provided on all four arms of the junction. The R105 westbound approach has two filter lanes, one for left turning traffic and one for straight ahead and right turn traffic. The R105 eastbound approach also has two filter lanes, one for right turning traffic and one for straight ahead and left turn traffic. A left turn slip lane is provided between the R105 eastbound and the R106 Regional Road.

The R105 Regional Road, or Dublin Road, is a single lane carriageway, approximately 7.3m wide. There is a mandatory cycle lane present on both the east and westbound carriageway for 500m between Sutton Cross and St. Fintan's High School. At this location, a two-way cycle track is provided along the coast side, segregated from the carriageway by a wall. A footpath is present along the northside of the R105. The R105 operates within a 50 km/hour urban speed limit. It has frequent residential access on both sides. Approximately 500m west of Sutton Cross, it runs along the coast on its southside, with residential access and local road accesses on its northside. A footpath is present Approximately 1km west of Sutton Cross, the R105 forms a signalised T-junction with the R809. A pedestrian crossing is provided on all three arms of the junction.

Approximately 2.3km west of Sutton Cross, the R105 Regional Road forms a signalised T-junction with the R104 Regional Road. At the traffic signals for westbound traffic on the R105, two filter lanes are provided, one for straight ahead and one for right turn only. There is one lane for straight ahead traffic and left turning traffic on the R105 eastbound. On the R104 there are two lanes present, for one right turning traffic and one for left turning traffic. Cycle facilities are provided at the junction on the R104 in the form of an Advanced Stop Line and an advisory cycle lane in the centre of the two filter lanes. A signalised pedestrian crossing is provided as part of the junction layout on the R104 and the west arm of the R105. Access to the segregated cycle track and walkway are provided at this location.

The R104 Regional Road, or Kilbarrack Road, is a signal lane carriageway of approximately 7.5m width. The R104 has an urban speed limit of 50 km/hour. A mandatory cycle lane is present on both sides of the carriageway, as well as a footpath. Access is provided to residences on both sides along the route.

The R104 Regional Road continues west to connect with the M50. It passes underneath the railway line for DART and Dublin Commuter services, with a height restriction of 4.86m (5'11''). West of the railway line, the R104 Regional Road becomes Tonlegee Road. It has access for local roads only. It remains a single lane carriageway, of approximately 7.3m in width.

The R104 continues west where it forms a signalised junction with the R107 Malahide Road, which is a dual carriageway. The R104 westbound has two filter lanes at the junction, one for straight ahead and left and one for straight ahead and left. The R104 eastbound approach to the junction has the same lane layout. Pedestrian crossings are provided on all four arms of the junction.

West of its junction with the R107, the R104 operates under a 60 km/hour urban speed limit and is known as the Oscar Traynor Road. The single lane carriageway increases in width to approximately 9m. Approximately 1.8km west of the junction with the R107, the R104 widens to include a hatched central reservation and a bus lane in each direction.

The R104 Regional Road joins the M50 with grade separated access from a 4-arm roundabout.

There are two bus stops present at Howth Harbour, one eastbound and one westbound on the R105 Howth Road. These are served by Bus Route 31, 31a and 31b, which provides services between Howth and Talbot Street, Dublin City. There are approximately 44 services each way, Monday to Saturday and 36 services each way on a Sunday.

Howth is serviced by the DART and Dublin Commuter trains, with services running daily between Howth Railway Station, Dublin City Centre and Gorey, Wexford and Howth Railway Station and Dundalk. The line terminates at Howth Railway Station, which is located on the R105, east of West Pier. It can be accessed by vehicle from the R105 and by foot from the R105.

13.2.1 Existing Traffic Volumes

On-site classified road traffic volumes were recorded on site in January 2019 on the R105 and R106. On-site classified road traffic volumes were recorded on the R104 in 2016. These were factored on the basis of TII's automatic traffic counter data to establish typical 2019 peak hour and Annual Average Daily Traffic (AADT) volumes for the latest full year, 2018, on the local urban road network. The factored typical baseline traffic volumes are provided in **Table 13.1**. The volume of peak hour Heavy Goods Vehicles (HGVs) are also provided. Automatic traffic counter data from TII's online database for the N139 / N32 are also provided, taken from January 2019 are also provided.

Table 13.1: Existing traffic volumes for local urban road network based on 2017 and 2019 surveys

Road	Total vehicles (HGVs)		
	AM Peak	PM Peak	AADT
R105	798 (14)	756 (9)	8813 (282)
R106	1107 (17)	814 (6)	8305 (266)
R104	2304 (45)	2050 (26)	28007 (896)
R139 / N32	3120 (122)	2932 (135)	38932 (1246)

Automatic traffic counter data from TII's online database for the M1 and M50 is provided in **Table 13.2**. The 2019 morning and evening peak hour traffic volumes are for Thursday 7th March 2019, during schools' term. The Annual Average Daily Traffic (AADT) volumes' data is for the latest full year, 2018, together with the percentage proportion of heavy goods.

Table 13.2: TII National Roads Traffic Volumes

Road	Direction	Total vehicles (HGVs)			
		AM Peak	PM Peak	AADT (2018)	
M1 between Jn1 and Jn2 Dublin Airport	NB	4739	6357	136186	5.1%
	SB	5869	4472		
M50 between Jn2 Santry and Jn3 M50/M1	NB	2685	3705	85777	9.3%
	SB	3808	2729		

The suburban road link capacities of the local road network within its 50 km/hour suburban speed limit zone, estimated on the basis of the TII Traffic Capacity of Urban Roads TA 79/99, are provided in **Table 13.3**. The TII suburban road link capacities are per each direction per hour, based on a 60/40 directional split.

Table 13.3: Existing TII Urban Road Link Capacity in each direction

Road	TII DMRB Urban Road Link		
	Type	Lanes	Capacity/Hour /Direction
R105	UAP4	2	900
R106	UAP3	2	900
R104	UAP2	2	1550
R139 / N32	UAP1	2	2010

The estimated existing suburban road link peak hour volume/capacity ratios for the R105, R106, R104 and R139/N32, within its 50km/hour suburban speed limit zones, are provided in **Table 13.4**.

Table 13.4: Estimated Road TII Urban Road Link 2018 Peak Hour Volume / Capacity Ratio

Road	TII DMRB Urban Road Link		
	2019 Peak Hour	Capacity/Hour /Direction	Volume / Capacity Ratio
R105	798	900	53.20%
R106	1107	900	73.80%
R104	2304	1550	89.19%
R139 / N32	3120	2010	93.13%

Note: Flows for single carriageways are based upon a 60/40 directional split in the flow. The volume / capacity ratio is based on the busiest 60% flow figure.

The R105 and R106 are operating well within their estimated suburban road link capacity with the highest volume/capacity ratios during the morning peak hour of 53.20% and 73.80%, respectively.

The R104 and R139/N32 are also operating within their estimated suburban road link capacity with the highest volume/capacity ratios during the morning peak hour of 89.19% and 93.13%.

13.3 LIKELY SIGNIFICANT IMPACTS

13.3.1 Do Nothing Impacts

The roads and transportation objectives and policies of Fingal County Council are set out in the Fingal Development Plan 2017 – 2024. The Council seek to implement a programme of road construction and improvement works closely integrated with existing and planned land uses, considering both car and non-car modes of transport whilst promoting road safety as a high priority. The R105 Sutton Cross improvements is indicated as a road improvement scheme during the plan period.

Subject to planning permissions, it is envisaged that work will commence at the site during summer 2022, with a duration of approximately 24 months. Accordingly, the proposed development is scheduled to be fully complete and operational by the middle of 2024. The TII Traffic and Transport Assessment Guidelines recommend that the opening year, should be considered for assessing a development proposal. In this case, the opening year is 2024 and the plan years are 2029 and 2039.

TII in their *Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections May 2019* envisage that car and light vehicles volumes in the Dublin Metropolitan area will increase by a factor of 1.0191 during the period to 2030, and by a factor of 1.0328 for heavy vehicles, based on their high sensitivity growth scenario. The equivalent factors for the period 2030 to 2040 are 1.0087 and 1.0172.

The predicted peak hour and AADT traffic volumes on the R105, R106, R104 and R139/N32, with the foregoing TII predicted high sensitivity growth scenario are provided in **Table 13.5.**

Table 13.5: Predicted Traffic Volumes with TII High Growth

Road	Year	Total Vehicles (HGVs)			
		Peak Hour		AADT (% HGVs)	
R105	2024	877	(16)	9688	3.64%
	2029	964	(19)	10649	4.28%
	2039	1062	(19)	11732	5.23%
R106	2024	1217	(20)	9129	3.64%
	2029	1338	(23)	10035	4.28%
	2039	1474	(29)	11055	5.23%
R104	2024	2253	(51)	30786	3.69%
	2029	2477	(60)	33841	4.34%
	2039	2728	(73)	37283	5.30%
R139 / N32	2024	3223	(71)	42795	3.64%
	2029	3543	(84)	47041	4.28%
	2039	3903	(102)	51826	5.23%

The estimated rural road link AADT volume/capacity ratios for the R105, R106, R104 and R139/N32 in the vicinity of the proposed development site are provided in **Table 13.5**, on the basis of the TII Traffic Capacity of Urban Roads TA 79/99 for the predicted years 2024, 2029 and 2039 peak hour volumes with the TII high growth scenario, without the proposed development.

Table 13.6: Predicted TII Urban Road Link Peak Hour Volume / Capacity Ratios with TII High Growth

Road	Year	Peak Hour Vehicles	Capacity/Hour /Direction	Volume / Capacity Ratio
R105	2024	877	900	58.48%
	2029	964		64.28%
	2039	1062		70.82%
R106	2024	1217	900	81.12%
	2029	1338		89.17%
	2039	1474		98.24%
R104	2024	2253	1550	87.21%
	2029	2477		95.87%
	2039	2728		105.62%
R139 / N32	2024	3223	2010	96.21%
	2029	3543		105.75%
	2039	3903		116.51%

Table 13.6 above shows the R105 and R106 will continue to operate within its estimated suburban road link peak hour capacity for the predicted 2024, 2029 and 2039 peak hour volumes based on the TII high growth scenario, with a highest volume/capacity ratio of 70.82% and 98.24% respectively.

The R104 will continue to operate within its estimated urban road link peak hour capacity for the predicted 2024 and 2029 peak hour volumes based on the TII high growth scenario, with a highest volume/capacity ratio of 95.84%. The predicted 2039 peak hour volume, based on the TII high growth scenario, has a volume/capacity ratio of 105.62%.

The R139 / N32 will continue to operate within its estimated urban road link peak hour capacity for the predicted 2024 peak hour volumes, with a volume /capacity ration of 96.21%. The predicted 2029 and 2039 peak hour volume, based on the TII high growth scenario, has a volume/capacity ratio of 105.75% and 116.51%, respectively.

The predicted 2024 peak hours and AADT volumes on TII national roads, with the TII predicted high sensitivity growth scenario are provided in **Table 13.7**.

Table 13.7: Predicted National Roads 2024 Traffic Volumes with TII High Growth

Road	Direction	Total vehicles (% HGV)			
		AM Peak	PM Peak	AADT (2024)	
M1 between Jn1 and Jn2 Dublin Airport	NB	5036	6375	146893	5.5%
	SB	6375	5098		
M50 between Jn2 Santry and Jn3 M50/M1	NB	2896	6857	92521	10.0%
	SB	4107	2944		

13.3.2 Construction Phase Impacts

A detailed description of the proposed development construction is provided in Chapter 2, Description of the Proposed Development.

Subject to planning permission, the proposed construction works will commence on site in the summer of 2022. The construction phase is expected to last approximately 24 months and will be completed by the middle of 2024.

The construction programme is divided into four elements. Element 1 is the construction of the perimeter embankment and rock armour revetment around the reclaimed land area. Element 2 is the dredging of the Inner Harbour. Element 3 is land reclamation, where the dredge material will be brought to an unloading point in the Middle Pier and will be treated before being pumped over to the land reclamation area. Element 4 will be the finishing's to the reclaimed land area. There will be an overlap between the elements in the construction programme. More details on this are provided in **Chapter 2 Description of the Proposed Development**.

13.3.2.1 *Access and Vehicle Routing*

Access to the site compounds are proposed via access on the west pier and middle pier as shown below in **Figure 13.4** Site compound locations and access **(Appendix 13 Volume 3 Of this EIAR, Drawing 19934-5014 dredge spoil procession site layout)** and also contained in the planning application package. It will include a vehicular access for construction traffic and a pedestrian access for construction personnel.

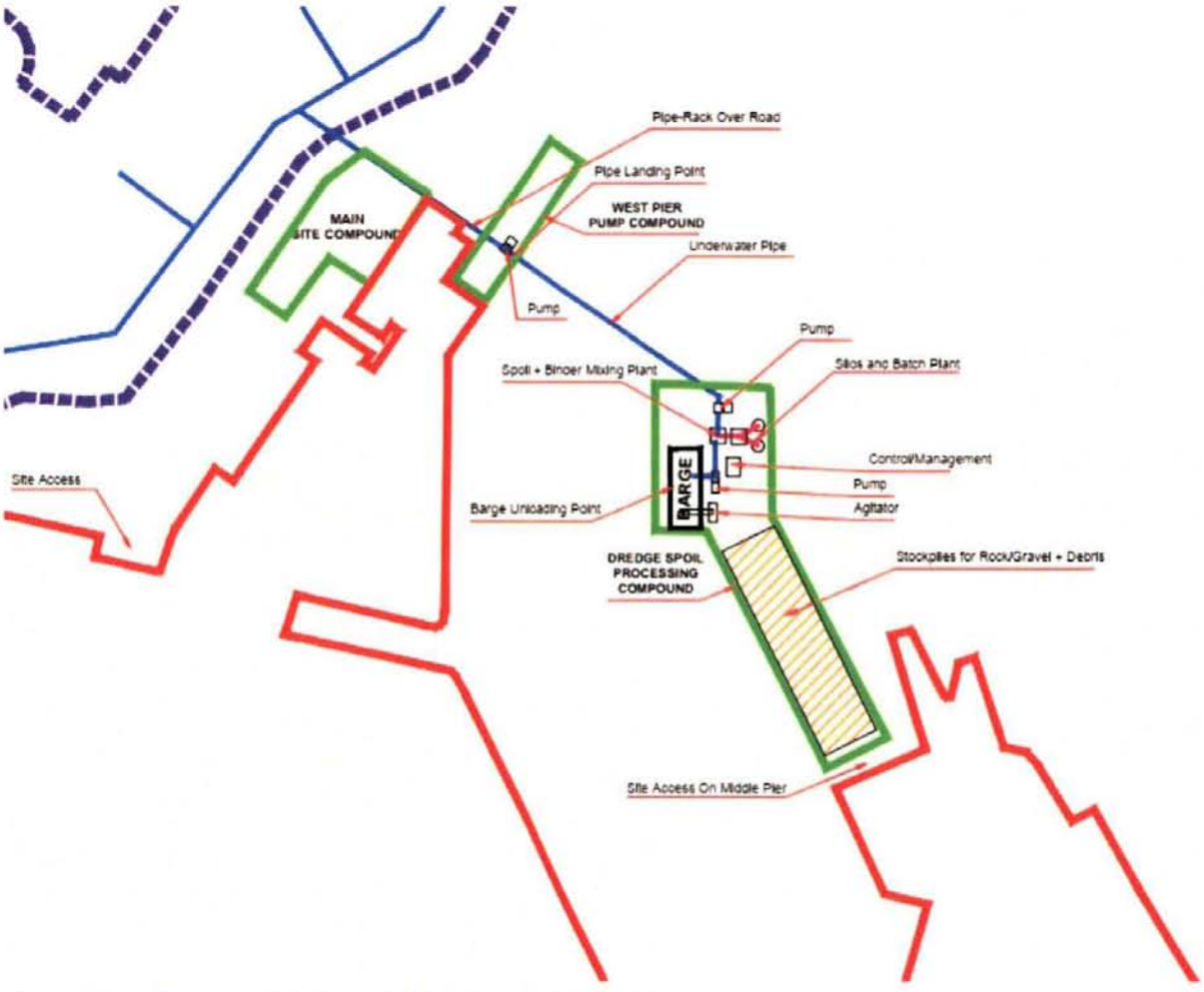


Figure 13.4 Compound locations (in green) and access

The Main contractor will prepare and implement a construction traffic management plan for the duration of the works. The traffic management plan will take into account all health and safety construction traffic guidelines. The plan will include delivery routes for the construction materials. The types and quantities of materials are outlined in
Table 13.8.

For the purpose of the traffic assessment, it is assumed that a significant number of the deliveries will be coming from the M1 / M50. They would then proceed east along the R104 until the coast road R105. The N32 / R139 also runs east from the M50. There is a weight restriction of 3.5T on sections of the R809 between Baldoyle and Sutton. As a result, it is envisaged most delivery vehicles will use the R104 / R105 route. The R105 continues to Sutton Cross and on into Howth. Delivery vehicles will return by the same route.

13.3.2.2 *Hours and Staff*

The proposed site working hours are between 7.00am and 7.00pm. Work is normally undertaken on a five-day week, depending on the programme, weather and availability of resources.

Dredging and sediment treatment activities will be carried out from 7am to 9pm (Monday to Friday) and 7am to 5pm (Saturday) with no work on Sundays. These activities will not impact on traffic volumes.

Site personnel will travel to site prior to 7.00am and depart from site from 7.00pm, on weekdays, outside the peak traffic hours. The expected peak construction staff will be up to 66 personnel, generating approximately 53 car and van trips, both to and from site each working day, based on an average worst case vehicle occupancy rate of 1.25 personnel per vehicle. Canteen facilities for personnel will be provided on-site. Parking for approximately 44 cars will be made available in the compound and construction work areas.

13.3.2.3 *Delivery Vehicle Volumes*

The 24-month construction programme will require the importation of up to 12,527 loads of construction materials. All construction materials will be imported using standard heavy vehicle delivery trucks with capacities of $10m^3$.

The proposed construction works heavy vehicle delivery traffic volumes are provided in **Table 13.8.**

Table 13.8: Proposed construction works heavy vehicles.

Material	Quantity	No. of Truck Delivery / HGV loads	No. of Truck Delivery Daily Average / HGV loads
Element 1 – Perimeter Embankment			
6A Stone Fill (embankment core)	53,000m3	5,300	30
Geotextile filter layer on seaward side	10,000m2	20	<1
Rock armourstone	25,000m3	2,500	14
Impermeable clay liner	10,000m2	20	<1
Reinforced Concrete Crest Wall	1,800m3	300	2
Masonry Facing Crest Wall	300m3	30	<1
Surface water drains	700m	2	<1
Element 1 Sub-Total		**8,172**	**50**
Element 2 – Dredging of the Inner Harbour			
Dredge spoil	240,000m3	Internal harbour movements by barge.	
Element 2 Sub-Total		N/A	N/A

Material	Quantity	No. of Truck Delivery / HGV loads	No. of Truck Delivery Daily Average / HGV loads
Element 3 – Land Reclamation			
Treated dredge spoil	240,000m3	Internal site movements by pump/pipe (sand/silt)	N/A
Cement/GGBS Binder	36,000 tonnes	1,800	5
Dredged rock/gravel	24,000m3	1,200 (Internal site truck movements)	4
Element 3 Sub-Total		**1,800**	**5**
Element 4 - Finishings			
Surface water drains	8,000m	20	<1
Stone fill (surface water drains)	12,000m3	1,200	10
Topsoil (landscaping)	8,100m3	810	7
Stone fill (pavements)	3,500m3	350	3
Pedestrian Paving	1,500m2	30	<1
Tar and Chip Paving	7,200m2	145	1
Element 4 Sub-Total		**2,555**	**23**
Total Construction		**12,527**	

Peak heavy vehicle traffic volumes generated by the delivery of construction vehicles will be up to 55 heavy vehicles per day, both to and from the site. This peak will occur during months 4-9 of the construction programme, where there is an overlap between Element 1, 2 and 3 of the construction works.

Table 13.9 below provides the total daily HGV deliveries during each construction period.

Table 13.9: Peak daily HGV delivery loads

Construction Programme Period	Estimated No. of Daily Delivery HGVs
Months 1 – 3	50
Months 4 – 9	55
Months 10 – 18	5
Months 19– 21	28
Months 22 – 24	23

13.3.2.4 *Traffic Volumes*

The predicted average annual daily traffic volumes, peak daily traffic volumes and highest peak hour traffic volumes generated by the proposed development construction are provided in **Table 13.10**. The predicted AADT volumes are based on the 24-month construction programme.

Table 13.10: Proposed construction works traffic volumes

Total Vehicles (HGVs)					
AADT (%HGV)		Peak Daily		Highest Peak Hour	
170	37.84%	216	(110)	14	(14)

The predicted 2024 peak daily and peak hour traffic volumes on the existing local roads with the proposed peak construction works traffic volumes are provided in **Table 13.11** and **Table 13.12** respectively.

Table 13.11: Predicted 2024 Daily Traffic Volumes with Peak Daily Construction Traffic

Road Location	Peak Daily Vehicles (HGVs)					
	Total Vehicles (HGVs)		Change		% Change	
R105	9857	(243)	215.6	(110)	2.2	(45)
R106	9344	(222)	215.6	(110)	2.3	(49)
R104	30786	(1026)	215.6	(110)	0.7	(11)
R139 / N32	43010	(1448)	215.6	(110)	0.5	(8)

Table 13.12: Predicted 2024 Peak Hour Traffic Volumes with Peak Hour Construction Traffic Volumes

Road Location	Peak Hour Vehicles (HGVs)					
	Total Vehicles (HGVs)		Change		% Change	
R105	891	(30)	14	(14)	1.5	(45.6)
R106	1231	(34)	14	(14)	1.1	(40.9)
R104	2267	(65)	14	(14)	0.6	(21.3)
R139 / N32	3237	(85)	14	(14)	0.4	(16.2)

13.3.2.5 *Volume / Capacity ratios*

The estimated urban road link peak hour volume/capacity ratio for the roads in the vicinity of the proposed development site are provided in **Table 13.13**, based on the TII Traffic Capacity of Urban Roads TA 79/99, for predicted 2024 peak hour volumes with the TII high growth scenario, with the proposed construction development.

Table 13.13: Predicted 2024 TII Urban Road Link Peak Hour Volume/Capacity Ratio with TII High Growth and Peak Hour Construction Traffic

Road	Peak Hour Vehicles	Capacity/ Hour/ Direction	Volume / Capacity Ratio
R105	891	900	59.40%
R106	1231	900	82.04%
R104	2267	1550	87.74%
R139 / N32	3237	2010	96.62%

Note: Flows for single carriageways are based upon a 60/40 directional split in the flow. The volume / capacity ratio is based on the busiest 60% flow figure.

The R105 and R106 will continue to operate within its estimated urban rural road link peak hour capacity, for the predicted AADT volumes, based on the TII high growth scenario and the proposed construction traffic volumes, with a volume/capacity ratio of 59.40% and 82.04% respectively. This compares to a ratio of 58.48% and 81.12%.

The R104 and R139/N32 will also continue to operate within its estimated urban rural road link peak hour capacity, for the predicted AADT volumes, based on the TII high growth scenario and the proposed construction traffic volumes, with a volume/capacity ratio of 87.74% and 96.62% respectively. This compares to a ratio of 87.21% and 96.12%.

13.3.2.6 *Harbour Parking*

During the dredging and stabilisation phases of the works which are estimated to be 18 months in duration, there will be a maximum loss of approximately 90 car parking spaces on the west pier (approx. 20 spaces) and middle pier (approx. 70) in order to create space for the site compounds, site works and treatment facilities. Middle pier will have a larger available area once the current development works there are complete (Planning permission F19A/0296). The harbour dredge and reclamation project will be able to utilise this area further reducing the potential impact of the required construction area on current parking volumes. The parking impact will be short term over the construction period. On this basis the impact of the project at Howth harbour will have a short term moderate negative effect on parking.

13.3.2.7 *Road pavements*

Heavy vehicle traffic volumes generated by the proposed development construction could result in damage to existing and proposed road pavements on public roads, including at vehicle turning, accelerating and decelerating locations. Road pavements will be regularly monitored and reinstated in accordance with the requirements of Fingal County Council.

13.3.2.8 *EPA Guidelines*

On the basis of the EPA Guidelines, the proposed construction works will have slight to moderate short-term negative effects.

13.3.3 Operational Phase Impacts

13.3.3.1 *Proposed development*

There are a number of existing harbour activities, including fisheries, a functioning shipyard, commerce (retail, leisure and food), tourism and leisure in Howth harbour. Howth is a popular tourist destination for amenity walkers, with easy access via the DART.

It is proposed as part of the development to provide landscaping on the reclaimed area to provide an amenity walking area, a slipway for access to the water, storage areas for harbour activities and additional car parking facilities. The reclaimed area is located west of the existing pier and will be accessed via a proposed road to the rear of the existing facilities. The proposed road is a single carriageway of 6.0m in width, with a footpath on each side of approximately 2.0m wide. The proposed road forms a T-junction with the existing West Pier local road.

Figure 13.5: Proposed reclamation area layout

The entrance to the proposed development area will be accessed from the existing West Pier local road.

A bus stop has also been provided, which is access from the proposed road. This area also includes facilities for bicycle parking. Vehicular parking has also been included as part of the proposed development and will provide approximately 45 additional car parking spaces.

13.3.3.2 *Traffic volumes*

The proposed water sports and slipway access relates to an existing activity within Howth Harbour. An existing slipway is located on the Middle Pier, and some activities relating to the slipway will relocate to the proposed area. This will result in no new generated vehicle trips on the external local road network. Access to the proposed slipway is provided from West Pier local road and the new proposed road. As additional car parking has been provided adjacent to the slipway, this will reduce existing car parking demand elsewhere.

An amenity walking area is also proposed as part of the development. This will result in no significant overall change to the generated traffic in the area, as amenity walking is already prevalent. The additional car parking spaces will reduce existing car parking demand elsewhere. The amenity walking area is located close to Howth Railway Station and the existing bus stops on the R105. A zebra crossing is provided on the R105. There is a network of pedestrian footpaths provided as part of the proposed development and these are linked to the proposed road, which will be accessed from the West Pier Local Road.

It is conservatively assumed that there will be one inbound and one outbound vehicle trip per available parking space per hour. It is assumed as part of this assessment, that there is full occupancy during peak traffic volume hour.

Table 13.14: Car parking spaces on West Pier

Car parking spaces	
Existing	106
Proposed	45
Total	151

This will result in 302 vehicle trips per hour on West Pier, which is accessed from the R105, by a priority T-junction.

The TII DMRB Geometric Design of Junctions DN-GEO-03060 June 2017 indicates that for junctions with a lightly trafficked minor road the provision of a simple priority junction is the most appropriate junction type for the predicted traffic, where the projected traffic (AADT) is less than 600 vehicles AADT on the minor road and less than 10,000 vehicles AADT on the major road. The existing priority T-junction between the West Pier and the R105 will continue to operate within its capacity for the plan years 2024, 2029 and 2039.

13.3.3.3 *EPA Guidelines*

On the basis of the EPA Guidelines, the proposed operation phase will have slight to moderate long-term negative effects.

13.3.4 Cumulative Effects

Planning permission (F19A/0296) has been granted by Fingal County Council for development works to the Middle Pier. The Middle pier development includes dredging, land reclamation and a new 134m length of quayside. Construction on this development began at the end of 2020 and is scheduled to end in March 2022. The construction timeline for this project is earlier than the harbour dredge project and there will be no overlap of construction works.

An Bord Pleanála (ref SHD/009/19) granted permission for 512 residential units (including parking for 439 cars) at the former Techcrete site, located immediately west of Howth Railway Station, known as Claremont. Their Construction Traffic Management Plan document and Traffic and Transportation Assessment indicate an opening year of 2024, with a 24-month construction project duration.
An Bord Plenala (ref ABP – 305828-19) also recently granted planning for 177 apartments, two shops a café and community room at Balscadden Road, Howth.

13.3.4.1 *Construction Phase*

In reviewing the Construction Traffic Management Plan for Claremont development, the following items were noted as relevant cumulative effects for this proposed development:

- Based on similar projects, in similar locations, 80 heavy goods vehicles per day have been estimated during the excavation process.
- The excavation works are programmed for 28 weeks at the start of the construction phase.
- 20 heavy goods vehicles per day have been estimated for outside the excavation process.
- Site workforce will generally arrive on site prior to 08:00 a.m. and leave after 18:00 p.m. Therefore traffic movements generated by site works will take place outside the peak times for network flows.
- To minimise the impact with morning traffic particularly between the hours of 08:00 a.m. and 09:00 a.m., no HGV will be allowed to leave site during this period.
- Vehicles coming to site will be against morning traffic. These vehicles will be able to enter site and wait in the waiting area, ready to leave site after 09:00 a.m.

The Claremont Development Construction Traffic Management Plan refers to the Balscadden Construction Management Plan. All traffic from the Balscadden development will use an alternative route to and from site, using the Carrickbrack Road to the south of Howth town centre. Therefore, their daily construction traffic movements will not contribute cumulatively to this assessment.

Table 13.15 below provides the predicted 2024 peak daily traffic volumes with both the Howth Dredging proposed development and Claremont development construction traffic movements provided. This is based on the worst case scenario of the excavation works for Claremont Development taking place at the same time as Months 4-9 on the Howth Dredging proposed development.

Table 13.15: Predicted 2024 Peak Daily Traffic Volumes with Cumulative Peak Daily Construction Traffic Volumes

Road Location	Peak Daily Vehicles (HGVs)					
	Total Vehicles (HGVs)		Change		% Change	
R105	9857	(243)	376	(270)	3.8	(45.3)
R106	9344	(222)	376	(270)	4.0	(45.3)
R104	30786	(1026)	376	(270)	1.2	(45.3)
R139 / N32	43010	(1448)	376	(270)	0.9	(45.3)

13.3.4.2 *Operational Phase*

The generated trips from the permitted developments are accounted for in the use of the TII high growth factors, which have been used as part of the traffic assessment.
There are no generated trips associated with this proposed development.

13.4 MITIGATION

13.4.1 Construction Phase

The Main contractor will prepare and implement a construction traffic management plan for the duration of the works. The traffic management plan will take into account all health and safety construction traffic guidelines. The plan will include delivery routes for the construction materials. No additional measures are proposed as no significant adverse impacts are envisaged.

13.4.2 Operational Phase

The proposed development will not have a significant operational traffic impact; therefore, no mitigation measures are proposed.

13.5 RESIDUAL IMPACTS

13.5.1 Construction Phase

On the basis of the EPA Guidelines, the proposed construction works will have a slight to moderate short-term negative effects.

13.5.2 Operational Phase

On the basis of the EPA Guidelines, the proposed development will have slight to moderate long-term negative effects.

14. INTERACTION OF EFFECTS

14.1 Introduction

This chapter addresses the potential for interactions and inter-relationships between one aspect of the environment and another which can have either positive or negative impacts, for example the interaction between noise and ecology. In accordance with the requirements of the EIA Directive, this EIAR has presented the assessments of the likely significant environmental impacts of the proposed development under each of the assessment topics.

Only topics that could reasonably be linked to the proposed development have been examined in detail. Accordingly, when a topic is not mentioned, the authors have concluded that no potential for significant impact exists.

14.2 Assessment Methodology

14.2.1 Interactive Effects

The EIAR has considered and assessed the interactive effects arising from the construction and operation of the proposed development based on best scientific knowledge. Interactive effects (or interactions), specifically refer to any direct or indirect effects caused by the interaction of environmental factors as outlined in Part 1(e) in Article 3 of the EIA Directive which states:

"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

(a) population and human health;
(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
(c) land, soil, water, air and climate;
(d) material assets, cultural heritage and the landscape;
(e) the interaction between the factors referred to in points (a) to (d). "

14.3 Interaction of the Environmental Effects

Where relevant, interactions between specific environmental aspects and effects are already addressed within each of the individual assessment topic areas of this EIAR. The preceding chapters of this EIAR identify the potential environmental effects that may occur in terms of Biodiversity, Population and Human Health, Land and Soil, Water, Air Quality and Climate, Archaeological, Architectural and Cultural Heritage, Landscape and Visual, Noise and Vibration and Traffic and Transportation. All of the potential impacts of the proposed development and measures proposed to mitigate them have been outlined in the preceding chapters. The result of interactive effects may either exacerbate the magnitude of the impact or ameliorate it. The purpose of this chapter is to draw attention to significant interactions and interdependencies between one topic and another.

The relevant interactions and interdependencies between specific environmental aspects have been summarised in the matrix set out in **Table 14.1** below. The matrix contains two axes outlining each of the environmental topics which have been considered as part of this EIAR. Interactions have been identified for both the construction and operational phases of the proposed development.

Table 14.1 Potential Interaction of Effects Matrix (C = Construction, O = Operational. If there is considered to be no potential for an effect, the box is left blank.)

	Population and Human Health	Biodiversity	Land and Soils	Water	Air and Climate	Material Assets	Heritage	Landscape and Visual Resource	Noise and Vibration	Traffic and Transportation
Population and Human Health			C	C	C	C	O	CO	C	C
Biodiversity			C	C	C			CO	CO	C
Land and Soils	C	C		C	C		C	C		C
Water	C	CO	C			CO				
Air and Climate	C	C	C							C
Material Assets	CO		C	CO	C		CO		C	
Heritage	O		C			CO		CO		
Landscape and Visual	CO	CO	C				CO			C
Noise and Vibration	C	C								C
Traffic and Transportation	C	C	C		C				C	

14.3.1 Population and Human Health

The additional employment of staff workers during the proposed dredging and site infrastructure works will have a positive impact on the local economy, impacting on material assets and will also have an impact on traffic. The impacts associated with each individual aspect are addressed in the preceding chapters.

14.3.2 Land and Soils

The dredging and reclamation works associated with the proposed development have the potential to impact on air quality and climate, surface and ground water, population and human health, landscape and visual, heritage, biodiversity, noise and vibration and traffic and transportation. The associated impacts for each aspect are addressed individually in the preceding chapters.

14.3.3 Water

There is potential for the impacts associated with surface water and ground water to interact with population and human health, land and soils and biodiversity. The potential impacts associated with surface and ground waters due to the construction and operational phases of the proposed development are addressed individually and in detail within **Chapter 7 Water.**

14.3.4 Air and Climate

There is potential for emissions to air during the construction phase in the forms of temporary fugitive dust and vehicle emissions. This has the potential to impact population and human health and biodiversity in the vicinity of the site. The potential and predicted effects of emissions associated with the project are addressed in **Chapter 8 Air Quality and Climate**.

14.3.5 Landscape and Visual Resource

The change in landscape during the construction and operational phase has the potential to impact on population and human health through local residents, tourists and the general public. The impact on biodiversity is via the change in existing wildlife habitats in the west pier. The heritage interaction is through the change in landscape in the immediate vicinity of protected structures.

14.3.6 Noise and Vibration

Noise impacts will occur during the dredging and construction phases of the project as a result of increased levels of site associated traffic, dredging and treatment/pump machinery during the works. Noise and Vibration has the potential to impact on population and human health and biodiversity, which are addressed individually and in detail within the preceding chapters.

14.3.7 Traffic and Transportation

The increase in traffic associated with the proposed dredging and site infrastructure works has the potential to have an impact on air quality and climate, landscape and visual, population and human health, land and soils and biodiversity. The impacts associated with each aspect are addressed individually within the preceding chapters.

14.4 References

Department of Housing, Planning and Local Government (2018) Circular PL 05/2018 -Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive);

Department of Housing, Planning, Community and Local Government (2017) Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licensing Systems;

Department of Housing, Planning, Community and Local Government (2017) Circular PL 1/2017 - Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive): Advice on the Administrative Provisions in Advance of Transposition;

Department of the Environment, Community and Local Government (2013) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;

Environmental Protection Agency (2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017);

European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report; and

Government of Ireland (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018)

15. SCHEDULE OF ENVIRONMENTAL MITIGATION MEASURES

15.1 Introduction

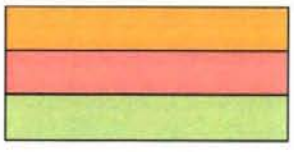
This Schedule of Environmental Mitigation has been prepared as part of the EIAR for the proposed Howth Harbour FHC Dredging Project. Where unavoidable environmental effects have been identified, measures have been proposed to mitigate against these effects as much as reasonably possible.

The schedule sets out the implementation programme of all mitigation measures contained within the EIAR. The recommended mitigation measures and predicted impacts are comprehensively detailed in the relevant chapters of the EIAR and summarised in **Table 15.1** below.

15.2 Format of the Mitigation Schedule

The mitigation schedule on the following pages is structured in accordance with the following project phases:

- Pre-construction
- During construction
- Operational phase



The mitigation schedule is presented in table format which, for each of the above-mentioned project phases, outlines the environmental aspect or resource for which mitigation is required, the required or proposed mitigation measure, and outlines any residual impacts where relevant.

Table 15.1 Programme of Mitigation Measures

TIME FRAME / SCHEDULE	ASPECT/ RESOURCE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	RESIDUAL IMPACT FOLLOWING MITIGATION
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**POPULATION AND HUMAN HEALTH**	To reduce potential impact on the resources using the marina harbour close contact communication and coordination will be opened with the commercial fishermen, Howth Yacht Club and the RNLI.	Residual impacts will be construction phase short term a slight negative effect and an operational phase permanent significant positive effect.
	BIODIVERSITY	**Environmental Management & Monitoring** A suitable qualified project ecologist will be employed for the duration of the works to ensure that mitigation measures and relevant ecological planning conditions are implemented in full. The project ecologist will also have a role in reviewing and approving all work method statements. The project ecologist will have the authority to stop works should an unforeseen issue arise. Additional environmental management tools include: • A detailed **Construction and Environmental Management Plan** (CEMP) will be developed by the appointed Contractor. This CEMP will comprise all of the construction mitigation measures, which are set out in this report. • A **Water Quality Management Plan** will be agreed with the relevant authority. • An **Invasive Species Management Plan** will be developed/implemented	The residual effects will be imperceptible to not significant.

TIME FRAME / SCHEDULE	ASPECT/ RESOURCE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	RESIDUAL IMPACT FOLLOWING MITIGATION
		Birds Bird monitoring will be undertaken prior to commencement of construction. Monitoring will have a particular focus on the Harbour itself and mudflat/sandflats and waters around Claremont Strand. Surveys conducted will be as follows: • Breeding Bird Surveys / Black Guillemot Surveys – April to August • High Tide / Low Tide Summer Surveys – May to August • Winter Bird Surveys – October to March This will allow for comparative analysis with 2019/2020 surveys. To mitigate the impact on the Black Guillemot and enhance breeding bird habitat on the site for Black Guillemot, 4 nesting tunnels / nest boxes will be incorporated into the proposed reclamation area and/or existing pier structures, at appropriate locations to encourage increased numbers of breeding pairs in the harbour. A qualified ecologist will be engaged to choose appropriate locations for nest boxes and supervise installation. Once the new nest boxes are in position a preconstruction survey will take place to ensure that the nest locations on the West Pier are not in use before construction starts. Under licence and with agreement of the NPWS the black guillemot nests in the holes within structures on the west pier will be blocked. The purpose of this is to stop possible nesting that may be abandoned later due to construction works. It is expected that the Black Guillemots will find more suitable nesting locations within the new nest boxes. To reduce disturbance on the remaining two identified winter roosts, screening will be erected along the southern boundary of the reclamation area. This will reduce disturbance on the southern winter roost near Claremont Beach. Screening or fencing will be erected around the winter roost at the end of the East Pier. The screening or fencing on the East Pier will happen over the period of time that the winter roosts are used by the birds (generally autumn and winter). The type of screening or fencing best suited and the requirement to close the walkway on the top of the pier wall at this location, will be agreed with the project ecologist before construction starts. All vegetation removal required to accommodate the works will be done outside of the bird breeding period, March to August, inclusive.	

TIME FRAME / SCHEDULE	ASPECT/ RESOURCE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	RESIDUAL IMPACT FOLLOWING MITIGATION
	LAND AND SOILS	Drainage and associated pollution control measures will be implemented on site before the main body of construction activity commences.	During the construction phase, once the mitigation measures are implemented there will be a short term not significant effect on the land and soil environment from the proposed development. During the operational phase once the mitigations are implemented the impacts on the land and soils from the proposed development range from a permanent not significant negative effect to a permanent not significant positive effect on the land and soils.
	MATERIAL ASSETS	The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services unless this has been agreed in advance with the relevant service provider.	The impact of the proposed project on resource use is a permanent significant positive effect. The impact of the proposed project on other material assets will be a short term not significant effect.
	CULTURAL HERITAGE	A detailed archaeological survey will be completed of the glacis of the West Pier that will extend from the glacis toe to the rear of the buildings that populate the West Pier. The survey will ensure to include the glacis and the two historic slipways and their details that are built into the glacis. The survey will be to a high standard, capable of producing metrically accurate plan, section and profile drawings that capture the detail. If a laser-scan is to be deployed to achieve this, the work will meet the standards required for large building surveys and will produce modelled space and cloud-point data that is accessible and interpretable to non-specialist end-users.	No residual impacts

TIME FRAME / SCHEDULE	ASPECT/ RESOURCE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	RESIDUAL IMPACT FOLLOWING MITIGATION
DURING CONSTRUCTION PHASE	**BIODIVERSITY**	**Habitats** To prevent incidental damage by machinery or by the deposition of spoil during the site clearance stage, any habitats earmarked for retention, particularly Annex I habitats in close proximity to site works, will be securely fenced off early in the construction phase. The fencing will be clearly visible to machine operators. **Birds** Bird monitoring will be undertaken during construction work using same methodology as outlined in pre-construction mitigation section. Lighting will be provided with the minimum luminosity during the construction phase and operational phase. Lights will be focused away from the intertidal areas which support feeding birds. Light spillage will be minimised and directed to the intended area only, particularly along the northern boundary, by use of accessories such as hoods, cowls, louvres and shields. Dark Zones will be maintained for roosting intertidal bird species in areas where lighting is not necessary. However, where lighting is required, this lighting should be placed at a minimum height using the lowest lux value permitted for health and safety. Exclusion zones will be established during the wintering bird period. These will be focused around the Claremont Beach to the southwest of the proposed reclamation area i.e. outside the proposed development boundary. Site personnel will avoid this area during rest periods e.g. breaks, as not to introduce a potential disturbance factor to foraging birds. This will allow for the continuance of exposed mudflat habitat, particularly during low tide, to be utilised as feeding ground for wading birds. **Marine mammals** A soft start procedure should be used to allow any marine mammals present in the area to vacate prior to the full dredging operation commencing. A dedicated Marine Mammal Observer will conduct a 15-minute watch for marine mammals within 200m of the dredger prior to start up. If a seal or cetacean (or otter) is sighted within 100m of the dredger, start-up must be delayed until the animal(s) is/are observed to move outside the mitigation zone or the 15 minutes has passed without the animal being sighted within the mitigation zone.	The residual effects will be imperceptible to not significant.

TIME FRAME / SCHEDULE	ASPECT/ RESOURCE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	RESIDUAL IMPACT FOLLOWING MITIGATION
		Invasive Species To prevent the transfer of in situ invasives off site and the introduction of ex-situ invasive plant species to the site, the following measures are proposed: • To reduce the likelihood of invasive species spreading throughout the site, the construction personnel involved in works will be trained in basic relevant invasive species prevention and management. • Invasive species management methodologies and plans outlining Best Available Techniques (BAT) will be sourced from current best practice/TII (The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads).	
	WATER	**Control of Suspended Solids during Dredging** During the dredging works, loss of suspended sediments will be controlled with the use of environmental buckets. A Water Quality Management Programme (WQMP) will be prepared by the contractor and implemented to incorporate the mitigation measures outlined in this section. Mitigations are as follows; • Environmental buckets to be fitted to the dredge excavator; • Silt curtains to be placed around the dredge as it is working; • Monitoring of the waters outside the harbour in line with agreed parameters and limits from the licencing authority; and • If monitoring indicates exceedances of agreed limits further management of the dredging methods will be undertaken to bring concentrations below the exceedance limits. **Monitoring** Limits on turbidity or suspended solids will be agreed with the relevant authority prior to commencement of works. The water quality will be monitored during works by the following methods: 1. Fixed station in situ water quality monitoring 2. Boat-based in situ water quality monitoring 3. Visual water quality monitoring 4. Laboratory water quality monitoring *Fixed station in situ water quality monitoring* Turbidity sensors should be used to determine turbidity during the dredging operation using in-situ readings. Continuous, real-time, in situ water quality data should be collected through the use of sensors deployed on a buoy near the construction site. High-frequency data is averaged at regular intervals and uploaded via telemetry to a website.	The residual impact will have a likely not-significant short term adverse effect on water quality.

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		Fixed locations for turbidity sensors should be identified and agreed with the relevant authority. *Boat-based in situ water quality monitoring* Monthly mobile manual monitoring will also take place by boat-based water quality monitoring, the frequency of which should be approved by the relevant authority. *Visual water quality monitoring* Daily visual monitoring should also be carried out from the shore and dredging vessel by the Contractor and Resident Engineer. The visual monitoring will include: • Visual monitoring for suspended solids within and outside of the harbour. • Daily inspection of surface water management systems including the stockpile drainage locations and any authorised discharge locations. • A log will be kept of all visual monitoring. *Laboratory water quality monitoring* Samples should be collected at agreed regular intervals and locations to test for suspended solids. The plan should be approved by the relevant authority. **Temporary Construction Compound** • Drainage within the temporary site compound will be directed to an oil interceptor to prevent pollution if any spillage occurs. • The waste water tank, and sewage tank will be emptied as required by a vacuum tanker, and removed from site to a licensed facility. These staff facilities will be removed at the end of the construction phase. • Temporary toilet facilities will be managed by the Contractor during the construction phase. • A bunded containment area will be provided within the compound for the storage of fuels, lubricants, oils etc. • The compound will be in place for the duration of the construction phase and will be removed once commissioning is complete. • Treatment of dredge material will be carried out in an enclosed and controlled material treatment facility. The facility consisting of the mixing plant, binder silos, storage areas and pumps will be fully bunded. Any loss of dredge material within the bunded area will be collected and fed through the treatment facility again for disposal within the reclaimed area.	

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		Reclamation works Dewatering will occur under appropriate authorisations and will be monitored to ensure limit parameters are followed. **Waste** Standard good waste management practices will be employed on the site during the construction and operational stages to ensure that waste management activities do not pose a risk to water quality. **Storage and Stockpiles** • Stockpiles will be located away from drainage systems and silt retaining measures (silt fence/silt curtain or other suitable materials) to reduce risk of silt run-off shall be installed along the downgradient edges of stockpiled earth materials. • Temporary storage areas for fuels and other hazardous materials required by the contractor during construction will be stored in appropriately bunded facilities to prevent the accidental spillage of hazardous liquids that could cause soil and groundwater contamination. • Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements. • Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or re-cycling by an approved service provider. • The scale of potential impacts on water quality will be reduced by only storing the required volume of oils for the works taking place at the time. • Oil and fuel stored in bunded areas shall be stores an appropriate distance from any watercourse/discharge point etc, as to prevent accidental spills entering the harbour. • Access to oil stores will be controlled by the storage of oils/fuels within a locked steel container/designated area, and cannot be accessed when there are no site personnel present. • Collision with oil stores will be prevented by highly visible signs/posted. • Leakages of oil from oil stores will be prevented by storing these oils in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Taps, nozzles, or valves will be fitted with a lock system.	

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		• The volume of leakages will be prevented through monitoring oil storage tanks/drums for leaks and signs of damage. This will be carried out daily/regularly by the Environmental Manager. • Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers, and removed from the site for disposal, or re-cycling by an approved service provider. **Control of concrete/ cementitious materials** Concrete for the reclamation area works will be poured *in situ*. The following measures will be implemented during the use of concrete: • To reduce the potential for cementitious material entering the Harbour, concrete pours will be supervised by the Construction Manager/suitably qualified Engineer/Environmental Manager. • The Construction Manager/Site Engineer will ensure that the formwork for the concrete works, are completely sealed prior to concrete pour, and there is no potential for concrete to enter the adjoining waters. • Weather and tidal conditions will be monitored, as to allow sufficient time for the concrete to cure, preventing runoff. • In the event of a spillage on site, the Environmental Manager/Site Engineer will shut down the supply of concrete immediately, temporarily seal off the area. Any spillage will be collected immediately, before entering marine waters, and deposited in appropriate manner/area/removed off site to an appropriate licensed landfill. • If dewatering is required, all contaminated water will be pumped to suitably sized settlement area/tank/bowser and treated, in order to prevent solids/contaminants escaping to the Harbour. • pH will be monitored continuously in the Water Quality Management Plan. • To reduce the volume of cementitious water, washout of concrete trucks will not take place on site. Concrete trucks will be washed out off site, at the batch area/source quarry. **Stabilised and solidified sediment mitigations** • Once stabilised dredge material is pumped into the reclamation area, excess water (supernatant) will form on the surface. Excess water (supernatant) will be collected from the surface of deposits and returned to the treatment area for reuse to fluidise the dredge spoil as necessary to make it pumpable. In cases where there is a higher amount of excess water then is required for reuse then the excess water or trade effluent will be treated and under a trade effluent licence be discharged to the sewer	

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		system or storm water system as authorised. The treatment required would be expected to be triple interceptor tank followed by a settlement and/or flocculent tank before discharge under licensed conditions. • The treatment locations will be continuously monitored by either the Site Engineer/ Environmental Clerk of Works / Environmental Manager. • As cement will be used in the treatment process, if there is a requirement, all high-alkaline water draining from the facilities must be neutralised in a settlement area (can dose with CO_2), before being discharged under authorisation, after settlement, back into Howth Harbour, preferably toward the inner end of the harbour. This will prevent leaching of heavy metals, avoid the adverse impacts of highly alkaline discharges, and minimise of the discharge of suspends solids. **Refuelling of Construction Plant On-Site** • Refuelling will be carried out using 110% capacity double bunded mobile bowsers. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using. • Plant nappies or absorbent mats to be place under refuelling point during all refuelling to absorb drips. • Mobile bowsers, tanks and drums should be stored in secure, impermeable storage area, away from drains and open water. • To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up to date service record will be required from the main contractor. • Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; the nearby dirty water drain outlet will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in a licensed facility. • The site Environmental representative will be immediately informed of the oil leak/spill, and will assess the cause and the management of the clean-up of the leak or spill. They will inspect nearby drains for the presence of oil, and initiate the clean-up if necessary. • Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery. • Correct action in the event of a leak or spill will be facilitated by training all vehicle / machinery operators in the use of the spill kits and the correct containment and	

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		cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction. • In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery. **Vessels/barge/s** • It is recommended that appropriate fuel management measures are put in place, and agreed with the Harbour Master prior to the works commencing, to ensure that no significant negative impacts occur to water quality. Potential leaks from vessels/boats will be mitigated by contractually requiring the contractors to only operate/supply vessels/boats that are in good working order, up to date in servicing etc., and free of leaks.	
	LAND AND SOILS	**Standard mitigation** The following mitigation measures are recommended: • Sustainable use of materials on site. Workers on-site should be briefed prior to commencing work with regard to appropriate use and disposal of waste; • Tight control on material required to avoid waste. Incoming materials should be of a suitable quantity so as to ensure a minimum amount of waste is generated; Temporary storage areas for fuels and other hazardous materials required by the contractor during construction will be stored in appropriately bunded facilities to prevent the accidental spillage of hazardous liquids that could cause soil contamination.	During the construction phase, once the mitigation measures are implemented there will be a short term not significant effect on the land and soil environment from the proposed development. During the operational phase once the mitigations are implemented the impacts on the land and soils from the proposed development range from a permanent not significant negative effect to a permanent not significant positive effect on the land and soils.
	AIR QUALITY AND CLIMATE	Standard mitigation measures will be implemented. This will include the following: • Dampening of exposed earthwork activities and site haul roads during dry weather; • Covering of stockpiles and/or dampened during dry weather; • Control of vehicle speeds, speed restrictions and vehicle access; and • Sweeping of hard surface roads. • Internal and public roads will be inspected regularly for cleanliness and cleaned as necessary; • All loads entering and leaving the site should be covered during dry periods if dust becomes a nuisance on site; • Control of vehicle speeds passing over access roads and within the site; and	The residual construction phase impact will be a short term not significant effect on air quality from fugitive dust emissions. Once operational, there will be a neutral impact on air quality from the proposed development.

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		• Daily site inspections should take place to examine dust measures and their effectiveness. • Generators will be located away from sensitive receptors. • Stockpiles will be located as far as possible from sensitive receptors and covered and/or dampened during dry weather. • Staff training and the management of operations will ensure that all dust suppression methods are implemented and continuously inspected. • Dust monitoring will be undertaken at the nearest sensitive receptor during the construction phase. The TA Luft dust deposition limit values of 350 mg/m²/day (averaged over one year) will be applied as a 30-day average. Construction traffic mitigation measures: • Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently; • Implementation of the Construction Traffic Management Plan to minimise congestion; and All site vehicles and machinery to be switched off when not in use - no idling.	
	NOISE AND VIBRATION	• Onsite noise monitoring will be undertaken once the works have started. This will assess the level of noise impacting on the West Pier. This will occur at different times depending on the location of the dredging barge. The results of this monitoring will define a working area between the hours of 7pm and 9pm in order to comply with the evening time noise limit. • Liaison with the businesses on the West Pier to let them know what works are taking place when and to get feed back on the noise impacts will take place. • Solid hording will be put up around the pump compound on West Pier in order to reduce noise impact coming from equipment. During the works, best practice noise reduction measures described in *British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites* will be incorporated into the Construction and Environmental Management Plan.	Given the nature of the works it is difficult to quantify exactly the noise impact at each noise sensitive receptor as it will vary from day to day as the works progress. The model predicts no daytime exceedance of the limit criteria. There is a predicted exceedance of the limit criteria during evening hours on West Pier. Once mitigation measures are implemented there will be a short term not significant effect on businesses and visitors at West Pier. The works are short term and once completed there will be no significant residual noise.

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	ARCHAEOLOGY	Archaeological monitoring licensed by the National Monuments Service will be conducted of all terrestrial, inter-tidal/foreshore and seabed disturbances associated with the development, with the proviso to resolve fully any archaeological material observed at that point. The level of monitoring of the dredging operation within the harbour basin should be limited to those areas and depths not achieved in the 1980s construction campaign. The following archaeological monitoring and management measures will be undertaken: • Retaining a project archaeologist/s. An archaeologist experienced in maritime archaeology will be retained by the Department of Agriculture, Food and the Marine for the duration of the relevant works. • Retaining a conservation engineer. A conservation engineer experienced in industrial and maritime architectural heritage will be retained by the Department of Agriculture, Food and the Marine for the duration of the relevant works, to advise specifically in relation to works associated with the West Pier. • Archaeological licences will be required to conduct the on-site archaeological works. Licence applications require the inclusion of detailed method statements, which outline the rationale for the works, and the means by which the works will be resolved. Licence applications take a minimum of four weeks to process through the Department of Housing, Local Government and Heritage, and advance planning is required to ensure that the necessary permits are in place before site works commence. It is anticipated that the following licence types will be required: Excavation, to cover monitoring and investigations works; Detection, to cover the use of metal-detectors; and Dive Survey, to cover the possibility of having to conduct underwater inspections. Since 2017, Excavation licence applications must be accompanied by a letter from the client on their letterhead 'confirming that sufficient funds and other facilities are available to the archaeologist to complete the archaeological excavation, post-excavation, and preliminary and final reports (including specialist reports)'. The Department of Agriculture, Food and the Marine has confirmed that sufficient funds and other facilities as required will be made available to the project archaeologist to complete all reports required. • Archaeological monitoring will be carried out by suitably qualified and experienced maritime archaeological personnel licensed by the Department of Housing, Local Government and Heritage. Archaeological monitoring is conducted during all terrestrial, inter-tidal/foreshore and seabed disturbances associated with the development. The level of monitoring of the dredging operation within the harbour basin should be limited to those areas and depths not achieved in the 1980s	No residual impacts on archaeological assets are anticipated.

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		construction campaign. Archaeological monitoring will be undertaken in a safe working environment that will facilitate archaeological observation and the retrieval of objects that may be observed and that require consideration during the course of the works. The monitoring will include a finds retrieval strategy that is in compliance with the requirements of the National Museum of Ireland. • The time scale for the construction phase will be made available to the archaeologist, with information on where and when ground disturbances will take place. • Discovery of archaeological material. In the event of archaeologically significant features or material being uncovered during the construction phase, machine work will cease in the immediate area to allow the archaeologist/s to inspect any such material. • Archaeological material. Once the presence of archaeologically significant material is established, full archaeological recording of such material will be recommended. If it is not possible for the construction works to avoid the material, full excavation will be recommended. The extent and duration of excavation will be a matter for discussion between the client and the licensing authorities. • Archaeological team. It is recommended that the core of a suitable archaeological team be on standby to deal with any such rescue excavation. This would be complimented in the event of a full excavation. • Archaeological dive team. It is recommended that an archaeological dive team is retained on standby for the duration of any in-water disturbance works on the basis of a twenty-four or forty-eight hour call-out response schedule, to deal with any archaeologically significant/potential material that is identified in the course of the seabed disturbance activities. • A site office and facilities will be provided by Department of Agriculture, Food and the Marine on site for use by archaeologists. • Secure wet storage facilities will be provided on site by the Department of Agriculture, Food and the Marine to facilitate the temporary storage of artefacts that may be recorded during the course of the site work. • Buoying/fencing of any such areas of discovery will be necessary if discovered and during excavation. • Machinery traffic during construction will be restricted to avoid any identified archaeological site/s and their environs. • Spoil will not be dumped on any of the selected sites or their environs. • Post-construction project report and archive. It is a condition of archaeological licensing that a detailed project report is lodged with the DCHG within 12 months of completion of site works. The report should be to publication standard and should	

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		include a full account, suitably illustrated, of all archaeological features, finds and stratigraphy, along with a discussion and specialist reports. Artefacts recovered during the works need to meet the requirements of the National Museum of Ireland. These measures are subject to the approval of the National Monuments Service at the Department of Housing, Local Government and Heritage. The Department of Agriculture, Food and the Marine has and will continue to engage with the Department of Housing, Local Government and Heritage.	
	LANDSCAPE AND VISUAL	Specific landscape and visual mitigation measures are not considered necessary. Instead, the carefully considered siting and design of the proposed reclamation works are inherent to the appraisal of landscape / seascape and visual impacts herein. Thus, the predicted impacts (pre-mitigation) are the same as residual impacts (post-mitigation) in this instance.	No significant visual impact.
	MATERIAL ASSETS	Good site practice and careful management on site will ensure efficient resource management and a reduction in waste. Any waste generated on site will be segregated at source and will be taken off site to an appropriate facility by an authorised contractor. All waste streams will be identified within the contractor's waste management plan at the outset and a defined area will be identified for the segregation and storage of waste. Adequate signage and notices will be provided on site along with training and supervision of staff to ensure compliance with sound waste management practice. The waste treatment activity and placement of the treated material will be undertaken in accordance with the conditions of a waste or IE licence from the EPA. Controls as part of the contractor's Construction and Environmental Management Plan will ensure minimal waste being generated and minimise the risk of pollution. Fully registered waste management companies will only be used to remove waste from the site. Standard good practice of only ordering the required amount of materials will be implemented. The small quantities of solid waste (packaging, surplus construction materials, etc) generated during the construction stage of the project will be sorted on site prior to disposal/recycling as appropriate off site by a licensed waste contractor.	The impact of the proposed project on resource use is a permanent significant positive effect. The impact of the proposed project on other material assets will be a short term not significant effect.

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	TRAFFIC AND TRANSPORTATION	The Main contractor shall prepare and implement a construction traffic management plan for the duration of the works. The traffic management plan will take into account all health and safety construction traffic guidelines. The plan will include delivery routes for the construction materials.	Slight to moderate long-term negative effects.

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OPERATIONAL PHASE	**Biodiversity**	**Birds** During the operational phase of the proposed development a permanent winter roost area will be established on the newly constructed revetment pier. This will provide a continuation of the existing winter roost area on the West Pier. The roost area will be fenced or screened off to reduce disturbance as agreed with the project ecologist.	The residual effects will be imperceptible to not significant.
	WATER	**Monitoring** Monitoring of the water quality during the operational phases will take place. The monitoring will be in accordance with an EPA issued licence needed to undertake the proposed works. The monitoring will include sampling and testing of the waters to show compliance with the EPA licence. The licence will not be surrendered until the EPA are satisfied there is no environmental liability with the proposed project. **Maintenance** Surface water run-off will be collected through a network of gullies feeding into storm water drains. The drains will collect at a number of hydrocarbon/silt interceptors before outfalling into the sea through headwalls in the proposed revetment. Maintenance of the interceptors will be carried out periodically during the operation of the west pier.	The residual impact of the S/S sediment will have a likely permanent imperceptible negative effect on water quality. The removal of the contaminated sediments and containing them within the reclaimed land will have a permanent not significant positive effect on water quality.