Galway Harbour Company

Galway Harbour Extension

Response to An Bord Pleanála Sept. 2024

EIS Addendum Chapter 10

Noise & Vibration

An Bord Pleanála (Ref: 61.PA 0033)

Table of Contents

List of Tables

List of Appendices

10.1. Introduction

Chapter 10 of the 2014 EIS describes the noise and vibration assessment undertaken in relation to the Galway Harbour Extension project (GHE). This addendum reviews the chapter and its three appendices. The addendum also reviews a number of documents prepared during the planning process following submission of the 2014 EIS. Acoustic findings presented in the documents are set out below. This addendum updates relevant information issued and received since the EIS was prepared, and determines if the findings set out in the EIS and attendant documents remain valid or otherwise.

The original noise and vibration assessment as described in Chapter 10 of the EIS was undertaken by Biospheric Engineering Ltd. As this company no longer exists, MKO was commissioned to prepare this addendum. The assessment was undertaken by Damian Brosnan (MKO Project Director, Acoustics) and Sinead Fagan (MKO Project Manager).

Damian has over 25 years of experience in both private practice and local authority, and holds an MSc in Applied Acoustics. Damian joined MKO in 2023, heading up the new MKO acoustics unit. Prior to joining MKO, Damian worked with Cork County Council's Environment Department and, subsequently, as an acoustic consultant. Damian is a member of the Institute of Acoustics, and is Secretary of the Irish Branch. He is also a founding member of the Association of Acoustic Consultants of Ireland, an industry body founded to promote acoustics best practice in Ireland. Damian has presented acoustic evidence in a number of court hearings and oral hearings.

Sinéad Fagan (MA in Environmental Resources Management) joined MKO in 2023, and has over 17 years of experience in private practice. Prior to working for MKO, Sinéad worked as an environmental consultant where she gained extensive experience in noise monitoring across a wide range of sectors including quarrying, industry and waste management facilities. Sinéad manages compliance monitoring programmes and noise management plans for MKO clients across a range of sectors.

10.2. Report format & objectives

10.2.1. Overview

This chapter initially identifies the documents reviewed and sets out the assessment objectives. Following this, the identified documents are reviewed in detail in a series of appendices attached to this chapter. Relevant updates are set out and conclusions drawn.

10.2.2. Documents reviewed

In preparing this addendum, the following documents were reviewed:

1. *Galway Harbour Extension – Environmental Impact Statement* (January 2014).
2. *Response to Request for Further Information* (October 2014).
3. *Environmental Impact Statement – Addenda/Errata to Chapters* (October 2014).
4. *Natura Impact Statement* (December 2013).
5. *Natura Impact Statement – Addendum/Errata Document* (October 2014).
6. *Natura Impact Statement – Addendum/Errata Document II* (January 2015).
7. *Oral Hearing – Galway Harbour Extension – Noise & Vibration* (January 2015).
8. *Response to Questions Raised by the Board on Noise & Air Quality and Points Raised by the DAHG* (January 2015).

9. *Proposed Compensatory Measures (Version 2.3B) in Relation to the Proposed Galway Harbour Extension (*August 2017).
10. *Compensatory Measures Report* (April 2019).
11. *Compensation – Reply to Further Information* (December 2019).
12. *Addendum to Natura Impact Statement to Include Consideration of the Compensatory Measures* (April 2019).
13. *Compensatory Measures Plan* (October 2022).
14. *Compensation – Response Document* (October 2022).
15. *Addendum to Natura Impact Statement to Include Consideration of the Compensatory Measures* (October 2022).

10.2.3. Addendum objectives

The overall purpose of this addendum is to determine if any changes have occurred since the 2014 EIS was submitted that may potentially render the acoustic findings of the 2014 EIS or subsequent documents invalid or to require updating. To this end, and following an initial review of the documents listed above, eight objectives were identified, as follows:

1. Undertake a review of the listed documents.
2. Summarise the findings of the original EIS in relation to noise and vibration.
3. Summarise additional noise and vibration findings, if any, set out in the various documents issued subsequent to the EIS (listed above).
4. Identify areas where new or updated noise and vibration information may apply.
5. Compile the information identified through Objective 4.
6. Compare newly compiled information with that set out in the original documents.
7. On the basis of this comparison, determine if the findings of the original EIS and the subsequent attendant documents remain valid, and identify where findings have changed.

10.3. Document review

10.3.1. Preliminary review

10.3.1.1. EIS

The following EIS chapters are relevant to the assessment of noise and vibration:

- Chapter 4 (Description of Development) described the GHE project in detail, including details of construction operations and sequencing. This information fed into the noise and vibration assessment.
- Chapter 5 (Human Beings and Socio Economic).
- Chapter 7 (Flora and Fauna) included a literature review of marine fauna and their sensitivity to underwater noise levels, as well as risk due to percussive effects from blasting and piling. This information again fed into the noise and vibration assessment.
- Chapter 10 (Noise and Vibration) described a comprehensive assessment of potential noise and vibration impacts on the terrestrial and underwater soundscape.
- Chapter 13 (Material Assets) included an assessment of road traffic impacts. This informed Chapter 10.
- Chapter 14 (Interactions) described interactive effects between the various disciplines. Table 11.1 of the EIS noted that potential noise and vibration impacts during the construction phase on human beings will be high, and similarly on soils and geology. During the operational phase,

potential impacts on human beings will be medium, with low potential impacts on soils and geology.

- Chapter 15 (Mitigation Measures and Monitoring Proposals) of the original EIS sets out mitigation and monitoring recommendations drawn from the various chapters. Any updates recommended in this addendum will inform the relevant individual chapters *e.g.* Chapter 7.

10.3.1.2. RFI

The October 2014 response addressed several queries raised in the 27.05.14 An Bord Pleanála request for further information ("RFI"). Seven items related to noise, summarised as follows:

1. Clarification on the parameter referenced in Figures 10.4.1 to 10.4.14 of the EIS.
2. Details of sound power levels (L_{WA}) emanating from machinery involved in certain works.
3. Clarification regarding use of the L_{den} parameter in the construction phase noise assessment.
4. Clarification if airborne noise prediction modelling takes overwater propagation into account.
5. Further analysis of potential tonal and impulsive emissions from unloading of bulk cargo.
6. Comment on treatment of dredgers as point sources rather than moving line sources.
7. Assessment of potential cumulative impacts attributable to simultaneous onsite construction works.

The information compiled in responding to the above items is assessed where applicable in this addendum.

10.3.1.3. EIS addenda & errata

While compiling the RFI response, the opportunity was taken to prepare a number of addenda and errata to the EIS. The compiled information did not include any changes to Chapter 10.

10.3.1.4. Natura Impact Statement

The original Natura Impact Statement ("NIS") document was submitted in January 2014. The document includes information regarding noise and vibration impacts on marine fauna. In a January 2015 addendum and errata document, an appendix was added which set out such impacts in greater detail. The appendix was reproduced from Chapter 10 of the EIS. Thus any updates or revisions to Chapter 10 may have implications for the NIS appendix and its conclusions. Two other NIS addenda (an addendum and errata document of October 2014, and an April 2019 addendum to include consideration of proposed compensatory measures) are not relevant here. An October 2022 document, Addendum to Natura Impact Statement to Include Consideration of the Compensatory Measures, is also not relevant.

10.3.1.5. Oral hearing documents

A statement of evidence dated January 2015 was prepared by the author of Chapter 10 of the EIS for the benefit of the oral hearing. The evidence adduced largely drew from the contents of Chapter 10, and the findings of the latter remained unchanged. In addition, the statement of evidence included a response to several submissions made to An Bord Pleanála in relation to the planning application, with a lengthy response with respect to potential marine fauna impacts.

A second document, also dated January 2015, was prepared by the same author, responding to several queries raise by the oral hearing Inspector as well as the Department of Arts, Heritage and the

Gaeltacht (DAHG). This document included a correction in relation to the marine mammal exclusion zone to be applied during certain underwater construction activities.

10.3.1.6. Compensatory Measures Reports

The April 2019 Compensatory Measures Report described in detail a number of measures proposed to offset habitat loss resulting from the proposed GHE project. The measures do not have any implications for acoustics or vibration, or for this addendum. This conclusion also applies to a number of interim draft Compensatory Measures Reports issued 2015-2017, a December 2019 RFI response in relation to the April 2019 Compensatory Measures Report, a Compensatory Measures Plan dated October 2022, and a Compensation – Response Document also dated October 2022.

10.3.2. Outcome of preliminary review

Following a preliminary review of the documents described above, it is evident that the document of most relevance to this addendum is Chapter 10 of the EIS. The chapter is assessed in Section 10.3. The RFI response document and oral hearing documents are also of some relevance, and are referenced where pertinent below. Information presented below may have implications for the NIS document.

10.3.3. EIS Chapter 10

Chapter 10 described a detailed noise and vibration impact assessment, broken down into the headings listed in Table 10-1. Some headings are renamed in the table to render their purpose clearer. The chapter findings are listed in Table 10-2, in the order in which they are concluded in the chapter. Sensitive receptors are termed noise sensitive locations ("NSLs") in the chapter.

Chapter 10 set out mitigation measures in relation proposed construction works, as follows:

- An extensive list of mitigation measures was proposed in relation to underwater blasting. These included use of initial trial blasting accompanied by monitoring, to allow the blast team to refine blast design and gradually work up to the maximum proposed charge size. Vibration monitoring was proposed at two locations. Blasting will not be undertaken April-July inclusive.
- Dredging works will be avoided close to the shore during night-time hours.
- Pile driving will be confined to 0700-2300 hours. No pile driving will take place, during the period April-July inclusive.

Table 10-3 summarises the assessment of residual impacts as set out in Section 10.7.3 of Chapter 10.

Table 10-1: Topics assessed in EIS Chapter 10.

Topic	Medium	Topic
Guidance and receiving environment	Airborne noise	10.1.1 Airborne noise and A-weighting 10.2.1 Noise impacts 10.2.2 Acceptable noise levels 10.2.3 Existing background noise levels 10.2.4 Noise prediction model
	Underwater noise	10.3.1 Behaviour of sound 10.3.2 Propagation losses 10.3.3 Background noise levels 10.3.4 Hearing of fish 10.3.5 Hearing of marine mammals 10.3.6 Impact thresholds for marine fauna 10.3.7 Noise propagation in Galway Bay
	Vibration	10.6.1 Introduction 10.6.2 Sensitive locations 10.6.3 Design criteria
Potential impacts	Airborne noise	10.4.1 Impact categories 10.4.2 Construction phase 10.4.3 Road traffic noise 10.4.4 Rail traffic noise 10.4.5 Operational shipping noise 10.4.6 Potential impact on fauna
	Underwater noise	10.5.1 Noise source levels 10.5.2 Construction phase 10.5.3 Operational phase 10.5.4 Propagation and receiver levels 10.5.5 Piling 10.5.6 Shallow water noise model
	Vibration	10.6.4 Sensitive structures in the harbour area 10.6.5 Ground nesting birds 10.6.6 Commercial shell fishing
Mitigation	-	10.7.1 Introduction 10.7.2 Construction phase 10.7.3 Residual impacts
Conclusions	-	10.8 Conclusions

Table 10-2: Chapter 10 findings.

Ref.	Page no.	Medium	Finding summary
1	10-32	Air	Lagoon construction: Impacts at NSLs will be negligible
2	10-34	Air	Trailer suction hopper dredging: Impacts at nearest NSLs will be minor
3	10-36	Air	Backhoe dredging: Moderate impact predicted at Frenchville and Mellows Park if undertaken during night-time
4	10-39	Air	Quay wall pile driving: Major impact at nearest NSLs during daytime and night-time
5	10-43	Air	Construction road traffic: Moderate change in noise levels at Radisson Hotel and NSLs along Lough Atália Road
6	10-45	Air	Operations road traffic: Negligible impact at NSLs
7	10-50	Air	Operations rail traffic: No conclusion drawn regarding impact, but rather that 'a significant benefit' will result at Mellows Park following installation of a barrier
8	10-54	Air	Operations marine traffic: Negligible impacts at nearest NSLs, and positive impacts at other NSLs
9	10-54	Air	Phocids and mustelids: Noise levels will be lower than disturbance threshold criteria
10	10-54	Air	Nesting birds: Noise levels will be lower than disturbance threshold criteria
11	10-66	Underwater	Construction blasting and pile driving: Exclusion zones are identified for marina fauna and diving birds
12	10-67	Underwater	Construction works general: Exclusion zones are identified for marina fauna and diving birds
13	10-68	Underwater	Operation marine traffic: Exclusion zones are identified for marina fauna and diving birds
14	10-69	Vibration	Construction and operations: No NSLs in proximity
15	10-69	Vibration	Underwater blasting: Mitigation measures required in relation to bitumen and fuel storage tanks and ground nesting birds
16	10-70	Vibration	Underwater blasting: Potential disturbance to prawns will be less than impacts from other causes

Table 10-3: Residual impacts.

Receiver	Residual impact
Existing docks area	A beneficial impact will arise due to reduced shipping noise, and elimination of night-time shipping noise in particular
Renmore and Southpark NSLs	A minimal increase in noise levels will arise, and new harbour noise emissions will be generally inaudible here
Underwater noise levels in vicinity of new port	Noise levels due to shipping will be limited in time and geography. No disturbance will arise at sensitive sites.

The final conclusions of Chapter 10 are reproduced here:

> *"The overall impact of the proposal will be to reduce the underwater noise levels in the existing harbour area. There will be an increase in the intensity of the underwater noise levels at the new harbour area due to larger vessels. The impact of these increase intensity levels is mitigated by the fact that the elevated levels will be of shorter duration as docking, entering and leaving the port will be quicker and less vessels will be required for an equivalent throughput of cargo.*
>
> *Operation noise levels due to the proposed development are below the level that has the potential to cause any hearing damage to fish or marine mammal species in the long term.*

Significant mitigation measures will be employed during the construction phase to avoid potential impacts on these species.

The proposed noise level due to larger vessels using the new port facility will be comparable with existing noise levels at the head of Nimmo's pier in both intensity and temporal effect. It is possible that shipping noise could create an avoidance response in both fish and marine mammal species for a short time while a vessel is berthing. The impact of this avoidance response will be short (minutes) and of no critical significance.

With the proposed noise and vibration mitigation measures in place no significant long term impact on marine life in the bay is expected."

10.3.4. RFI response

10.3.4.1. RFI noise item 1

Request summary: Clarify the parameter referenced in Figures 10.4.1 to 10.4.14.

The October 2014 response does not alter the findings of the original EIS.

10.3.4.2. RFI noise item 2

Request summary: Provide details of sound power levels (L_{WA}) emanating from machinery involved in certain works.

The response does not have any implications for the findings of the original EIS.

10.3.4.3. RFI noise item 3

Request summary: Clarify why the L_{den} parameter was used in the construction noise assessment.

The response does not have any implications for the findings of the original EIS.

10.3.4.4. RFI noise item 4

Request summary: Clarify if airborne noise prediction modelling took overwater propagation into account.

The response does not have any implications for the findings of the original EIS.

10.3.4.5. RFI noise item 5

Request summary: Provide further analysis of potential tonal and impulsive emissions from unloading of bulk cargo.

The response does not have any implications for the findings of the original EIS.

10.3.4.6. RFI noise item 6

Request summary: Comment on treatment of dredgers as point sources rather than moving line sources.

The response does not have any implications for the findings of the original EIS.

10.3.4.7. RFI noise item 7

Request summary: Assess potential cumulative impacts attributable to simultaneous onsite construction works.

The response states that noise monitoring will be undertaken at the nearest receptors, including sensitive ecological receptors, during the construction phase. Corrective action will be taken in the event that cumulative noise levels exceed construction phase noise limits identified in the EIS, and applied in the Environmental Management Framework document. Corrective measures include removing plant, reducing operation duration, or installing screening.

10.3.5. Oral hearing statement of evidence

A statement of evidence dated January 2015 was prepared by the author of Chapter 10 of the EIS for the benefit of the oral hearing. The evidence largely drew from the contents of Chapter 10 of the submitted EIS, and the findings of the latter remained unchanged. The statement of evidence included a response to several submissions made to An Bord Pleanála in relation to the planning application, with a lengthy response in relation to potential marine fauna impacts. The statement of evidence drew the same conclusions as those in Chapter 10, repeating that:

> *"With the proposed noise and vibration mitigation measures in place no significant long term noise related impact in the bay is expected."*

A second document, also dated January 2015, was prepared by the same author, responding to several queries raised by the oral hearing Inspector and the Department of Arts, Heritage and the Gaeltacht. This document included a correction in relation to the marine mammal exclusion zone to be applied during certain underwater construction activities – the document proposed that this zone will be 1000 m. In the original EIS, it was proposed that the blasting exclusion zone would be agreed with the National Parks and Wildlife Service prior to commencement of blasting.

10.4. Noise and vibration updates since 2014

Most acoustic assessments, including the GHE assessment described in Chapter 10, are based on the following conventional approach:

- Relevant acoustic standards and criteria are identified.
- Noise receptors are identified.
- Baseline noise levels are established.
- Noise sources expected during construction and operations are identified.
- Noise levels at identified receptors are calculated, usually through predictive modelling.
- Impacts at receptors are assessed with reference to identified criteria, some of which may be based on baseline noise levels.
- Where required, mitigation measures are proposed.

In order to identify areas where Chapter 10 may require updates due to interim changes, each of the above steps requires a revisit. Thus a list of tasks can be set out, the purpose of which is to bring the assessment process up to date. Questions relevant to this addendum, based on the above steps, are as follows:

- Have acoustic standards and criteria been revised in the interim?

- Have new noise receptors been built or identified?
- Have baseline noise levels changed?
- Have proposed construction and operation sources changed?
- Is the original predictive methodology still valid?
- Does the impact assessment categorisation process meet current standards?
- Is the original mitigation list sufficient, or are new measures required?

These questions may be applied to airborne noise, underwater noise, and vibration. In order to answer these questions, 15 tasks were identified, as set out below. The tasks are arranged in the order in which they are conventionally assessed.

1. Identify if relevant airborne noise guidance documents have been revised in the interim, or if new guidance has been issued.
2. Identify if relevant underwater noise guidance documents have been revised in the interim, or if new guidance has been issued.
3. Identify if threshold criteria for marine fauna species have been revised in the interim, or if new evidence has emerged.
4. Identify if airborne noise disturbance criteria for fauna have been revised in the interim, or if new evidence has emerged.
5. Identify if relevant vibration guidance documents have been revised in the interim, or if new guidance has been issued.
6. Identify new receptors in the built environment.
7. Confirm if new ecological receptors (terrestrial and aquatic) have been identified by the ecology team.
8. Identify if the terrestrial soundscape has changed in the interim.
9. Identify if underwater noise levels may have changed in the interim.
10. Identify any revisions to the proposed GHE project (construction and operation).
11. Identify any updates to texts used for source noise data.
12. Identify updates to noise modelling methodology in the interim.
13. Identify if proposed mitigation measures are still valid and relevant.
14. Identify updates to impact assessment guidance, specifically in relation to assigning impact categories (minor, major, etc.).
15. Identify any updates to potential cumulative impacts.

The above tasks are addressed in Appendices 10-1 to 10-15 respectively. It is concluded from the appendices that a number of updates are relevant, chiefly in relation to guidance documents. The most significant updates relate to marine mammal noise thresholds, as well as categorisation of impacts. As a result of these updates, a number of mitigation measures require revision, as discussed below.

10.5. Conclusions

Chapter 10 of the 2014 EIS described a comprehensive assessment of airborne and underwater noise and vibration impacts. The chapter findings are summarised in Table 10-3 above. A number of mitigation measures were proposed in the chapter. During the subsequent oral hearing, a 1,000 m exclusion zone was proposed to avoid potential construction phase underwater noise impacts on marine mammals.

A detailed review of Chapter 10 and the subsequent RFI, oral hearing and addenda documents has been undertaken. The findings are presented in Appendices 10-1 to 10-5 and are summarised in Table 10-4 below.

Table 10-4: Assessment findings summary.

Appendix	Conclusions
10-1	**Updates to airborne noise guidance** •The Environmental Noise Directive and the corresponding Irish Regulations, although updated, remain unchanged, and there are no implications for the EIS. •Two of the three documents used for the construction noise assessment have been updated since the 2014 EIS was prepared. However, criteria presented in the revisions are unchanged, and consequently there are no implications for the EIS. •The 55 dB daytime and 45 dB night-time criteria remain valid and relevant in 2024. •Road traffic noise changes are commonly assessed in 2024 with reference to Design Manual for Roads and Bridges guidance issued in 2020. Application of the guidance does not alter the EIS conclusions, apart from a slight reduction in impact category at the Radisson, now Galmont, Hotel, from moderate to minor.
10-2	**Updates to underwater noise guidance** •No international, British or other standards have been issued to date, and the underwater standard landscape in 2024 remains as it was in 2014. •The 2014 EIS assessed impacts on marine fauna by referring to scientific reports issued by several authors. This continues to represent best practice. •The only Irish guidance issued in relation to underwater noise impacts on marine mammals was released by the Department of Arts, Heritage and the Gaeltacht in 2014, although the EIS referred to a 2013 draft version. Guidance included in the DAHG document was applied in the EIS, as both documents are informed by Southall et al (2007). Although Southall et al (2007) guidance was updated in 2019, DAHG guidance remains unchanged, and thus the EIS continues to be consistent with current DAHG guidance.
10-3	**Updates to threshold criteria for marine fauna** •Criteria applied in the 2014 EIS in relation to fish incorporated a considerable margin of safety, and continue to be lower than current guidance. •Marine mammal criteria have been revised downward since the EIS was prepared, in some cases significantly. In most cases, the 1000 m exclusion radius proposed at the oral hearing will continue to provide sufficient protection throughout the construction works. The 1000 m radius will be insufficient for the very high frequency cetacean group in relation to impact piling, blasting and dredging, and revised exclusion radii are warranted. Increased radii will be required for the very high frequency cetacean group, which includes porpoises, during dredging, blasting and impact piling operations. The respective radii are required to be 1,700 m, 1,500 m and 1,900 m at a minimum
10-4	**Updates to airborne noise disturbance criteria for fauna** •Predicted construction phase and operational phase noise levels received at the locations used by fauna will be lower than updated criteria. The 2014 EIS concluded that no impacts will arise, and this conclusion remains valid.
10-5	**Updates to vibration guidance** •The 2006 EPA document which informed the 12 mm/s criterion applied in the EIS remains valid today, and thus the criterion still stands. •A similar conclusion applies to the 8 mm/s criterion where blasting will arise more than once per week. The 2004 Department of the Environment, Heritage and Local Government document which most likely informed the EIS in this regard also remains valid. •No vibration guidance has been issued in the interim which would result in a need to revise these peak particle velocity criteria downwards.

Table 10-4 continued.

Appendix	Conclusions
10-6	**New receptors in built environment** •No new noise or vibration receptors, built or proposed, have been identified in the area between the port and existing receptors, and noise receptors built at the time of the original assessment continue to be the nearest receptors to the proposed development area. •It follows that there is no requirement to update the airborne noise prediction model in this regard. •Vibration monitoring was proposed in the 2014 EIS at the Galway Harbour Enterprise Park to assess potential impacts on vibration-sensitive structures. When discussing the monitoring programme with the park operator, account will be taken of any new structures in the interim.
10-7	**New ecological receptors** •No changes in ecological receptors have been identified since the 2014 EIS was prepared, and the Chapter 10 assessment remains valid in this regard. •The construction phase underwater blasting vibration monitoring programme will be discussed with shellfish operators between Mutton and Hare Islands, in order to take account of any changes in shellfish production areas since 2014.
10-8	**Terrestrial soundscape changes** •There is no indication that noise levels across the local area have fallen since the EIS was prepared. This is confirmed by recently measured noise data. •The local soundscape is likely to experience a reduction in traffic noise levels in the long term. This is unlikely to cause an appreciable difference in noise levels at receptors during the GHE construction period. •Noise data reported in the EIS were chiefly used to inform night-time criteria of 40 dB at Mellows Park and 35 dB at Grattan Road, and these levels were used in assessing airborne construction noise impacts in particular. Measured night-time $L_{AF90\ T}$ levels at these locations are consistent with these values, and thus the findings of the EIS remain valid.
10-9	**Underwater noise level changes** •Sources of prevailing ambient noise in the local harbour area, most or all of which are typically naturally derived, are unlikely to have changed since the 2014 EIS was prepared. Distant marine traffic noise is unlikely to contribute significantly to harbour noise levels. •Outside of local natural sources such as wind derived noise, the chief noise source of note in the harbour area is local vessel activity. Vessel activity has not changed significantly between 2013 and 2024. This is particularly evident with respect to large vessels, the greatest contributor to man-made underwater noise. •Regardless of any changes in ambient underwater noise levels, such levels are not a factor in the assessment of impacts on marine fauna, as such assessment relies on absolute criteria unaffected by ambient noise levels.
10-10	**Changes in GHE project details** •No changes in construction or operational details are proposed, and project details set out in the 2014 EIS still stand.
10-11	**Source noise data updates** •There have been no updates of relevance with respect to noise emissions data applied in respect of airborne noise sources assessed in the 2014 EIS. Source data used remain valid in 2024. •Similarly, there have been no changes of significance in relation to underwater noise sources assessed in the 2014 EIS.
10-12	**Updates to noise modelling methods** •The three modelling methods applied in the 2014 EIS remain valid in 2024.

Table 10-4 continued.

Appendix	Conclusions
10-13	**Updates to mitigation requirements** •Mitigation originally proposed remains broadly valid and relevant. Use of marine mammal exclusion zones during construction continues to represent best practice. Two updates are required, as follows. •Exclusion zone radii in relation to porpoises require an increase during certain construction works. •All underwater blasts will be designed taking into account the updated document BS British Standard BS 5607:1998 Code of Practice for the Safe Use of Explosives in the Construction Industry. •In addition to the above, it is noted that the response to item 7 of the RFI included a proposal to undertake noise monitoring at receptors during the construction phase.
10-14	**Updates to impact qualification** •Following publication of the original 2014 EIS, several guidance documents have issued which clearly set out, for the first time, how impacts may be assessed in the human soundscape. Using these documents, noise impacts in the human soundscape have been reassessed. •Construction phase impacts will be imperceptible in most cases. Piling impacts, and night-time backhoe dredging impacts will be not significant to slight at the nearest receptors. •Road traffic noise impacts will be imperceptible, potentially increasing to not significant at some receptors during the construction phase. •Rail traffic impacts will be imperceptible to not significant. •Noise impacts due to berthed vessels will be imperceptible to not significant. At receptors near the existing docks, there will be a profound positive impact. •Vibration impacts will be imperceptible.
10-15	**Cumulative impact updates** •No projects of cumulative noise or vibration significance have been constructed since the original EIS was submitted in 2014, and there are no permitted but unbuilt projects of potential cumulative significance.

The mitigation originally proposed remain broadly valid and relevant. The use of marine mammal exclusion zones during construction works continues to represent best practice. Two updates are required, as follows:

- Exclusion zone radii in relation to porpoises require an increase during certain construction works, as listed in Table A13-1 above.
- All underwater blasts will be designed taking into account the updated document *BS British Standard BS 5607:1998 Code of Practice for the Safe Use of Explosives in the Construction Industry*.

In addition to the above, it is noted that the response to item 7 of the RFI in 2014 included a proposal to undertake noise monitoring at receptors during the construction phase.

It is concluded that, apart from some minor exceptions, the findings of the EIS remain valid and relevant. While several guidance documents referenced in Chapter 10 have been updated in the interim, the EIS findings continue to remain valid in the context of these updates, again apart from a small number of exceptions. These exceptions are as follows:

- Marine mammal noise threshold criteria have been revised downward since the EIS was prepared, in some cases, significantly. For instance, the non-pulse sound exposure level

recommended with respect to high frequency cetaceans has reduced from 200 dB to 178 dB in the interim, while the pulse sound exposure level recommendation for very high frequency cetaceans has decreased from 183 dB to 140 dB. In most cases, the 1,000 m exclusion radius proposed at the oral hearing will continue to provide sufficient protection during construction works. However, increased radii will be required for the very high frequency cetacean group, which includes porpoises, during dredging, blasting and impact piling operations. The respective radii are required to be 1,700 m, 1,500 m and 1,900 m at a minimum. This mitigation measure has been included in Chapter 7 of the EIS and the NIS.

- Chapter 10 proposed that vibration monitoring will be undertaken at certain vibration-sensitive structures at Galway Harbour Enterprise Park during underwater blasting. In order to cater for changes in park structures in the interim, it is proposed to discuss an updated monitoring programme with the Galway Harbour Enterprise Park operators prior to commencement of blasting.
- Similarly, the updated monitoring programme will be discussed with shellfish operators between Mutton and Hare Islands, in order to take account of any changes in shellfish production areas since 2014.
- Underwater blasts will be designed taking into account the updated document *British Standard BS 5607:1998 Code of Practice for the Safe Use of Explosives in the Construction Industry*.

The original noise impact assessment predated the issuance of clear guidance on the assessment of noise impacts. The EIS predates several guidance documents which clearly set out, for the first time, how impacts on the human soundscape may be assessed. Using these documents, noise impacts on the human soundscape have been reassessed as follows:

- Construction phase impacts will be imperceptible in most cases. Piling impacts, and night-time backhoe dredging impacts, will be not significant to slight at the nearest receptors.
- Road traffic noise impacts will be imperceptible, potentially increasing to not significant at some receptors during the construction phase.
- Rail traffic impacts will be imperceptible to not significant.
- Noise impacts from berthed vessels will be imperceptible to not significant, contrasting with a profound positive impact at the existing docks.
- Vibration impacts will be imperceptible.
- The assessment of impacts on ecological receptors is included in the NIS addendum, based on the findings of this addendum.
- There are no offsite projects of potential cumulative significance, and cumulative noise or vibration impacts are not expected.

10.6. References (including references for the appendices)

Arveson, P.T. and Vendittis, D.J. (2000). *Radiated Noise Characteristics of a Modern Cargo Ship*. Journal of the Acoustical Society of America, 107(1), 118-129.

Bies, D.A. and Hansen, C.H. (2003). *Engineering Noise Control: Theory and Practice* (3rd ed.). CRC Press, London.

British Standards Institution (1993). *BS 7385-2:1993 Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground Borne Vibration*.

British Standards Institution (2009). *BS 5228-1:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise*.

British Standards Institution (2009). *BS 5228-2:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration*.

British Standards Institution (2014). *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise*.

British Standards Institution (2014). *BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration*.

Collier, R.D. (1997). *Ship and Platform Noise, Propeller Noise*. In: Encyclopaedia of Acoustics, Chapter 46, 521-537. Wiley, New York.

Cutts, N., Hemmingway, K. and Spencer, J. (2013). *Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects*. University of Hull.

De Jong, C.A.F., Ainslie, M.A., Dreschler, J., Jansen, E., Heemskerk, E. and Groen, W. (2010). *Underwater Noise of Trailing Suction Hopper Dredgers at Maasvlakte 2: Analysis of Source Levels and Background Noise*. Commissioned by Port of Rotterdam. TNO report TNO-DV, p.C335.

Department of Arts, Heritage and the Gaeltacht (2014). *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*.

Department of the Environment, Heritage and Local Government (2004). *Quarries and Ancillary Activities: Guidelines for Planning Authorities*.

Department of Transport Welsh Office (1988). *Calculation of Road Traffic Noise* (CTRN).

Department of Transport Welsh Office (1996). *Calculation of Railway Noise* (CRN).

Dutch Ministry for Housing, Spatial Planning and the Environment (1996). *Reken en Meetvoorschrift Railverkeerslawaai.*

EPA (2006). *Environmental Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals)*.

EPA (2016). *NG4 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities*.

EPA (2022). *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*.

Erbe, C., Liong, S., Koessler, M.W., Duncan, A.J., Gourlay, T. (2016). *Underwater Sound of Rigid-Hulled Inflatable Boats*. Journal of the Acoustic Society of America 139: 223-227.

EU (2012). *Common Noise Assessment Methods in Europe (CNOSSOS-EU)*. EU Publications Office.

EU Commission Decision 2017/848 of laying down Criteria and Methodological Standards on Good Environmental Status of Marine Waters and Specifications and Standardised Methods for Monitoring and Assessment.

EU Directive 2002/49/EC of the European Parliament and of the Council Relating to the Assessment and Management of Environmental Noise (2002).

EU Directive 2008/56/EC of the European Parliament and of the Council establishing a Framework for Community Action in the Field of Marine Environmental Policy.

Evans, P.G.H., Canwell, P.J., Lewis, E. (1992). *An Experimental Study of the Effects of Pleasure Craft Noise upon Bottle Nosed Dolphins in Cardigan Bay, West Wales*. European Research on Cetaceans 6, 43-46.

Finneran, J. J., and Jenkins, A. K. (2012). *Criteria and Thresholds for US Navy Acoustic and Explosive Effects Analysis*. San Diego, CA: SPAWAR Systems Centre Pacific.

Galway City Council (2019). *Galway City Council Noise Action Plan 2019-2023*.

Government of Ireland (2018). European Communities (Environmental Noise) Regulations 2018 (SI No. 549/2018).

Institute of Environmental Management and Assessment (2014). *Guidelines for Environmental Noise Impact Assessment*.

International Standards Organisation (1996). *ISO 9613-2:1996 Acoustics – Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation*.

International Standards Organisation (2017). *ISO 1996-2:2017 Acoustics – Description, Measurement and Assessment of Environmental Noise, Part 2: Determination of Environmental Noise Levels*.

Jalkanen, J.P., Johansson, L., Andersson, M.H., Majamäki, E., Sigray, P. (2022). *Underwater Noise Emissions from Ships during 2014–2020*. Journal of Environmental Pollution 311: 119766.

Marine Management Organisation (2015). *MMO Project No: 1097: Modelled Mapping of Continuous Underwater Noise Generated by Activities*.

National Oceanic and Atmospheric Administration (2018). *NOAA Technical Memorandum NMFS-OPR-59 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) – Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*.

National Roads Authority (2004). *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*.

National Roads Authority (2014). *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*.

Picciulin, M., Armelloni, E., Falkner, R., Rako-Gospić, N., Radulović, M., Pleslić, G., Muslim, S., Mihanović, H., Gaggero, T. (2022). *Characterization of the Underwater Noise Produced by Recreational and Small Fishing Boats (<14 m) in the Shallow-Water of the Cres-Lošinj Natura 2000 SCI*. Marine Pollution Bulletin, 183.

Popper, A.N. and Edds-Walton, P.L. (1997). *Bioacoustics of Marine Vertebrates*. In M.J. Crocker (Ed.) Encyclopaedia of Acoustics (pp 1831-1836). New York: John Wiley & Sons.

Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, S.A., Bartol, S., Carlson, T.J., Coombs, S., Ellison, W.T., Gentry, R.L., Halvorsen, M.B., Løkkeborg, S., Rogers, P.H., Southall, B.L., Zeddies, D.G., Tavolga, W.N. (2014). *ASA S3/SC1.4 TR-2014 – Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI*.

Reyff, J. (2007). *Compendium of Pile Driving Sound Data*. California Department of Transportation, California.

Richardson, W.J., Greene, C.R., Malme, C.I., Thomson, D.H. (1995). *Marine Mammals and Noise*. Academic Press, San Diego.

Robinson, S.P., Theobald, P.D., Hayman, G., Wang, L.S, Lepper, P., Humphrey, V.F., Mumford, S. (2011). *Measurement of Underwater Noise arising from Marine Aggregate Dredging Operations*. Marine Aggregate Levy Sustainability Fund.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., Tyack, P.L. (2007). *Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations*. Aquatic Mammals 33(2): 411-521.

Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P., Tyack, P.L. (2019). *Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects*. Aquatic Mammals 45(2): 125-232.

Smith, T.A, La Rosa, A.G, Wood, B. (2024). *Underwater Radiated Noise from Small Craft in Shallow Water: Effects of Speed and Running Attitude*. Journal of Ocean Engineering 306: 118040.

UK Highway Agency (2020). *Design Manual for Roads and Bridges – LA111: Noise and Vibration*.

Urick R.J. (1983). *Principles of Underwater Sound*. McGraw-Hill, New York.

Urick, R.J. (1984). *Ambient Noise in the Sea*. Department of the Navy, Washington.

Wales, S.C. and Heitmeyer, R.M (2002). *An Ensemble Source Spectra Model for Merchant Ship-Radiated Noise*. Journal of the Acoustic Society of America 111(3), 1211–1231.

Wenz, G.M. (1962). *Acoustic Ambient Noise in the Ocean: Spectra and Sources*. The Journal of the Acoustical Society of America. 34(12) 1936-1956.

Witte, J.R. (2010). *Noise from Moored Ships*. Paper presented at InterNoise 2010, Portugal.

World Health Organisation (1999). *Guidelines on Community Noise*.

World Health Organisation (2009). *Night Noise Guidelines for Europe*.

World Health Organisation (2018). *Environmental Noise Guidelines for the European Region*.