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13 MATERIALS

13.7 MATERIAL ASSETS SAFETY HEALTH AND WELFARE

13.7.1 Introduction

This section of the EIS deals with Safety Health and Welfare impacts of the proposed development on human beings. These impacts may occur during the preparatory stages, various construction phases, periods between various construction phases, operational use, maintenance/repair and removal/replacement of elements of the physical asset comprising the New Harbour Extension Infrastructure.

13.7.2 Topics

In this section, we deal with the New Harbour Extension development under the following key headings:-

- **Concept Design and Planning**
- **Preparatory Investigations**
- **Scheme Design**
- **Construction Procurement**
- **Detailed Construction Design**
- **Preparatory Construction Activities**
- **Construction On-Site**
- **Construction Interfaces with Neighbouring Activities**
- **Operational Handover**
- **Lifetime Operation**
- **Element Maintenance/Repair/Removal/Replacement**

13.7.2.1 Concept Design and Planning

The concept design and planning stage of the project has been underway for a number of years. During this stage, the various statutory requirements from a safety, health and welfare perspective have been observed. The Client, Galway Harbour Company, has appointed a competent Project Supervisor Design Process (PSDP), TOBIN Consulting Engineers, in accordance with the Safety Health and Welfare at Work (Construction) Regulations 2006, and competent designers, including Architect, and Civil, Structural and Transport (Roads and Rail) Engineers, for the various construction elements within the overall project. These designers are obliged to carry out their designs in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 and the Safety, Health and Welfare at Work Act, 2005. This requires these designers, while they are designing the project, to design their elements so that they are capable of being safely constructed and maintained, taking account of the general principles of prevention set out in the Safety, Health and Welfare at Work Act, 2005. The PSDP has organized cooperation between the designers and ensured coordination of the designers' activities in relation to the project concept design and planning, specifically with a view to protecting the safety, health and welfare of persons involved in the construction of the project.

The concept design and planning stage included examining a number of options and iterations, and included the consideration of safe constructability and maintainability in each case. The aspects, affecting safe construction and maintenance, and considered at the concept/planning stage, included location, configuration, orientation, construction materials, material delivery/removal, access for construction for the different development phases and for operation/maintenance, and interfaces with adjacent activities. Safe constructability considerations included deep water and exposure to significant wind, current and wave climate, and in these conditions, the difficult handling and transport of large quantities of natural

materials, the delivery and installation of heavy prefabricated civil engineering products, using very large marine engineering plant, and the particular planning/sequencing constraints involved.

To facilitate safe access to the site, both temporary and permanent, the design also involved reviewing a number of options, with safety of persons always a prime consideration. The limiting of construction works interface with persons and associated risks to their safety health and welfare was a key design parameter. The road, rail and sea access were each examined, again in the context of safety during construction, future maintenance and ongoing harbour operation.

The concept design also included significant deliberation on the relationship of the new harbour extension location and configuration to the variety of port users, with particular reference to their safety during construction. Specifically, the decision to split the construction into a number of development phases took particular account of this at concept stage, and this was developed in detail during the subsequent stages of the project.

13.7.2.2 Preparatory Investigations

Coincidental with the design development, the team planned and procured preparatory investigations involving a variety of data collection stages and types. These had to be planned to recognise the sensitive environmental constraints including those identified elsewhere in this report, but also the climate and tidal constraints, all the while taking account of the safety of those personnel carrying out those investigations. Some of these comprised construction activities, for example the geotechnical investigations. These required in each case the appointment of a competent Project Supervisor Construction Stage (PSCS), and the provision of Preliminary Safety and Health Plans by the PSDP to the PSCS, to pass on all information, known to the designers, regarding particular risks to the safety, health and welfare of persons and any other relevant information, known to the designers, to provide for the safe carrying out of those works.

Like many such investigations, it is their nature that they are liable to change, and indeed some were amended, during the collection of data, to reflect the information being gathered. This can present new risks, and the design team and PSDP reassessed those risks, took any decisions/actions to eliminate, reduce or mitigate them, and, where necessary, passed any information regarding any residual risks to the PSCS.

In the case of each investigation, the PSCS developed full Safety and Health Plans to control the activities and protect the safety of personnel involved in the investigations and others who could be affected by the works. These covered such items as planning the works to respect the weather and marine environment to facilitate safe mobilisation and demobilisation, so that works were carried out within safe weather windows. Equipment, e.g. jack-up platform, suitable for the site conditions, was used to ensure the safety of personnel. In the case of the marine geotechnical investigations, evacuation boats were permanently on hand to assist personnel if it became necessary.

Some investigations involved interface with public road traffic, and the PSCS, in consultation with the investigative team, PSDP and contractor, prepared temporary traffic management plans and installed the appropriate control measures, including signage and guarding works, to support the temporary traffic management. This included a shuttle stop/go system, where necessary, to protect the workers from passing traffic and the public traffic from the works.

As the project develops into the later construction design stages, further more detailed investigations will be required across a variety of areas, and very similar approaches will be required to protect the safety, health and welfare of those involved or affected by them. The key framework for the processes involved is in place with the main designers and PSDP already appointed. This will be adapted as the project advances into the tender and construction stages, when additional designers, contractors and PSCS will be appointed.

13.7.2.3 Scheme Design

Following on from the concept design, and taking account of the further development of the project principles and requirements, integrated with the information provided to the design team from the investigative studies, and working within the budgetary, legal, physical, social and environmental constraints, the design has been developed in significant detail.

In particular, the determination of physical design parameters, the phasing/sequencing of the development was studied in considerable detail, involving many options and iterations, to arrive at a workable design scheme. During this process, the designers had to take account of the safety of personnel involved in the proposed construction processes, assess the risks to their safety and, in so far as was reasonably practicable, eliminate these risks. Given the nature of this significant marine project, there are however significant residual risks to construction personnel safety. Much of the focus in this regard is on the planning of the works, not only with respect to the main project phases, but critically the sequencing of the segments contained within each phase. The sequencing indeed determined the final design in a number of areas, so as to provide logistically for the safe construction at each step in a phase. These included provision for safe access at critical times within a phase. This is described in detail in this report under Chapter 4 on Description of Proposed Development and illustrated graphically with sequencing drawings 2139-2145 to 2139-2153. The designers considered this an essential process in the delivery of a design that would be safe for all, during each step of that phase. The designers recognised that the construction works will involve significant marine works including dredging, rock blasting, pile installation, fill placement, rock armour, concreting, and underground services, using conventional marine equipment and resources, including barges, pile driving hammers, underwater personnel and support, as well as other land-based civil engineering equipment and resources. As set out below, the procurement process will place primary emphasis on the competence of the contractor in such works.

This detailed consideration of risks, not only considered the safety of construction personnel, but also port users, including commercial, fishermen, anglers, the various leisure users of the port, both with respect to marine and land activities. The PSDP duty of designer activity coordination played an important role in this process.

Some critical considerations illustrate the importance of safety integration within the design process. The development of access ways, effectively protected breakwaters, to facilitate containment of excavated and recycled fill material, critically protects personnel during the excavation and filling operation from the exposed marine climate. The particular design of the sheet piled outer terminal jetty, involves a bracing system that recognises the exposure to the aggressive marine environment during construction, and the particular geotechnical conditions on the site, namely soft marine soils above hard bedrock. By bracing in the sequence planned and illustrated, the stability of the system will be maintained on a continuous basis during construction. The sequencing of construction has been designed in such a way as to facilitate, as far as practicable, safe access for the works from the shore during all phases of the project.

Safety is paramount and any prolonged exposure to an unsafe unstable system has been designed out.

Development of the project construction design will be carried out as the project moves forward, involving further inputs, including ongoing establishing of detailed client requirements, more detailed data collection, including geotechnical investigations, at the various segments particularly of the Phase 1 works.

The key framework for the processes involved is already in place with the main designers and PSDP appointed. As the project moves forward, the procurement of construction, maintenance/repair, operation and replacement risk assessments, decisions and actions will be further developed, informed by and built off the risk assessments, decisions and actions already provided for the earlier stages of the project.

13.7.2.4 Construction Procurement

A critical stage in protecting the safety, health and welfare of personnel, occurs as part of the construction procurement process.

The procuring design team with its PSDP, will have, in developing the concept, planning and scheme design, considered the risks to construction personnel and in so far as reasonably practicable eliminated, reduced or mitigated those risks at the various stages of design development. Arising from that process, the designers will provide to the PSDP considerable information that has become known to them regarding residual risks to safety of personnel that they have not been able to eliminate. The PSDP will develop a Preliminary Safety and Health Plan which will include the passing of information regarding residual risks to persons involved in construction, which is a fundamental statutory requirement outlined in the Safety Health and Welfare at Work (Construction) Regulations, 2013. Of the Particular Risks listed in Schedule 1 of these Regulations, the key risks identified by designers to date include "engulfment in swampland" (No. 1a in Schedule 1) related to lagoons to be filled with soft dredged materials, "drowning" (No. 5) related to all marine based activities, "divers" (No. 7) involved with underwater installations, "explosives" (No. 9) in connection with blasting trenches in rock for sheet/bearing/bracing piles and for berth deepening, "assembly of heavy pre-fabricated components" (No. 10) related to sheet/bearing/bracing pile pitching/driving/installation, and armour rock installation on the rubble breakwater structures. In each case, the designers have, during the design process, so far as is reasonably practicable, reduced the risks associated with these activities. For example, to limit the risks of engulfment, the filled lagoons have been designed in defined sections and phased construction. There are other particular risks identified by designers including working with heavy machinery in difficult marine/coastal conditions. Although significant, these risks are normal for works of this nature and can be mitigated and controlled by contractors competent in works of this nature, scope and scale.

A fundamental part of ensuring safety during construction is in selecting competent contractors with adequate resources to construct the works. The procuring team will assess the competence and resources of the tendering contractors to safely construct the works. This assessment will form a core part of the tendering process, and is embedded in the standard forms of public procurement.

13.7.2.5 Detailed Construction Design

As the design develops, each designer will identify any hazards, and assess the risks, associated with their element of design. They will be obliged by statute to eliminate any of these hazards and, reduce any residual risks that they have not been able to eliminate. The PSDP will organise cooperation between all designers and ensure coordination of their design activities, in relation to any risks to the safety, health and welfare of persons affected by the project. This will include specialist designers, for example designers of proprietary elements, appointed by the construction contractor. Specialist designers will be working within the constraints set out in the tender documents, and informed by the Preliminary Safety and Health Plan issued with the tender documents all as outlined earlier. In addition, as the project moves into the construction phase, the contractor's temporary works designers will examine in detail methods for constructing the works, again taking account of the General Principles of Prevention, to design the temporary works elements in such ways as will provide for safe construction.

The temporary works designers will pay particular attention to temporary stability, and sequencing/timing constraints placed on the construction by marine conditions and this will involve significant planning around weather and tidal windows. During this process, they will be liaising with all of the other relevant designers, to see that their temporary works design do not compromise the design of the permanent works. During this process, the PSDP will organise cooperation between all of these designers and will ensure coordination of the design activities with a view to the protection of the safety health and welfare of persons affected by construction.

Similar to the scheme design process, the detailed construction designers will pass on, to the PSCS and Contractor, all information known to them regarding safe construction, including any particular residual risks, and any methodologies envisaged by their designs.

13.7.2.6 Preparatory Construction Activities

As noted above, significant preparatory and investigative work has been carried out to date as part of the design and planning of the project. These were required to provide dependable physical and other data relating to the site and conditions, so that designers could plan the project and prepare scheme designs that were properly informed as to conditions, appropriate to those stages of the project.

However, there will be additional preparatory activities as part of detailed construction designs. Some of these activities will involve activities that fall within the 'construction' definition in the Safety, Health and Welfare at Work (Construction) Regulations 2013. A PSCS will be appointed by Galway Harbour Company for each such 'construction' activity, to coordinate safety during that construction activity. In addition, these activities will involve certain other protocols depending on the time involved, nature of risks etc., for example notification to the Health and Safety Authority by the PSCS, and provision of a Preliminary Safety and Health Plan by the PSDP. These are all designed to ensure that the specialists carrying out these activities are in possession of all necessary information, properly design, plan and resource them, and follow statutory protocols, all in order to protect the safety health and welfare of personnel affected by their activities.

These preparatory activities will include more detailed geotechnical and other site investigations. The information from these activities will provide more detailed information to the designers and planners of the works to enable design/coordination for dependable and safe constructability, operation and maintenance/repair/replacement.

13.7.2.7 Construction On-Site

All of the activities by Galway Harbour Company, project planners and designers as described above, focus on facilitating safe construction, in terms of minimising the risks to personnel associated with construction. Although Galway Harbour Company, and its project planners and designers, have and will continue to play a significant part in facilitating safe construction, there will be a significant process involved in ensuring safety, once the construction process commences.

Again, prior to commencement, the PSCS appointed by Galway Harbour Company will notify the Health and Safety Authority (HSA). This facilitates visits by the HSA to the site during construction, which will occur regularly on this project. In this way, the contractor and PSCS will be closely and independently scrutinised with regard to safe systems of work on site.

The PSCS will prepare a detailed Safety and Health Plan before work commences. This will include all arrangements for the safe carrying out of the works, including special personnel resources (safety officers/advisors), personnel safety competence, equipment testing/certification, methodologies and safe systems of work, construction risk assessments and control measures.

The PSCS and Contractor will be obliged to advise the PSDP, and other affected parties including designers, of any changes affecting construction as envisaged. This might be due to unforeseen conditions, detailed requirements, resource changes etc., and facilitates all parties, including the PSDP and the designers in particular, to review any affected elements, assess associated risks and take necessary actions to protect the safety of personnel affected by construction works.

13.7.2.8 Construction Interfaces with Neighbouring Activities

As part of the above described detailed Safety and Health Plan, the PSCS will provide full details as to how the works will be controlled to minimise any interfaces between the works and neighbouring activities. Detailed risk assessments will be prepared and plans and measures put in place to carefully control the risks arising from these interfaces. These will cover all existing harbour activities, including cargo, oil, fishing and leisure, and all of the occupants in the Harbour Enterprise Park, local residents and the general public trafficking through the affected area.

Where feasible, delivery of construction materials will be arranged by sea and designated storage areas will be located within the Harbour and the Harbour Enterprise Park, so as to minimise traffic and interfaces with neighbouring activities.

It is however not possible to eliminate completely some interface with neighbours. Already constructional and operational mobility management plans have been prepared and are contained in the traffic section of this document. Special temporary traffic management designs and plans will be developed as part of the construction design activities outlined above. Subsequently, temporary traffic arrangements will be put in place to control movement and interfaces between the various access activities themselves and crossovers with the public and other commercial traffic. These will be monitored and controlled by competent certified personnel. There are recognised systematic approaches to this process, both in statutory form (Construction Regulations 2013), Ministerial Direction (Traffic Signs Manual Chapter 8) and Guidelines (HSA and Department of Transport), which the designers and contractors will be required to follow.

In addition to traffic, there are other potential safety interfaces, for example dust and noise, and these are dealt with in detail in the various sections of the report (e.g. dust under Chapter 9 – Air Quality and noise under Chapter 10).

13.7.2.9 Operational Handover

Upon completion of the works, or any phase of the works, the PSDP will arrange for handover to the Galway Harbour Company of the project Safety File. This Safety File will comprise all information related to the design and construction of the works, necessary for the Galway Harbour Company to maintain, repair or replace any part of the works. The exact content, format and number of copies of Safety File required by the client will be agreed at the start of the project.

Information for the Safety File will be provided to the PSDP by the designers and contractors, as collated by the PSCS, to meet strict requirements specified in the construction contract documents.

The Safety File will be supplemented after each phase is complete and will build into a total Safety File upon completion of the entire project. Prior to the commencement of a phase of the project, the team, including designers, planners, PSDP, PSCS and contractors, will have access to the Safety File built to date from previous phases, in order to provide all necessary information to them to facilitate the safe construction of the next phase.

13.7.2.10 Lifetime Operation

The operational safety of the New Galway Harbour Extension involves a wide variety of elements, which all have been taken account in the planning and design of the project.

This aspect of the project is dealt with in dedicated chapters, in particular in the Material Assets section of this document.

13.7.2.11 Element Maintenance/Repair/Removal/Replacement

A fundamental aspect of every designer's consideration involves designing to facilitate safe maintenance of each element of the design. In addition, each designer has to consider how any element will be replaced if required and how the design will facilitate this. In most cases, the significant aspect of this consideration involves the design providing for safe access to carry out such maintenance/repair/replacement. For example, the designers of the works have had to pay attention in their designs as to how access will be provided to the variety of elements that will need to be maintained, repaired or replaced. This will range from underground pipelines, quay ladders, quay bollards, quay surfaces, marina equipment, pavements, to sheet piling. Equally, the designers have taken into account the need for elements to be strengthened in the long term to maintain the integrity of retained structures, for example sheet piling or rock armour revetment.

13.7.3 Potential Significant Impacts

The potential significant health and safety impacts of this project are largely associated with the construction and operation of the New Harbour Extension.

The potential health and safety impacts during construction are mainly related to the personnel involved with the construction process itself. These include engulfment in the soft soils being placed in the contained land reclamation areas, drowning associated with all of the marine activities, interfaces between machinery and personnel, installation of heavy pre-fabricated elements, underwater activities during installation of the quay structures, and the use of explosives in trench preparation and berth deepening in rock.

The protection of the safety of construction personnel, and also interface of the works with neighbouring activities (general public or commercial traffic), is provided in a detailed systematic process, described above. Each step in this process involves competent persons taking actions, within their control and area of expertise, to minimise risks to persons arising from the works. This process commenced at the start of the project when Galway Harbour Company appointed competent designers, planners and PSDP, all of whom play an important role in the process of ensuring the preparation for a safe construction project. Later further appointments of competent persons including PSDP (post-tender), construction designers, PSCS and contractors, will see the continuation of this systematic project safety process.

13.7.4 References

Safety Health and Welfare at Work Act, 2005

Safety Health and Welfare at Work (Construction) Regulations, 2006 and 2013

Traffic Signs Manual – Chapter 8 – Revised 2010 (Department of Transport)

Guidance for the Control and Management of Traffic at Roadworks 2010 (Department of Transport / HSA / NRA / LGMSB)

HSA Guidelines on the Procurement, Design and Management Requirements of the Safety Health and Welfare at Work (Construction) Regulations 2006