3FMProject

Bringing
Dublin Port
To 2040

Environmental Impact Assessment Report

Chapter 4

Assessment of Alternatives

Volume 2 Part 1

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

rps
A TETRA TECH COMPANY

Third & Final
Masterplan
Project

4 ASSESSMENT OF ALTERNATIVES

4.1 Introduction

The EIA Directive requires an EIAR to contain "a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".

Alternatives are different ways of carrying out the Project in order to meet its agreed objective. DPC, as the developer of the 3FM Project, has considered a range of practicable alternatives in relation to the 3FM Project, including:

- Design;
- Technology;
- Location;
- Size; and
- Scale.

The assessment of alternatives for the 3FM Project has been undertaken in accordance with the following guidance documents:

- The EU Commission's Environmental Impact Assessment of Projects Guidance on the Preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014 /52/EU), 2017;
- The EU Commission's Guidance on the implementation of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment, 2022;
- The Department of Housing, Planning and Local Government (DHPLG) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, 2018; and
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Environmental Protection Agency (EPA), 2022.

The DHPLG Guidelines state that the EIA Directive requires that an EIAR includes *"a description of the reasonable alternatives studied ….. which are relevant to the project and its specific characteristics".* This *"must also indicate the main reasons for the option chosen taking into account the effects of the project on the environment ….. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment ….. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. A 'mini-EIA' is not required for each alternative studied."*

Assessment of alternatives includes consideration of the avoidance, prevention, reduction, or offsetting of adverse environmental effects, which may be described at a number of levels including:

- those assessed at plan stage (which the EU Commission guidance states *"it would likely be unnecessary to consider them again");* and
- those assessed at design stage (which the EU Commission guidance describes as *"alternatives or variants of Project components in order to mitigate significant environmental impacts that emerge during assessment"*).

The 2022 EPA Guidelines advises that *"In an effective EIA process, different types of alternatives may be considered at several key stages during the process",* accommodating the consideration of plan level (strategic) and project level (design) alternatives as summarised in Figure 4.1.

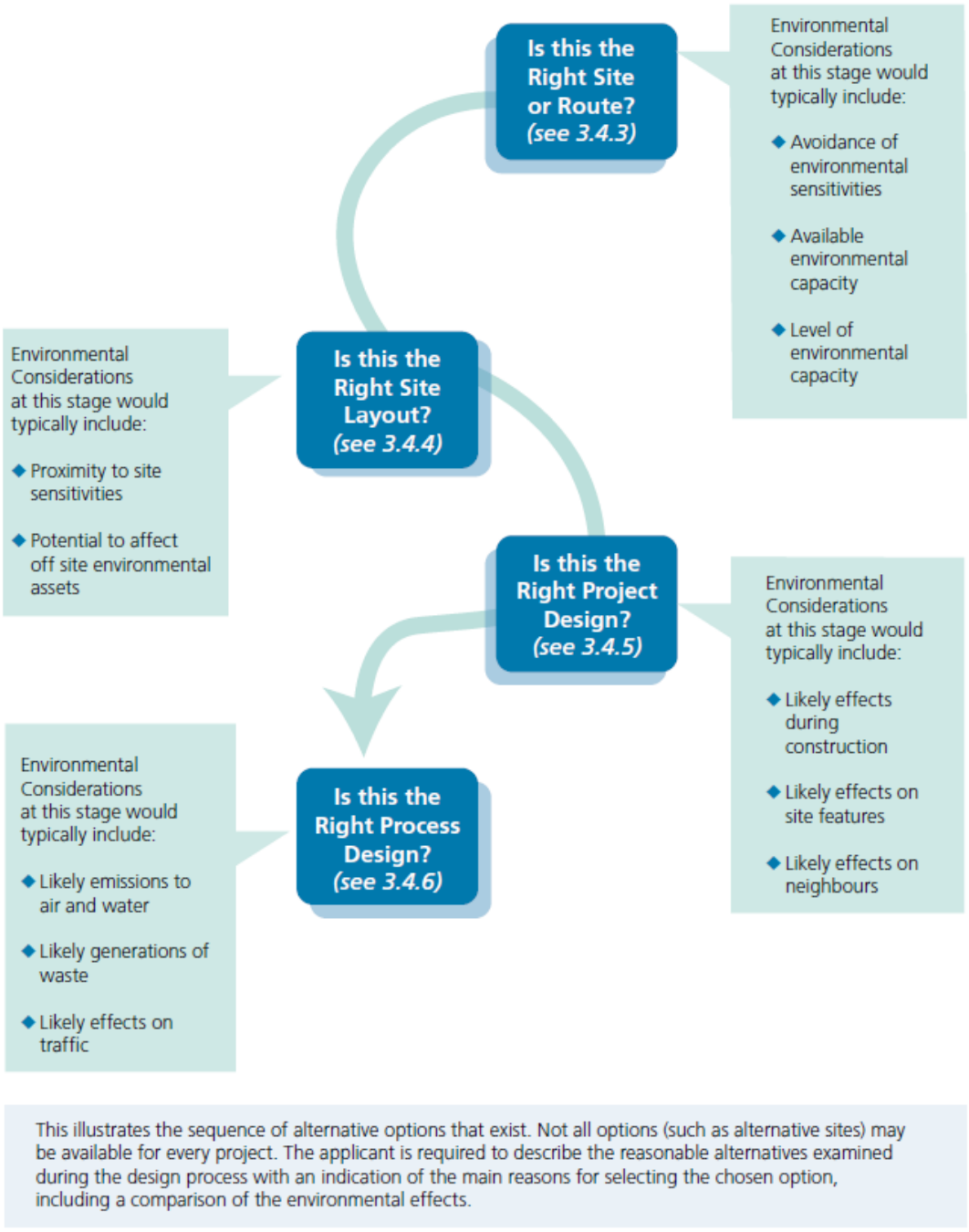


Figure 4.1 Consideration of Alternatives in an EIAR (excerpt from EPA Guidelines 2022 Figure 3.3)

The consideration of alternatives relating to the 3FM Project have been addressed following the EPA guideline's logical sequential approach:

- The project's site alternatives were discussed, at strategic level, in a series of papers titled "Dublin Port Post 2040 Dialogue" with supporting technical studies, available at Post 2040 Dialogue - Dublin Port;
- The 3FM's site layout alternatives were addressed, initially at strategic level, in the Dublin Port Masterplan (reviewed 2018) with supporting high level environmental reports, available at Masterplan Documents - Dublin Port, and subsequently during the refinement of the general arrangement at feasibility stage;
- The 3FM's project design alternatives are a key part of this EIA process, these evolved during the engineering outline design stage as summarised within this chapter; and
- The 3FM's process design alternatives are also a key part of this EIA process, similarly their evolution and consideration are summarised within this chapter.

This chapter of the EIAR also examines the 'alternatives' that have been considered at a plan/strategic level (in the preparation of the post-2040 dialogue and Dublin Port's Masterplan, reviewed 2018), and the subsequent more detailed, project level feasibility development and outline design stage evolution of the 3FM Project.

The strategic assessments of alternatives were conducted in accordance with the pertinent Strategic Environmental Assessment (SEA) Directive (Directive 2001/42/EC) and its supporting guidance. This level of assessment addressed reasonable and practicable alternatives with regard to site location and layout (size and scale) amongst others.

The assessment of detailed alternatives during the project-level design evolution process primarily considered the design and process alternatives (including alternative locations, layouts and materials), conducted on the basis of EIA topics.

This chapter should be read in conjunction with Chapter 2 'Need for the 3FM Project', as this provides the statement of need and land-use planning support for the 3FM Project, having regard to international, national, regional and local policies and objectives. Chapter 3 'Consultation and Scoping' describes the consultation process and feedback on the strategic alternatives and design level options. Furthermore Chapter 5 'Project Description' is also pertinent as it describes the proposed development and provides information on the project site, design, size and other relevant features.

4.2 Strategic Level Options – is this the right site?

Dublin Port will reach its maximum throughput capacity, achievable using its current sites at some point between 2030 and 2040.

With the committed completion of the ABR, MP2, Inland Port and associated projects, Dublin Port would reach its capacity limit closer to 2030 than 2040. This represents the do-nothing scenario within this 3FM strategic assessment.

The proposed 3FM Project is the third and final strategic infrastructure development project which will deliver the full capacity envisaged in the Dublin Port Masterplan 2040. Completion of the 3FM Project is needed to provide the capacity required for growth up to 2040.

Post-2040, additional port capacity will be needed elsewhere on the east coast of Ireland, to cater for the further growth which Dublin Port will not be able to accommodate once the maximum capacity point of its current sites has been reached.

On the basis that building large new infrastructure takes twenty years or more, from concept to completion, in 2020/2021, DPC considered the strategic projects that would be needed to provide additional capacity beyond 2040. In June 2021, DPC produced a series of seven dialogue papers, with supporting technical studies, for consultation regarding this post-2040 planning period. Within these studies six strategic options were developed, however, only those that introduced a new site were able to provide the full capacity required.

To further consider these viable options, a site selection process was undertaken to identify site alternatives on Ireland's eastern region to serve the Port's hinterland. These alternatives were assessed in terms of key environmental considerations also including technical, economic, and planning factors:

- Engineering and costing studies;
- Coastal processes modelling;
- Environmental and social appraisal; and
- Planning timescales and complexities.

Notably these new sites could be used as alternatives to, or in conjunction with the 3FM Project and current port sites, dependant on growth projections, planning horizon and site scale and layout.

A series of origin and destination surveys of the HGVs using Dublin Port were undertaken in 2001, 2011 and 2022. These surveys have consistently confirmed the following patterns of movements to and from the Port:

- Over 20% of movements originate from, or are travelling to, the Inner Dublin area;
- Over 60% of movements originate from, or are travelling to, a destination within 40km of Dublin Port; and
- Almost 75% of movements originate from, or are travelling to, a destination within 90km of Dublin Port.

To accommodate this overwhelmingly Leinster-centric freight (Figure 4.2), suitable new sites must be located on Ireland's eastern coast in order to serve Dublin Port's hinterland. Furthermore, these sites must be located in proximity to sufficient water depth in order to allow safe passage for all vessels likely to operate to and from the new port.

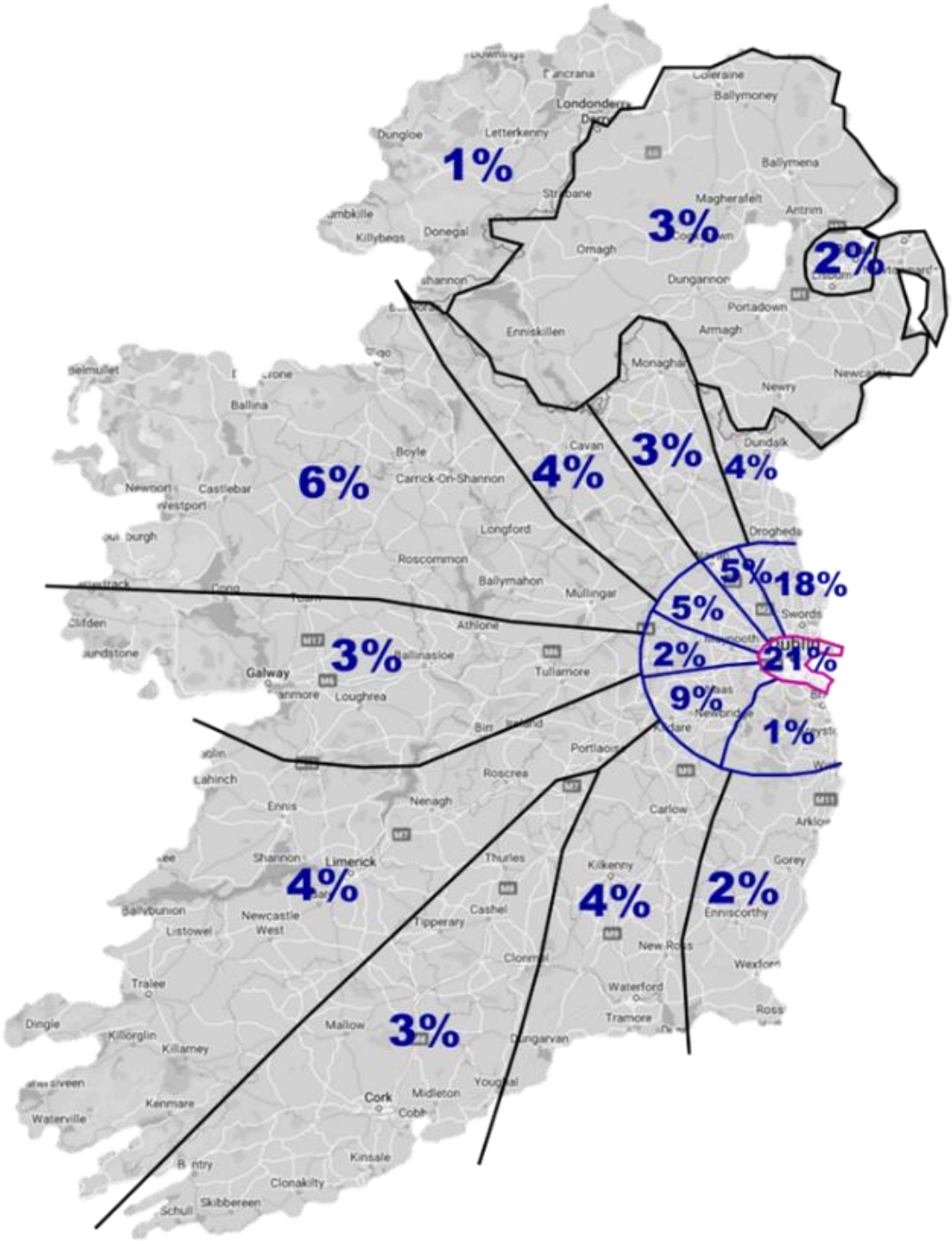


Figure 4.2 Dublin Port Origin Destination Study

4.2.1 Description of Strategic Site Alternatives Scenarios

DPC's site selection process identified that, apart from the South Port Estate (Poolbeg Peninsula) where the 3FM project is proposed, there are no other "brownfield" sites available to redevelop.

All current facilities (such as Greenore and Rosslare) are in operation and outside the ownership of DPC, so they are not considered as reasonable site alternatives for DPC to assess in the context of the 3FM Project. If the operators of existing facilities were to develop them independently of DPC's proposed 3FM Project, this would most likely extend the timescale in which Dublin Port reaches operational capacity. However, this would not obviate the need to intensify the Dublin Port operations by developing the 3FM Project to achieve optimal usage of the existing port infrastructure which is achievable ahead of 2040.

The site selection process therefore identified "greenfield" alternative locations at Bremore, Co Dublin, and Arklow, Co. Wicklow. These new greenfield sites effectively represent the possible alternative sites to progressing the proposed "brownfield" 3FM Project within the southern port estate (Poolbeg Peninsula) at Dublin Port.

The strategic site alternatives at Bremore and Arklow were each assessed using the following two long-term, high-level, post-2040 port capacity projections, which informed the assessment of the layout, size, and scale of these considered alternatives:

- An annual throughput of 134m tonnes at the new facility. The resulting project was referred to in the post-2040 dialogue process as "DP2.0" as it represented nearly twice the capacity of Dublin Port; and
- An annual throughput of 40m Tonnes at the new facility. The resulting project was referred to in the post-2040 dialogue process as "DP1.5" as it represented a capacity of 134m tonnes when combined with growth at Dublin Port and other ports.

The DP2.0 assessment considered the substitution of the existing Dublin Port estates (north and south of the Liffey) allowing the release of these lands for non-port related future development. The DP1.5 assessment represented similar overall capacity, by retaining and complementing the existing site capacity with a smaller development at a new location and growth at other ports.

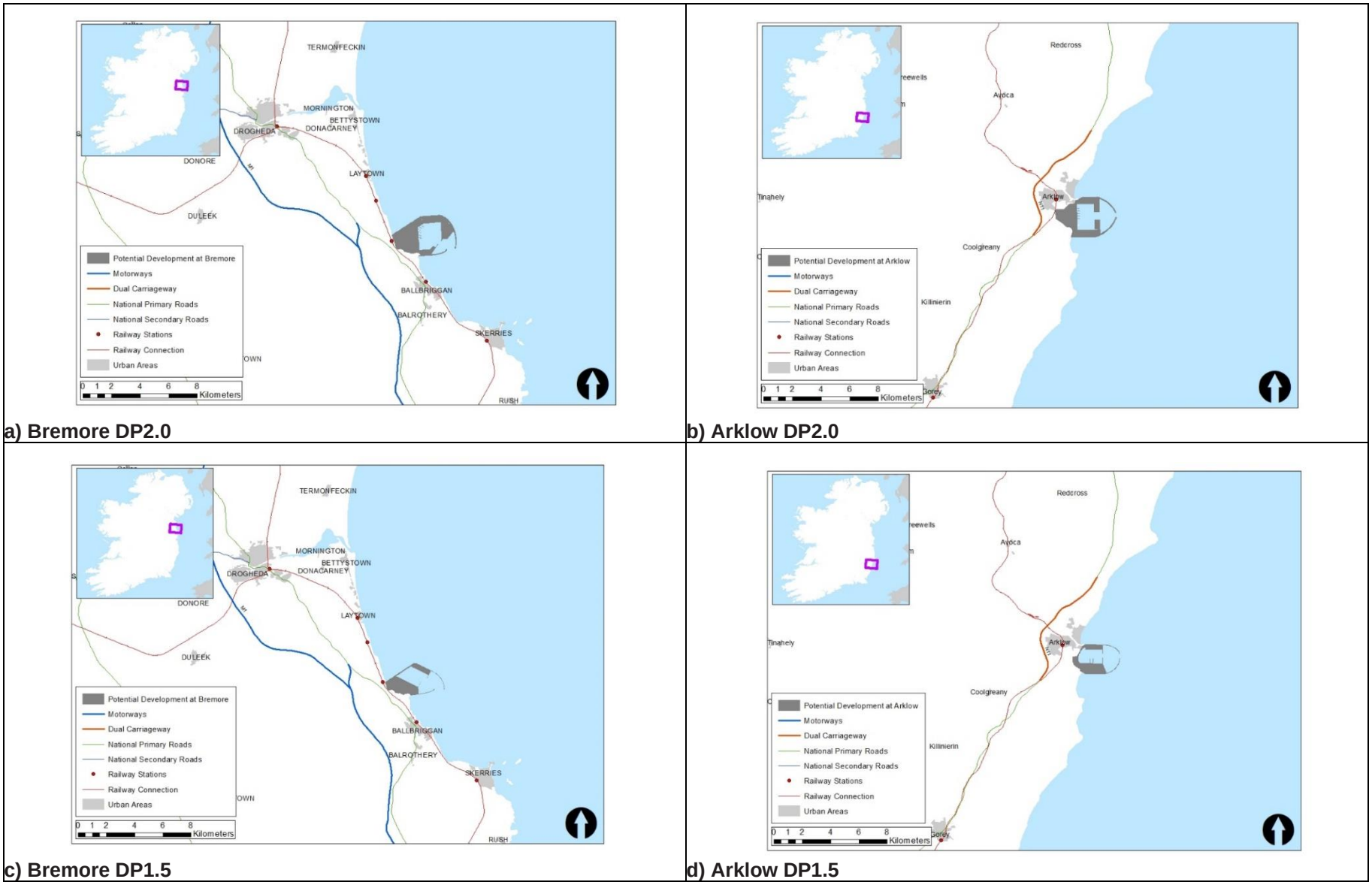
Having selected the two locations of Arklow and Bremore, the layout and orientation of a workable port with the required capacities was determined for each location. Figure 4.3 shows the locations and layouts of the Bremore and Arklow site alternatives, under the DP2.0 and DP1.5 capacity assessments. These four options each represent a large project requiring substantial planning, consenting and construction.

The total area of the current Dublin Port (land plus water) is 443 hectares. DP1.5 would be larger, at 574 hectares at Arklow or 617 hectares at Bremore. DP2.0 would be larger again, at 893 hectares at Arklow or 963 hectares at Bremore.

4.2.2 Summary of Strategic Site Alternatives Assessment

The strategic level assessment of the effects on the environment of these four proposals was undertaken by considering the headings in the SEA Directive. All were found to have similar levels of potential negative impact.

While those associated with the smaller DP1.5 development were lower when compared to the DP2.0 project, these impacts were still considered to be either of moderate or significant negative impact during construction.



a) Bremore DP2.0

b) Arklow DP2.0

c) Bremore DP1.5

d) Arklow DP1.5

Figure 4.3 Consideration of New Site Alternatives

Environmental Topic	Short Term Timescale Impacts (Construction)	Long Term Timescale Impacts (Operation)
Biodiversity, Flora & Fauna	-3/+1	-3 /+1
Population & Human Health	-3/+2	-3/+3
Geology, Soils and Landuse	-3	-2/+3
Water	-3	-3/+2
Air, Noise & Vibration	-2	-2
Climatic Factors	-2	-2/+1
Material Assets & Infrastructure	-2	+3
Cultural, Architectural & Archaeological Heritage	-3	-3 +1
Landscape & Visual Amenity	-3	-3
Summary Chart of Impacts (Arklow / Bremore under DP2.0 / DP1.5 planning horizons)		

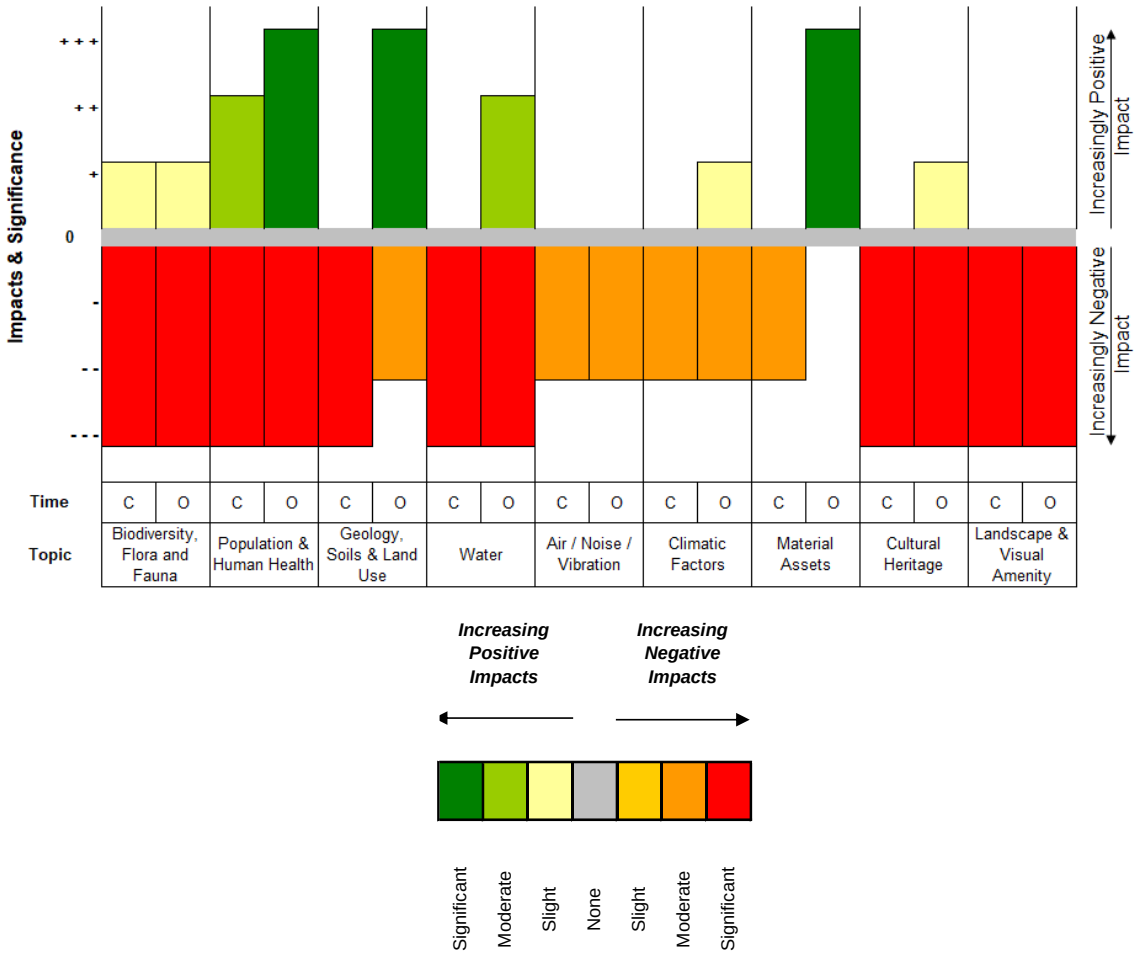


Figure 4.4 Environmental Assessment of New Site Alternatives

Figure 4.4 summarises the conclusions of this environmental assessment, with further details available in the technical reports supporting the post-2040 dialogue papers, DP2.0 Project High Level Environmental Appraisal and the Addendum Report (DP1.5 Project Option Appraisal).

There are strong legal protections for the environment and any large infrastructure project must have regard to these. The extent of the projected impacts of DP2.0 and DP1.5 is such that an application for development consent for DP2.0 or DP1.5, at either Arklow or Bremore, would almost certainly have to invoke Imperative Reasons of Overriding Public Interest (IROPI) provisions under Article 6(4) of the Habitats Directive. No large IROPI-justified port project has, as of yet, completed in Ireland. In 2014, Galway Harbour Company applied to An Bord Pleanála for planning permission for an IROPI port project. The decision in relation to that application remains outstanding as at 30 June 2024.

Consequently, these new "greenfield" sites are not considered to represent reasonably practicable site alternatives to the 3FM Project. The planning and construction timelines are such that neither alternative can deliver the required operational capacity increase in advance of 2040.

Furthermore, the overall cost estimates (at 2020 prices) for the DP2.0 project, which included construction of the required port facilities and buildings, land acquisition, remediating the lands and compensating the leaseholders at the current Dublin Port site was €7.6-€8.9 billion at Arklow and €7.7-€8.9 billion at Bremore. It is noted that, given the environmental and planning challenges, the timescale would be uncertain and cost inflation from 2020 prices would be almost guaranteed.

Similarly, DP1.5 would be very costly to build. It is estimated it would cost €3.9 billion (at 2020 prices) to construct DP1.5 at Arklow and €4.2 billion at Bremore, again with concern regarding timescale and cost inflation linked to these estimates.

Projects of the size of DP1.5 and DP2.0 would be beyond DPC's financial means, requiring state financing.

DPC concluded, in their post-2040 dialogue papers, that *"future infrastructure deficits are foreseeable and plans to address these deficits by way of large infrastructural projects need to be progressed. Moreover, given the scale and importance of Dublin Port, the need for these projects is of national significance. DPC believe the capacity of existing brownfield port sites should be maximised before any greenfield development is progressed".*

The DPC strategic assessment deferred progression of new site alternatives for the following reasons:

- Firstly, there is the hope that the long-term link between national economic growth and growth in Dublin Port's volumes will weaken to the point where year on year increases become very small;
- Secondly, there is the possibility of large infrastructure projects being completed in other east coast ports to provide additional capacity to cater for demand which Dublin will not be able to accommodate as it reaches its ultimate throughput capacity; and
- Thirdly, and finally, the need to build either DP1.5 or DP2.0 can be deferred by the completion of all projects in Masterplan 2040. In 2019, Dublin Port's throughput was 38 million gross tonnes. By 2040, it is planned that three Strategic Infrastructure Development projects will have been completed to provide capacity for 77.2 million gross tonnes: ABR, MP2 and 3FM.

DPC recognised the uncertainties in projections and planning timescales for this level of project. It has concluded that completion of the 3FM Project (DPC's third and final Strategic Infrastructure Development) is

necessary in order to achieve an annual throughput capacity of 77.2 million gross tonnes by 2040. The 3FM Project alone will not be sufficient to meet this end and needs to be coupled with a more efficient utilisation of Dublin Port's capacity by the operators of unitised terminals (both Ro-Ro and Lo-Lo) to meet the required annual throughput.

The conclusion of the assessment of site alternatives identified that the proposed 3FM Project on the Poolbeg Peninsula is the only "brownfield" site where DPC can deliver the capacity increase in the necessary timescale. Other sites outside the ownership of DPC, can be developed and this will provide capacity to assist with increased demand that will outstrip DPC's ultimate capacity post-2040. "Greenfield" site alternatives would have extended delivery timescales, meaning they are not practicable alternatives as they cannot meet the capacity required ahead of 2040. These "greenfield" sites may be developed for additional capacity post-2040, but with considerable complexity and cost. DPC has elected to defer the progression of these schemes given the uncertainties inherent in planning capacity for these longer timescales. The preferred option, having duly considered the detailed alternative strategic locations set out in this Chapter, is therefore to progress the 3FM Project on the Poolbeg Peninsula site.

4.3 Strategic Level Options – is this the right site layout?

DPC prepared a Masterplan in 2012 which considered the redevelopment of the existing Dublin Port estates north and south of the Liffey. Following the grant of permission in respect of the first SID project (the ABR project), DPC conducted a review of its Masterplan, which was updated and published in 2018. As part of this plan level assessment process, alternative development options for the port were considered with regard to their layout, feasibility and reasonableness. These strategic options included retaining the original Masterplan 2012 layout.

During the preparation and review of the Masterplan, detailed consideration was given to Dublin Port's ultimate capacity and how this could be achieved alongside the port's current activities. This mainly addressed the layout, size and scale of the alternatives. A suite of assessments was undertaken and presented for public consultation, in order to establish the strategic needs for the two remaining SID projects (the MP2 Project and 3FM Project) to be taken forward to this more detailed planning phase.

The Dublin Port Masterplan 2040, reviewed 2018, determined that the port's ultimate capacity was 77.2m tonnes of cargo throughput annually by 2040 based on the brownfield land available to the port. Since then, however, there has been a permanent loss of 7ha of port land to State Services in the North Port, primarily for Customs as a result of Brexit. The consequence of this loss of land has been to reduce the port's ultimate capacity to 73.8m tonnes of cargo throughput annually by 2040.

The SEA for the Dublin Port Masterplan 2040, reviewed 2018 was prepared in accordance with the requirements of the relevant European Union and Irish legislation.

The 3FM Project mainly addresses the facilities within the south port estate on the Poolbeg Peninsula. This would deliver increased levels of Ro-Ro throughput in Area K, and of Lo-Lo throughput in Areas N and O, with associated utilisation intensification resulting in Dublin Port's throughput per unit of land area increasing to almost 250,000 tonnes per hectare annually by 2040.

The 3FM Project is an essential step to implement the reviewed Masterplan's fundamental objective of providing the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually). This would be achieved by maximising the utilisation of Dublin Port's brownfield lands. The assessment process, in support of the Masterplan review, identified that this was the most feasible and reasonable layout, and therefore the most sustainable approach. The primary reason for the decision to select the proposed layout rather than the alternatives assessed as part of the EIA, was to avoid the direct adverse significant environmental impact on the designated SPA within the Tolka Estuary which the assessed alternatives would entail.

4.3.1 Description of Strategic Site Layout Alternative Scenarios

During the preparation of the Dublin Port Masterplan 2040, reviewed 2018, alternative potential layouts to plan the port's future were considered at a strategic level. This process has informed the consideration of alternative layouts in the preparation of the 3FM Project. A number of potential scenarios were assessed yielding a full range of potential options as follows:

- No Port Expansion:

  - No port expansion. (This particular option represents the strategic 'do-nothing' scenario).

- Optimise Main Port Lands:
  - Optimise throughput of existing facilities.
  - Optimise throughput of existing facilities and increase berthage in North Port lands.
  - Optimise throughput of existing facilities and increase berthage in North Port and South Port lands.
- Optimise Main Port Lands and Increase Port Lands:
  - Rationalise existing facilities, increase berthage in the North Port and South Port lands, improve road infrastructure and infill adjacent to Port (part of the Tolka Estuary). (This particular option represents the implementation of the original Masterplan 2012 which addresses the scenario of "The Evolution of the Environment in the Absence of the Masterplan 2040").
  - Rationalise facilities, increase berthage in North Port and South Port lands, improve road infrastructure and develop Inland Port.
  - Rationalise facilities, increase berthage in North Port and South Port lands, improve road infrastructure and develop additional Coastal Port Facility external to Dublin Port.

The potential strategic options were assessed against a technical requirement in the first instance. The target for expansion is to achieve the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually). This value is utilised as a pass/fail criteria to screen and short list the options. A technical assessment is used to determine the growth that any potential option can accommodate.

Table 4.1 summarises the findings of this analysis. The basis for comparison of alternative options was to determine if they were technically feasible within the timescale of capacity demand, environmentally sustainable and socially acceptable. Utilising those criteria, it was determined that only those options involving the optimisation of the main port lands and increasing port lands would be capable of delivering the required capacity to meet growth projection. The sub-set of potential options, which passed the capacity test, were then subjected to further technical, environmental and social assessment. Figure 4.5 shows these site layout alternatives.

Option 1: This option, which comprised rationalising existing facilities, increasing berthage in the North Port and South Port estates, improving road infrastructure and infilling waters adjacent to the port in the Tolka Estuary, was screened out on environmental grounds. This was due to its potential impact on the South Dublin Bay and River Tolka SPA. As a viable alternative of utilising additional lands at a new Inland Port had been identified, this potential impact was thus assessed to be avoidable. This potential option, as identified in the original 2040 Masterplan, represented a strategic scenario in the absence of a plan and was therefore retained in the EIA analysis to provide a reference point against which other options could be assessed.

Option 2: This option comprised rationalising facilities, increasing berthage in the North Port and South Port estates, improving road infrastructure and developing an Inland Port (to provide capacity for non-core port activity and thus support the Dublin Port minimum dwell time initiative). This option satisfied the further technical,

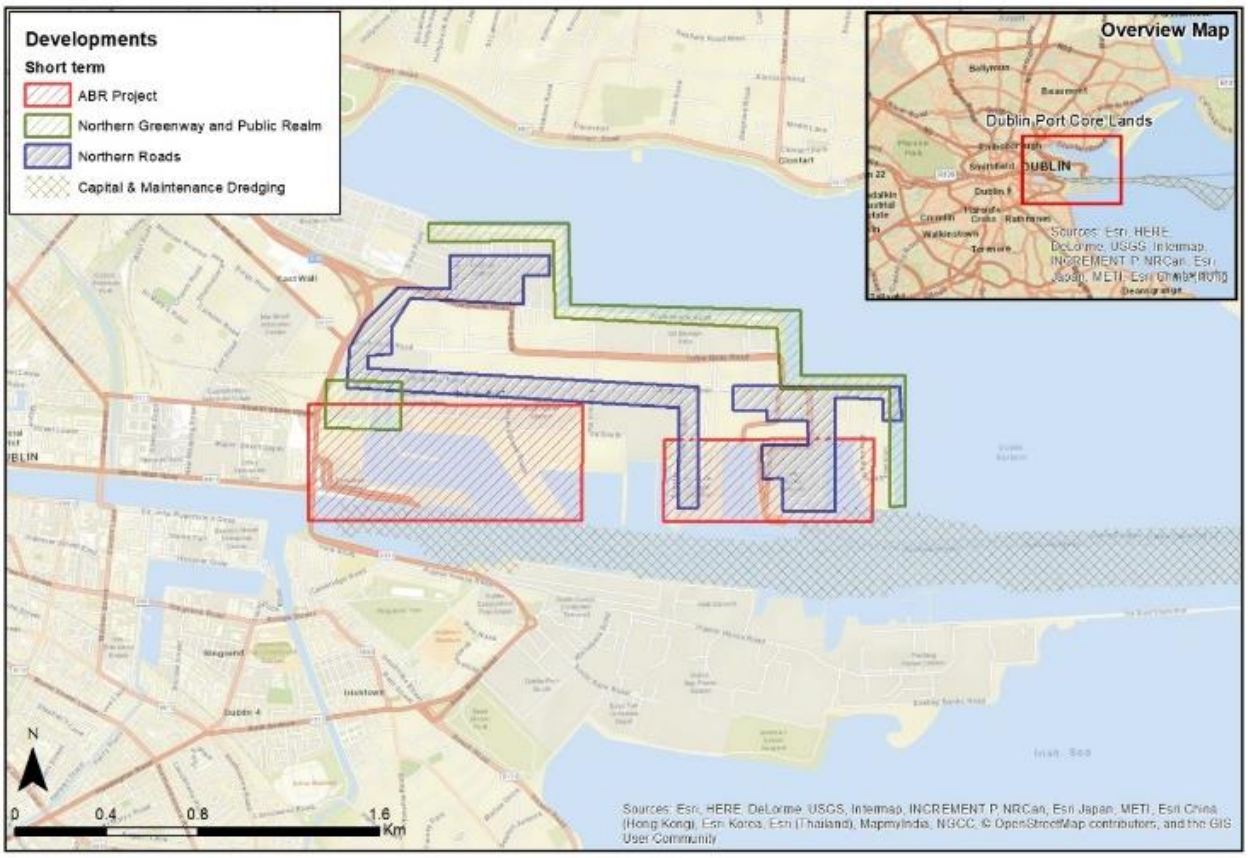
environmental and social criteria. It presents the preferred layout option identified by the Masterplan review process and the 3FM Project forms a significant element of this option.

The potential option of rationalising facilities, increasing berthage in North Port and South Port lands, improving road infrastructure and developing an additional coastal port facility external to Dublin Port was addressed in the Masterplan review. This was not considered to be achievable within the timescale of the capacity demands. This finding was further reinforced by the analysis supporting the post-2040 dialogue papers. This option was therefore not considered further as a practicable means of achieving the required port capacity to 2040 (see Section 4.4.2 for more detail).

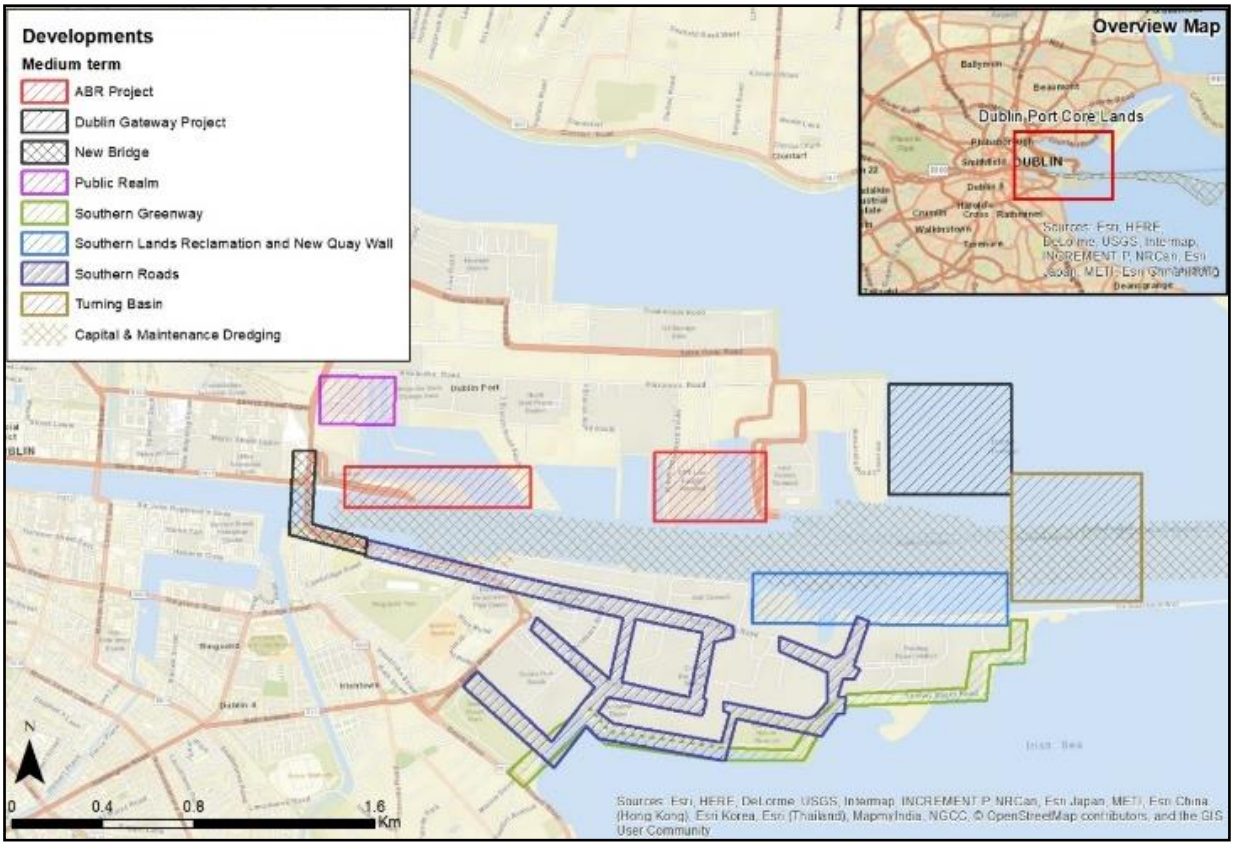
The development options arising from the Masterplan 2040, reviewed in 2018, allow for the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), in comparison to the 60 million tonnes resulting from the development projects outlined in the original Dublin Port Masterplan 2012. In order to achieve this increased throughout, DPC has purchased greenfield lands at Coldwinters, close to the M50 and Dublin Port Tunnel, which has been designated as "Dublin Inland Port". This increase in DPC-owned land has meant that the need to infill 21 hectares of waters in the Tolka Estuary as part of the Dublin Gateway Project (included in the Dublin Port Masterplan 2012) is redundant. Instead, the MP2 Project utilises the eastern end of the Northern Port Lands. With regard to strategic environmental impact, the main difference is that Option 2 avoids a direct significant adverse environmental impact on the South Dublin Bay and Tolka Estuary SPA by utilising the Dublin Inland Port lands. Greater development of the Southern Port estate will arise from the Masterplan 2040, reviewed 2018, in comparison to the Dublin Port Masterplan 2012 in order to deliver this increased projected annual throughput. This development will include the SPAR along the southern foreshore of the Inner Liffey Channel, reclamation of a slightly greater area (1.2 ha) in front of the Poolbeg Power Station, relocation of Lo-Lo operations east and allocation of 4ha public realm.

Table 4.1 Details of How the Options were identified in Technical Assessment

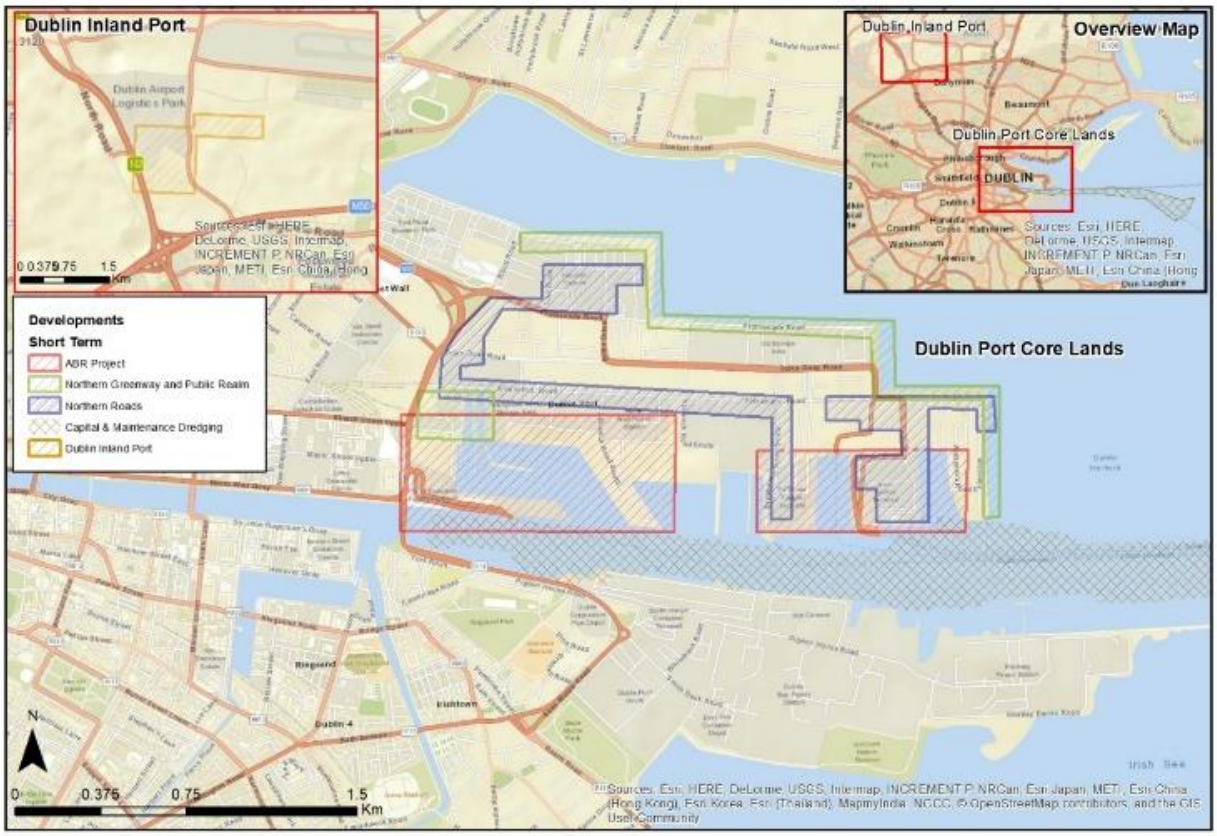
Long List of Options	Achieves Throughput of 73.8m Tonnes Technical Screening	Short list of Options	Short Description
No Port Expansion			
No port expansion	**Fail** Does not provide adequate expansion	Do-Nothing	No further Port Expansion once projects through the planning process are completed. The existing port lands continue the present day/*status quo* operations and facility use, at Masterplan review stage, the ABR development, and other smaller projects (DPC internal roads, demolitions and associated upgrade works, and terminal upgrades) which have been approved and are under construction form part of this regime.
Optimise Main Port Lands			
Optimise throughput of existing facilities	**Fail** Does not provide adequate expansion	Not Applicable	Increased capacity is provided by relatively minor improvements to the existing operations and facilities, towards maximising efficiencies and capacity use of brownfield sites.
Optimise throughput of existing facilities and increase berthage in North Port lands	**Fail** Does not provide adequate expansion	Not Applicable	Increased capacity is provided by an additional eastern jetty and further quay development within the North Port area (MP2 Project) alongside relatively minor improvements to the existing operations and facilities, towards maximising efficiencies and capacity use of brownfield sites.
Optimise throughput of existing facilities and increase berthage in North Port and South Port lands	**Fail** Does not provide adequate expansion	Not Applicable	Increased capacity is provided by an additional eastern jetty and further quay development within the North Port area (MP2 Project) and development of new quays within the South Port lands, alongside relatively minor improvements to the existing operations and facilities, towards maximising efficiencies and capacity use of brownfield sites, using existing road infrastructure linkages.
Optimise Main Port Lands and Increase Port Lands			
Rationalise existing facilities, increase berthage in the North Port and South Port lands, improve road infrastructure and infill adjacent to Port (part of Tolka Estuary).	**Fail** Provides adequate expansion, however, the Art 6(4) process of the Habitats Directive (IROPI) would require no better alternative to exist (regardless of financial cost)	Not Applicable **OPTION 1**	Increased capacity is provided by infilling adjacent to the North Port lands (part of Tolka Estuary) and development of quays within the North Port and South Port lands, alongside rationalisation/relocation of the existing operations and facilities, towards maximising efficiencies and capacity use of brownfield sites using enhanced road infrastructure linkages including new bridge across the River Liffey.
Rationalise facilities, increase berthage in North Port and South Port lands, improve road infrastructure and develop Inland Port.	**Pass** Provides adequate expansion, within 2040 timescale	Applicable **OPTION 2**	Increased capacity is provided by the creation of a new Dublin Inland Port, and development of quays within the North Port and South Port lands, alongside rationalisation/relocation of the existing operations and facilities, towards maximising efficiencies and capacity use of brownfield sites and enhancing road infrastructure linkages including new bridge across the River Liffey.
Rationalise facilities, increase berthage in North and South Port lands, improve road infrastructure and develop additional Coastal Port Facility external to Dublin Port.	**Fail** Provides adequate expansion, but not technically feasible within 2040 timescale and inconsistent with current national Ports Policy	Not Applicable	Increased capacity is provided by developing an additional coastal facility, and development of quays within the North Port and South Port lands, alongside rationalisation/relocation of the existing operations and facilities, towards maximising efficiencies and capacity use of brownfield sites and enhancing road infrastructure linkages including new bridge across the River Liffey.



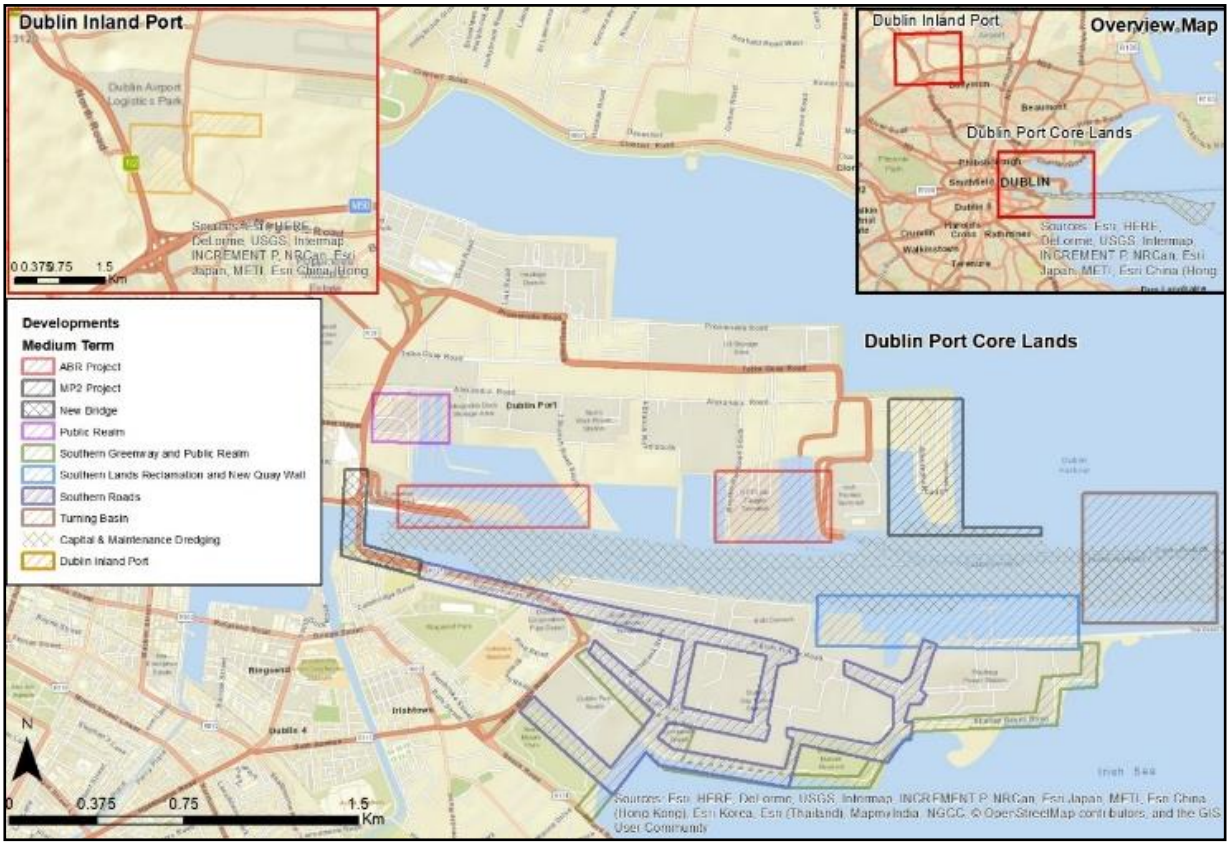
a) Strategic Option One Short Term (2017-2021)



b) Strategic Option One Medium Term (2021-2031)



c) Strategic Option Two Short Term (2023-2026)



d) Strategic Option Two Medium Term (2026-2036)

Figure 4.5 (a-d) Strategic Layout Alternatives

4.3.2 Summary of Strategic Site Layout Alternatives Assessment

The findings of the comparison of the potential environmental impacts of strategic site layout alternatives (which the 3FM project is an integral part of) are summarised in the following sections, considering their potential short, medium and long term impacts.

4.3.2.1 Option 1: Dublin Port Masterplan 2040, published 2012

Prior to the review of the Dublin Port Masterplan in 2018, the major SID projects outlined in the Dublin Port Masterplan 2012 were considered for development. Under Option 1, these developments were envisaged to progress in the short (2017 – 2021), medium (2021 – 2031) and long (post-2031) term. The development projects within the short and medium timescales are illustrated in Figures 4.5 a & b. Port operations would be ongoing in tandem with the proposed developments throughout the period of the Masterplan.

MASTERPLAN 2012 Short Term: 2017 – 2021: Developments were to be concentrated within the Northern Port Lands. In summary the main proposed developments were:

- Development of the ABR Project.
- Commencement of a capital dredging programme to deepen the Alexandra Basin West and navigation channel to a standard depth of -10m CD as part of the ABR Project.
- Construction of public realm and greenway.
- Construction of revised road network in Northern Port Lands.

MASTERPLAN 2012 Medium Term: 2021 – 2031: Development (2021-2026) was concentrated within the Northern Port Lands. Development (2026-2031) was concentrated in the Southern Port Lands. In summary the main proposed developments were:

- Completion of the ABR Project and capital dredging programme.
- Completion of the Dublin Gateway Project including an eastward extension of approximately 21 ha, development of two new river berths and development of a multi-user check in area for Ro-Ro traffic. This development will provide a new Ro-Ro facility in the Northern Port Lands.
- Development of a turning circle.
- Public realm works including the conservation of port heritage projects.
- Development of a bridge over the Liffey and upgrading the road network in the Southern Port Lands. Reclaiming of 12.6 ha for development of a multi-purpose berth in front of the Poolbeg Generating Station. Development of new quay wall and berth directly west of reclaimed land for bulk solid.
- Extension/upgrade of Southern Greenway.

MASTERPLAN 2012 Long Term: 2031+ All Dublin Port Masterplan development was to be completed, with Port infrastructure capable of handling a throughput of 60 million tonnes annually. This infrastructure is capable of handling the required throughput of Dublin Port until 2032.

4.3.2.2 Option 2: Dublin Port Masterplan 2040, reviewed 2018

With the implementation of Option 2 (the Masterplan 2040, reviewed 2018), the SID projects would take place within the short and medium timescales as illustrated in Figures 4.5 c & d. Port operations would be ongoing in tandem with proposed developments throughout the period of the Masterplan.

MASTERPLAN Short Term: 2023 – 2026: Developments were to be concentrated within the Northern Port Lands and at Dublin Inland Port. In summary the main proposed developments were:

- Development of the ABR Project.
- Commencement of a capital dredging programme to deepen the Alexandra Basin West and navigation channel to a standard depth of -10 m CD as part of the ABR Project.
- Construction of public realm and greenway.
- Construction of revised road network in Northern Lands.
- Development of the Dublin Inland Port including the construction of roads, buildings and freight terminals, and the relocation of non-core users to Dublin Inland Port.

MASTERPLAN Medium Term: 2026 – 2036: Development (2021-2026) would be concentrated within the Northern Port Lands. Development (2026-2031) would be concentrated in the Southern Port Lands. In summary the main proposed developments were:

- Completion of the ABR Project and capital dredging programme.
- Completion of the MP2 Project i.e. construction and operation of a unified ferry terminal (UFT) and neighbouring container terminal.
- Public realm works including the conservation of port heritage projects.
- Development of the SPAR bridge and new road connecting to the Southern Port lands and upgrading the road network in the Southern Port Lands. Reclaiming and redevelopment of 13.8 ha for deepwater Lo-Lo and multi-purpose berths, relocating Lo-Lo operations east towards Poolbeg Generating Station, allowing for development of Ro-Ro operations at this location.
- Development of a turning circle.
- Development of active travel corridors on the Poolbeg Peninsula.
- Continuation of the Dublin Inland Port.

MASTERPLAN Long Term: 2035+ Within the last nine years of the Masterplan, only small plots on the Northern Lands currently utilised by Bulk Liquid may be acquired and redeveloped for unitised freight. The infrastructure in place at this juncture would allow for the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), equating to a growth rate of 3.3% per year.

A strategic level assessment was conducted in accordance with relevant SEA policy and guidance and therefore has not needed to be revisited within this EIA process. The main differences in potential environmental impacts between the two options were summarised (during the SEA of the Masterplan review) as follows, with regard to SEA environmental issues, and taking mitigation into account:

- Option 1 proposed to infill 21 hectares of water, part of which is located within the South Dublin Bay and River Tolka Estuary SPA. The omission of this element within Option 2 results in long term positive impacts to the designated and undesignated biodiversity of this area, with no loss in their habitat, and an improvement in the landscape of the Dublin Bay Biosphere with no eastward extension of land. Option 2 proposed development of Dublin Inland Port in tandem with the MP2 Project. The potential environmental impacts resulting from Option 2 are likely to be less than those arising from Option 1 which included the Dublin Gateway Project. No designated biodiversity sites are likely to be significantly affected, and the natural landscape designated in the Dublin Bay Biosphere remains unaltered.
- Option 2 proposes to relocate Lo-Lo operations on southern lands away from the Ringsend SDZ and Poolbeg SDZ. This is likely to result in medium and long term reductions in noise and vibration impacts to the area and to the local community.
- Option 2 proposes to develop the SPAR with the aim of keeping port traffic within the Port Estate. This is likely to reduce long term impacts on the public road network, thereby reducing negative impacts to material assets, and reduce long term disturbance impacts and air emissions to the local communities.
- Option 2 proposes to install shore-side electricity facilities at new berths. This will result in permanent reductions in local air emissions, reducing negative air, noise and climatic factor impacts associated with port operations.
- Option 2 proposes to design future development for flood risk and climate change. This is likely to reduce negative impacts resulting from flooding to material assets owned by DPC in the long-term, improving climatic factor and water impacts.
- Option 2 proposes extension/upgrade of Southern Greenway and to allocate 4 hectares public realm. These will result in an increase of social amenity areas available to the local communities, and an improvement of the landscape in the medium and long term with areas of public realm blocking views of industrial port activity.
- Option 2 proposes to design screening for the greenways and public realm areas to ensure views of industrial port activity are partially blocked to the public, resulting in benefits to the landscape in the medium and long term. Option 2 also proposes to design screening into the greenways to ensure the public and the industrial port activity is partially blocked to the waterbird species in the South Dublin Bay and River Tolka Estuary SPA, resulting in benefits to the biodiversity in the medium and long term through reduced disturbance.
- The NIS concluded that the loss of the ESB ‘dolphin’ structures used by terns in the South Dublin Bay and River Tolka Estuary SPA can only go ahead if certain conditions are met at the detailed project level to maintain the integrity of the SPA. As a result, this process is likely to decrease the potential negative impacts to biodiversity in the medium and long term.

A comparison of the potential positive and negative scores that have been generated from the mitigated assessment of these strategic options is presented in Figure 4.6. Option 1 (Masterplan 2012) is taken as the base case for comparison with Option 2 (Masterplan reviewed 2018): the comparative arrows show increases in positive impact and reductions in negative impact. In all cases Option 2 is either equal to, or better, than Option 1 with regard to the environmental topics.

The implementation of Option 2 will result in a greater number of positive impacts when compared to the impacts resulting from Option 1. The medium and long term impacts to biodiversity, flora & fauna are likely to increase to slight and moderate impacts, respectively, with screening designed into the greenway developments. The long-term impacts to biodiversity, flora & fauna are likely to increase from moderately positive to significantly positive with the exclusion of the Dublin Gateway Project. The medium and long term significant negative impacts to biodiversity, flora & fauna are likely to decrease to slight negative impacts with the removal of the tern dolphin going ahead only in the case that the integrity of the South Dublin Bay and River Tolka Estuary SPA is not impacted. This relocation was subsequently mitigated by avoidance during detailed project assessment thus further reducing potential impacts. The medium and long term negative impacts to the population & human health are likely to reduce to slight negative impacts with less noise disturbance and air emissions to the local communities. The negative medium and long term impacts to geology, soils and land use are likely to reduce to slight negative impacts with the omission of the Dublin Gateway Project in Option 2. The moderate negative medium and long term impacts to water are likely to reduce to slight negative impacts, with improvements in flood risk management at Dublin Port. Air, noise and vibration impacts are likely to permanently reduce to slight negative impacts with the instalment of shore-side electricity facilities, and are likely to become moderately positive in the medium term and significantly positive in the long term with the creation of public realm, development of the SPAR link and the relocation of Lo-Lo operations away from the local communities. There is likely to be an overall improvement in climatic factor impacts in the medium and long term with the instalment of shore-side electricity facilities and the inclusion of management for flood risk into all future development at the Port. Medium and long term negative impacts to the overall landscape are likely to improve with the omission of the Dublin Gateway Project, the inclusion of greater public realm in Option 2 and the inclusion of screening into the design of greenways and public realm areas. Overall, Option 2 is a more sustainable development project, and therefore the preferred alternative layout for the Southern Port Lands.

The selected strategic alternative (Option 2), incorporates a 3FM Project site layout which implements the reviewed Masterplan's fundamental approach of providing capacity in Dublin Port for the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually) by maximising the utilisation of Dublin Port's brownfield lands and new additional inland Port facilities (rather than seeking to expand eastwards into Dublin Bay). The increased levels of Ro-Ro throughput in Area K and of Lo-Lo throughput in Areas N and O will result in Dublin Port's throughput per unit of land area increasing to almost 250,000 tonnes per hectare annually by 2040. Construction of the 3FM Project is concluded to be the essential final step in achieving this ambitious objective.

The Masterplan assessment process identified that Option 2 is the most feasible and sustainable approach available to the Port within the project's timescale. The 3FM Project layout optimises the Southern Port Estate, intensifying the use of these water-side port activities by provision of infrastructure, which is consistent with the Masterplan's strategic objectives (particularly in relation to **Port Functions, Investment and Growth and Movement and Access)** and therefore represents the most suitable land-use for this portion of Dublin Port.

Environmental Topic	Short Term Difference	Medium Term Difference	Long Term Difference
Biodiversity, Flora & Fauna	0 / 0	+2 / +1	+2 / +1
Population & Human Health	0 / 0	+1 / 0	+2 / 0
Geology, Soils and Landuse	0 / 0	+2 / 0	+2 / 0
Water	0 / 0	+1 / 0	+1 / 0
Air, Noise & Vibration	+1 / 0	+1 / +2	+1 / +2
Climatic Factors	0 / 0	0 / +1	+1 / +2
Material Assets & Infrastructure	0 / 0	0 / 0	0 / +1
Cultural, Architectural & Archaeological Heritage	0 / 0	0 / 0	0 / 0
Landscape & Visual Amenity	0 / 0	+1 / +1	+1 / +1

Comparison of Options

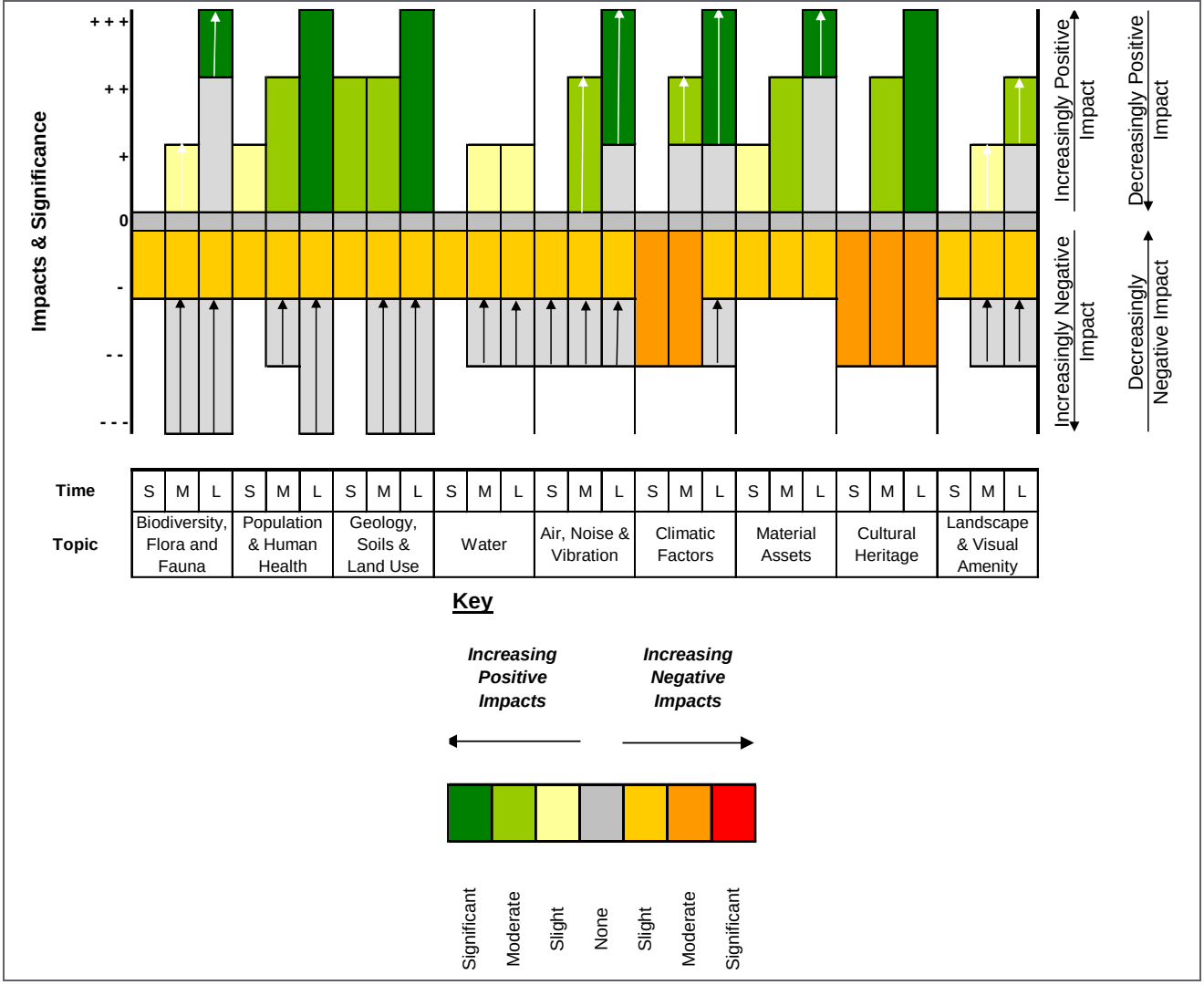


Figure 4.6 Environmental Assessment of Layout Alternatives

4.3.3 Consideration of Strategic Transport Connectivity Scenarios

The Masterplan, reviewed 2018, seeks to deliver the projected throughput by developing additional infrastructure and also intensifying the use of brownfield port lands. DPC has optimised the layout of the required port facilities, within its lands, by considering operational, navigational and environmental factors.

The intensification of the use of DPC owned lands on the Poolbeg Peninsula is, however, restricted by the single carriageway Tom Clarke Bridge. Since Masterplan conception, it has been recognised that this intensification necessitates additional transportation capacity connecting the Northern and Southern Estates.

There have been a series of strategic transport studies undertaken on behalf of the former NRA, and more recently TII, which considered a road crossing of the Liffey eastwards of the Tom Clarke Bridge, initially in assessing the feasibility of a strategic infrastructure route (the Dublin Eastern Bypass DEB). DPC has considered the transport link that it requires (titled the Southern Port Access Route SPAR) alongside the evolution of these independent strategic transport studies.

The DEB was a proposed extension to the M50 from the Dublin Tunnel to Sandyford to complete a full orbital motorway around Dublin. It should be noted that the ultimate conclusion of the studies into the DEB, published in the Transport Strategy for the Greater Dublin Area, 2022-2042, is that the scheme is no longer required to be developed. This strategy:

- Retained a corridor reservation for the SPAR;
- Released lands for development that had been previously reserved for the DEB within Dublin City Development Plan, Poolbeg Strategic Development Zone Planning Scheme and Dún Laoghaire Rathdown County Development Plan; and
- Stated that "*the NTA is of the view that the lands reserved in the Dún Laoghaire Rathdown County Development Plan for this scheme should be reserved, pending the outcome of an assessment for its potential use as a transport corridor accommodating sustainable transport modes*".

Whilst the DEB is not being progressed, the routes considered in, and strategic findings of, these strategic transport studies are relevant to the SPAR route layout alternatives. The timeline of these studies is summarised in Table 4.2.

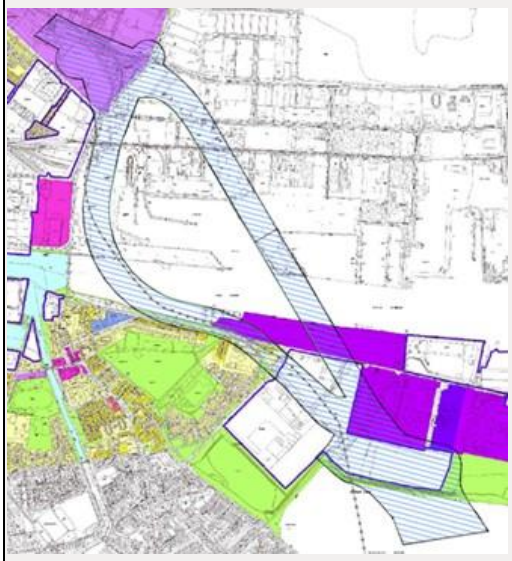
Table 4.2 High Level Timeline Summary of the Progression of the DEB / SPAR

2007: NRA released a DEB feasibility study. Sector A (Dublin Port-Sandymount) assessed five options of various alternative layouts, combining route and form, of which three were selected for further evaluation.

Alternative layouts included:

- High level bridge - route A4 (Options 1 & 2)
- Cut and cover tunnel - route A2 (Option 4)
- Medium level bridge which was rejected.

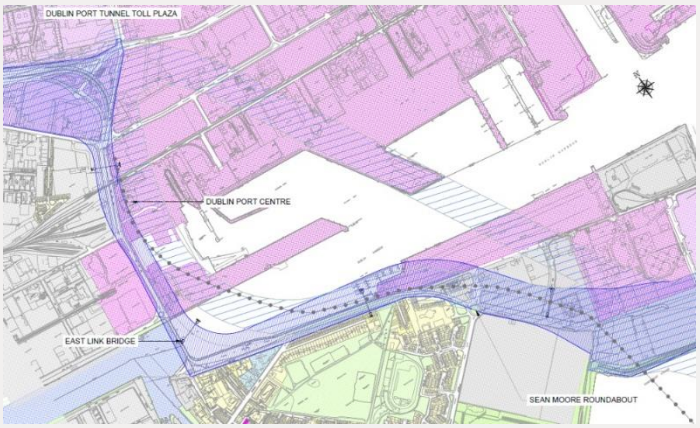
The study recommended a route corridor crossing eastwards of Tom Clarke bridge, or an alternative extending from ocean pier, with further consideration of bridge and cut and cover forms.



2009: NRA progressed a Corridor Protection Study for Sector A of the DEB, which protected these two corridors (as indicated in the image extracted from the report). The corridor to the west was for a cut & cover tunnel, and the corridor to the east for a high-level skew bridge.

2012: DPC released the Dublin Port Masterplan 2040, which was progressed as a response to a failed planning application for reclaimed lands at the eastern side of the Northern Estate. The Masterplan included a concept layout of the intensification of Dublin Port lands on the Poolbeg Peninsula with a separate road crossing of the Liffey to the east of the Tom Clarke Bridge.

2013-2014: DPC's first SID project under the Masterplan, the ABR Project challenged the sterilisation of lands within the ABR Project resulting from the NRA 2009 DEB Corridor Protection Study. DPC obtained planning permission for an alternative layout which protected a c50-60m corridor to the east of the East Wall Road and Tom Clarke Bridge.



2014: Following feasibility work by NRA/ROD it was concluded that the bridge Route A4 (extending from Ocean Pier) was no longer feasible due to conflicts with other development proposals in the area, most particularly DPC's aspiration to accommodate large cruise liners in the Alexandra Basin. The study also considered an at grade crossing alternative and recommended that three alternatives (all within the corridor immediately eastwards of Tom Clarke Bridge) were progressed to route selection process and also environmental impact assessment. The NRA revised the Corridor Protection Study for Sector A of the DEB to be consistent with the permitted ABR Project with a c50-60m protection corridor to the east of the East Wall Road and Tom Clarke Bridge.

2016-2018: The SPAR terminology was introduced in the NTA Transport Strategy for the Greater Dublin Area 2016-2035, as a link road connecting the southern end of the Dublin Port Tunnel to the South Port Area, which was identified as being delivered within the lifetime of the strategy. The National Development Plan 2018-2027 and National Roads Programme 2018-2027 identified the SPAR for pre-appraisal/early planning.

2018: DPC released 'Dublin Port Masterplan 2040, reviewed 2018', which included an updated concept of the proposals on the Southern Estate and formalised the SPAR terminology and the concept as being an at-grade single carriageway private road, as assessed within the Strategic Transportation Study that accompanies the SEA of the Reviewed Masterplan. The SPAR alignment remained consistent with the NRA 2014 Protection Study layout corridor as it crossed the Liffey.

2019-2021 A suite of feasibility reports were commissioned by NTA relating to the DEB and SPAR and surrounding areas, to inform the NTA Transport Strategy for the Greater Dublin Area 2022-2042. A SPAR Steering Group with key stakeholders, including DPC, was formed to inform the process. The process culminated in the Route Options for SPAR Working Paper dated 9 April 2021, which assessed eight options:

1. Public at grade road SPAR with existing road network.
2. Private Port only at grade SPAR with existing road network (Option A).
3. Private Port only at grade SPAR with existing road network (Option B).
4. Elevated SPAR (on alignment of potential future DEB).
5. Cut & cover tunnel SPAR (on alignment of potential future DEB).
6. Rail Spur option alongside at grade SPAR.
7. Ferry crossing within port (Two variants Option 7A and Option 7B).
8. Short bored tunnel for SPAR only.

The study assessed the engineering, environmental and economic aspects of each option and concluded that the at-grade road (Options 1 and 3) scored the highest and therefore proposed that these options be assessed in further detail with the implications and impacts of each option considered further. It was noted that Option 6 ranked third (albeit without including the cost of adding rail infrastructure). The study stated that there may be merit for considering inclusion of a rail connection, as a variation of any at-grade road option in further detail in subsequent phases. Notably the tunnel option for the SPAR was eliminated by the assessment in this study.

The key findings of this suite of strategic transport studies, which have considered high, mid and tunnel crossings (and alternatives such as ferries), identified a bridge crossing with an at-grade SPAR as the preferred form. They have also assessed various crossing points and concluded a corridor immediately eastwards of the Tom Clarke Bridge to be the preferred crossing point. These findings are consistent with the layout produced in the Dublin Port Masterplan reviewed, 2018.

The Dublin City Development Plan 2022 - 2028, Sustainable Movement and Transport (Chapter 8) states in Policy SMT30 - National Road Projects *"To protect national road projects as per the NTA Transport Strategy for the Greater Dublin Area 2022 – 2042 and in consultation with TII, NTA and other relevant stakeholders including the Dublin Port Authority Company to support the delivery of the Southern Port Access Route to Poolbeg, as a public road".* Consequently, DPC have ensured that the design of the SPAR meets the requirements for a public road which will be a 'restricted scheme' or tolled scheme under the Roads Act. This will limit its use to HGVs/commercial vehicles, public transport and emergency vehicles ensuring that all port traffic remains within the port estate and will not impact adjacent public road networks.

Considering the recommendations of the 2019-2021 NTA studies, DPC assessed the potential for a rail connection alongside the at-grade SPAR.

Dublin Port is rail connected and is at the hub of the national rail network. It has been a clear strategic policy objective of DPC to grow rail freight at the port as stated in the Dublin Port Masterplan 2040, reviewed 2018; *"Dublin Port is at the heart of the national rail network with direct connections to all major centres of population. DPC believes that there is continuing potential for rail freight to grow over the period of the Masterplan"* (Dublin Port Masterplan, 2040, page 10). The Masterplan also expressly has a key strategic objective to maximise the use of rail transport for goods to and from the Port (Ibid, page 17).

DPC remains committed to the development of rail freight in Dublin Port and in furtherance of this objective has engaged extensively with Irish Rail on exploring such potential and has contributed fully to the All Island Strategic Rail Review – a copy of the DPC Submission to the Review is presented in Appendix 4-1.

Between April 2021 and May 2024, DPC and Irish Rail have had numerous interactions on how to address rail freight in Dublin Port and including the 3FM Project. These interactions have involved meetings, site visits, engagement between professional advisors to both DPC and Irish Rail, the making of submissions to studies and strategies and engagement with the organs of the State of direct relevance, including the Department of Transport, and the Irish Maritime Development Office (IMDO). There have also been engagements involving terminal operators with detailed costings being prepared on the different capital projects required. In total there have been nearly 20 direct meetings or engagements between DPC and Irish Rail over a three year period on addressing rail freight in Dublin Port. These meetings have been productive, and a MOU is being prepared to set out the scope of the co-operation between the parties.

The majority of rail freight in Ireland currently moves in and out of Dublin Port. DPC has invested heavily in maintaining rail networks within the Port Estate, including the opening of a 1.6km rail spur in 2011. Despite this investment and the level of rail connectivity at Dublin Port, the volumes of goods carried by rail remains very low. At present the primary cargo carried by rail is 0.16m tonnes/week of unitised freight on the Ballina route, with on average five trains per week. This represents 1/225th (<0.5%) of the total port throughput.

The port has also serviced the Boliden Tara Mines, with 0.29m tonnes of lead/zinc ore per annum, with on average 10 trains per week. The production at Boliden Tara Mines has been suspended since 2023 but has recommenced/is due to be recommenced by the third quarter 2024, with ramp-up production starting the fourth quarter 2024 and full production expected from January 2025[1].

In reviewing the potential for rail connectivity in the context of the 3FM Project it is important to consider the potential for rail freight in the port generally, rather than in isolation. This involves a consideration of the potential for rail freight demand at Dublin Port, followed by a review of different options to address and grow that demand.

There are several factors that contribute to the current low level of demand for rail freight in Ireland and understanding these factors are important when reviewing the feasibility of different development options and various alternative approaches. Some of the issues impact on rail freight generally in Ireland, while other aspects are specific to Dublin Port.

The current low level of rail freight at Dublin Port (and across the rail network generally) is due to several contributory aspects:

- Low levels of customer demand – at present, the customer demand for rail freight services is exceptionally low. DPC is a facilitator of trade and will respond to customer demand for different freight services. Where that demand level is low, any additional investment would need to be supported by a business case which can demonstrate an achievable increase.
- Origin and Destination of Goods – an Origin/Destination Study (OD Study, illustrated in Figure 4.7) commissioned by DPC from RPS in 2022 demonstrated that 73% of Port Volumes have an origin or destination within 90km of Dublin Port, with 61% of volume having an origin or destination within 40km of the Port. The All-Island Strategic Rail Review noted that future rail freight services will be most viable where there is sufficient critical mass with increased tonnage lifted and indicates that this is most likely for distances in excess of 100km. Nearly 75% of Port Volumes have an origin or destination less than 100km from Dublin Port. It is also relevant that the OD study indicated that the 27% of volume which is outside the 90km is widely dispersed and only 6% of this residue is suitable for rail freight.
- Competitiveness of rail freight – as a facilitator of trade, DPC has sought to support increased use of rail freight in Dublin Port. The feedback from customers (and prospective private rail freight operators) is that rail freight costs are excessively high. Any significant migration to rail freight will need to be on a basis where customers make this choice based on the cost attractiveness of the proposal and the suitability of handling movements to maximise flexibility and efficiency. This is primarily a matter for Irish Rail.
- National Rail Freight Infrastructure – for any significant increase in rail freight to be accomplished, there will need to be significant capital investment in national rail freight infrastructure with a targeted focus on rail heads in locations where customers can secure the distribution of goods transported by rail. Constructing new rail freight depots will need significant investment which will require underpinning by a strong business case to justify the investment and embodied carbon costs involved.

[1] https://investors.boliden.com/sites/boliden-ir/files/pr/202405022610-1.pdf?ts=1714731763

- Access – in addition to the issues identified above, which apply generally across the rail network, there is a specific challenge for the growth of rail in Dublin Port concerning access to the Port from the national rail network. At present, it is necessary for trains and wagons to traverse the busy East Wall Road to access the Port Estate. Closing the East Wall Road to facilitate train movements causes significant levels of traffic disruption with knock on impacts on the city traffic, port traffic and access to the Port Tunnel. Any increase in rail freight traffic would need to be based on new access arrangements between the national rail network and the Port. DPC has addressed these arrangements with Irish Rail in the context of the development of a dedicated intermodal facility at North Wall Freight Depot which could serve all the different terminals at Dublin Port, which would be serviced by a dedicated overbridge across East Wall Road to shunt cargo between vessels and the rail freight hub.
- Land use – the low levels of take up of rail freight in Ireland and the high levels of land utilisation at Dublin Port limit the potential for expanding rail freight within the Dublin Port Estate. There is little benefit to be derived from allocating scarce port land for the development of an underused rail freight facility and which would come at a huge opportunity cost for DPC. A Study by Indecon in 2023 determined that allocating land within Dublin Port for an intermodal facility could result in reduced capacity with an economic consequence value of up to €5.4bn per annum. DPC has worked closely with Irish Rail to seek to identify a realistic alternative for an intermodal facility at the North Wall Freight Depot, which could serve all the different terminals at Dublin Port, including the new 3FM Project. Any solution to increase rail freight connectivity to Dublin Port should seek to address the Port as a whole and not just focus on one terminal in particular, developing a proposal that overcomes the access challenges for rail with Dublin Port are important.

In light of the above it is clear that examining a range of different options for rail connectivity of the areas proposed as part of the 3FM Project cannot take place without looking at the wider issues relating to rail connectivity and the demand for rail freight in Ireland generally. There are a range of possible alternative options that have been reviewed in that context.

Do Nothing - one option is to do nothing and to keep the existing rail services with the existing limited services. This option, while responding to current levels of market demand for rail freight services and maintaining current usage levels, limits the potential for the South Port Estate to be serviced by rail. This option also fails to address the issues of access concerning East Wall Road, which restricts the number of trains and wagons that could access the port area daily but does provide a baseline case to compare other options to.

Do Something - there are a range of different options that could be examined when addressing how the 3FM project sites could be rail enabled, while also enhancing the rail connectivity and accessibility of Dublin Port. These alternatives are set out firstly for the North Port Estate, as several assessments have been completed to consider options, which set the context, and assist in, the consideration of alternatives for the southern port and specifically the 3FM Project.

Enhance rail connectivity for the North Port Estate – anticipated levels of rail freight to and from Dublin Port will remain at current levels for as long as market demand is low and while rail freight infrastructure is limited. There are two key issues impacting on enhanced connectivity and rail freight levels – access and land use.

On the first issue of access, there are three key options to connect Dublin Port to the national rail network;

- rail underpass of East Wall Road – which is not feasible due to the gradients needed for rail freight.
- traffic underpass of East Wall Road – whereby East Wall Road would be placed in an underpass beneath the existing rail line, again not feasible or viable due to cost, and disruption to East Wall Road traffic during construction.
- dedicated vehicular road bridge across East Wall Road – this is a feasible option, which would overcome the existing rail access issues into the port and would see intended rail freight transferred by HGVs or electrified trailer tractors between different port terminals and the North Wall Freight Depot.

On the second issue of land use, DPC's preferred option is for an intermodal rail freight depot to be developed at the North Wall Freight Depot, which could serve all of the port's terminals by the East Wall access bridge. This would allow all terminals to access an intermodal depot by HGV or electrified trailer tractor transfer and, given rail access and port land capacity restrictions, would be a more sustainable and viable option than seeking to locate a rail intermodal facility within the Dublin Port Estate.

Enhance Rail connectivity to the South Port Estate – the two key alternatives considered were:

- dedicated rail line – this would be hugely expensive as it would require a dedicated opening rail bridge to cross the Liffey Channel and up to 2km of rail track to connect with the Lo-Lo storage area in Area L. A DPC estimate has indicated that the capital cost of such works would be in the region of €180m. In addition to the financial cost, the footprint would impact on port land capacity restrictions, furthermore, there would also be significant amounts of embodied carbon generated as part of this aspect of the project and importantly, it would not lead to any additional rail freight tonnage to and from the port. On current and anticipated trade flows, an investment of this scale could not be justified by DPC, specially in circumstances where it would not lead to any additional rail freight tonnage being created. Therefore, the development of a dedicated rail line to Poolbeg and the South Port Estate has been discounted, particularly when another viable and more sustainable option exists.
- transfer of freight by road – this would connect freight from the South Port terminals to an intermodal facility to be developed at the North Wall Freight Depot. This would be directly serviced by the SPAR (including its bridge crossing of the Liffey) which would have ample capacity to manage the anticipated flows. This is the most sustainable, cost effective and environmentally sound option because it does not require additional infrastructure. Therefore, this is the preferred option of DPC in terms of facilitating rail connectivity for the terminals to be developed as part of the 3FM Project. Such a proposal would also utilise the North Wall Freight Depot and therefore have the broader benefit of enhancing rail connectivity for the entire port.

DPC has engaged with Irish Rail on the potential for a North Wall Freight Depot and has committed to funding the development of a rail intermodal facility at the existing depot. DPC believes this to be the most efficient, safest and most sustainable solution for delivering the "first mile, last mile rail access" for Dublin Port.

DPC recognises that the development of a dedicated intermodal rail freight depot on Irish Rail-owned lands at North Wall is a distinct and separate project to the 3FM Project and will need to be pursued through a development agreement between DPC and Irish Rail. It will also be subject to its own statutory consent process. DPC and Irish Rail are engaged in extensive discussions on this proposal and both companies recognise the importance of such a facility to support enhanced rail freight connectivity for Dublin Port.

Ensuring that more customers use rail freight facilities will also be a factor of cost, inland connectivity, and convenience, which are primarily matters for Irish Rail to address directly.

In summary, having reviewed alternatives for rail connectivity for the 3FM Project, and the port more generally, DPC believes that the preferred option, which is most beneficial from a cost, sustainability and environmental perspective is the servicing of rail freight for the port from a dedicated intermodal rail freight depot at North Wall, accessed by a dedicated bridge over East Wall Road, with new proposed 3FM terminals accessing the depot via transfer on the SPAR.

DPC's preferred strategic transport layout, having considered connectivity of the port, therefore remains an at-grade crossing, immediately east of Tom Clarke Bridge which provides for future light rail expansion, as identified in the Masterplan, reviewed 2018.

4.4 Project Level Options – is this the right project design and process design?

The following sections address the evolution of the detailed level assessment of the construction and operational alternatives considered for the 3FM Project facilities. These project level alternatives evolved during more detailed project feasibility and outline design, informed by the collection of site investigation information and environmental data, environmental assessment, planning studies and associated ongoing stakeholder engagement.

These alternatives primarily address the dual issues of project design and process (technology) design alternatives, with due consideration of location and layout (size and scale). Project design and process design are considered in an integrated manner in this section as the construction and operational decisions, and associated mitigations, are interactive. For example, the selection of the preferred structural form of a berth can depend on the rate of import/export of construction materials or piling technique and construction programme and therefore these selections are viewed holistically.

The 3FM Project outline design evolution was progressed on behalf of DPC by RPS' integrated team of engineers, environmental scientists and planners, supported by COWI for specialist opening bridge design and Darmody Architecture for specialist architectural and landscape design. Specialist navigational and terminal simulation studies were also undertaken by Portwise Consultancy and HRW respectively.

The project team's combined approach to developing the project and process design was based on examining each of the key infrastructure elements, avoiding or minimising any adverse environmental and planning impacts, while meeting the requirements of the project brief. The various design iterations were informed by a number of key factors including:

- Compliance with project brief;
- Location of element;
- Scale and size;
- Form of construction;
- Construction methodology;
- Project phasing;
- Environmental impacts; and
- Operational impacts (land & marine).

The 3FM Project design and process level alternatives, were evolved for each of the six key elements through the development of a general arrangement:

1. Southern Port Access Route (SPAR);
2. Lift-on Lift-off (Lo-Lo) container terminal;
3. Roll-On Roll-Off (Ro-Ro) freight terminal;
4. Ship turning circle;
5. Maritime Village; and

6. Community gain – by enhanced recreational amenity, public realm, community support and heritage, and biodiversity.

Other significant ancillary works include:

- Improvements to the existing road network, linking and providing access to the port terminals, including new signal-controlled junctions and a new roundabout on Pigeon House Road;
- Improved pedestrian access from Irishtown to the proposed Maritime Village; and
- Demolition of the existing Poolbeg Oil Jetty and Sludge Jetty.

In addition, design and process assessment of alternatives for ancillary marine works, required across a number of elements of the scheme, was also undertaken for dredging, disposal, re-use of materials and for piling works. This enabled consideration of the cumulative environmental impacts of these activities at 3FM Project level.

In addition, but outside the scope of the 3FM Project, DPC is making the following provisions:

- **Reservation for Utilities –** The provision of a site within Area O to accommodate the infrastructure required to deliver District Heating from the Dublin Waste to Energy Scheme. The planning consent for this infrastructure will not form part of the 3FM Project and will be a matter for Dublin City Council.
- **Renewable Energy Infrastructure -** The provision of a site within Area M for a substation to facilitate the onshoring and transmission of Offshore Renewable Energy by Codling Wind Farm. Planning permission for the development of this infrastructure will be a matter for Codling Wind Park.

4.4.1 Description of Project Design and Process Design Alternative Scenarios

Evolution of alternatives for project design and process design, for each of the infrastructure elements, examined design progression relative to a do-nothing scenario. The do-nothing scenario described existing port activity or activity that incorporates previously consented development, in particular the ABR and MP2 projects.

The do-nothing scenario in respect of the 3FM Project is described, in accordance with the EU Commission's Guidance on the preparation of the EIAR and section 3.4.2 the EPA Guidelines 2022, as follows:

- Under the do-nothing scenario, as described in the Port Rationale, Dublin Port is currently experiencing increased growth trends. Initiatives to optimise existing operations and throughput have already been implemented in order to maximise the Port's capacity using the existing facilities. Rapid economic post-recession recovery, increasing population and an increase in patterns of trade between Dublin and Continental Europe have created a need for port expansion to cater for increasing demand. The six key elements within the 3FM Project all integrate to provide a third and final tranche (after the ABR and MP2 Projects) of the additional capacity required to cater for the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually). This is specifically achieved by the 3FM Project elements providing the necessary additional facilities and maximising land-use to increase throughput.

- The key environmental factors associated with the do-nothing scenario are used as the baseline case of the comparison of design progressions for each infrastructure element. This is detailed for the project design and process design alternatives in Sections 4.4.2 - 4.4.4.
- These assessments also take account of previously consented projects, in particular the ABR and MP2 Projects, in the environs of each infrastructure element.

However, the do-nothing scenario would fail to deliver on the port's strategic objectives without redevelopment of the south port lands (Poolbeg Peninsula) brownfield site's opportunities. The do-nothing scenario (Option 0) is therefore not considered to be a practicable alternative and is presented to provide a baseline for analysis for a series of do-something alternatives which can deliver the project's required capacity and objectives.

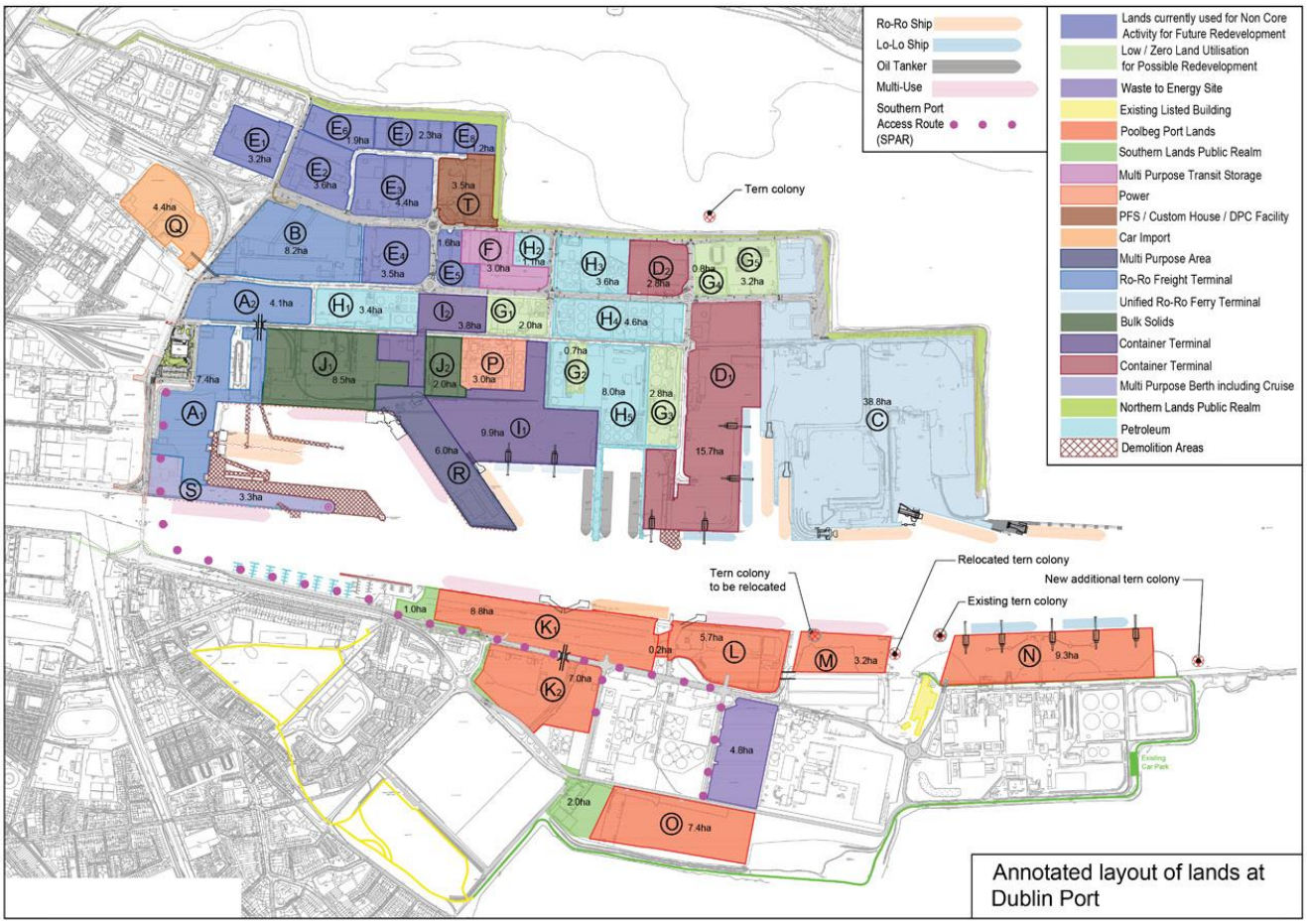


Figure 4.8 Strategic Layout (Masterplan, Reviewed 2018 Figure 4)

The Masterplan, reviewed 2018, site location and the existing layout of the relevant areas of the port (described in detail in Chapter 5 'Project Description'), are summarised in Figure 4.7 which shows the route of the SPAR and the main DPC ownership land plots on the Poolbeg Peninsula. The diagram also shows the location of the waste to energy plant, proposed amenity areas and the pathways included in the Masterplan.

The Masterplan proposals at completion of the strategic stage assessment for the 3FM Project, and therefore the commencement of the feasibility and outline design stage, on Areas K-O were described as follows:

- **Area K** The current use of these lands for a container terminal will be reviewed in the context of changed land uses on the Poolbeg Peninsula. However, the lands adjacent to South Bank Quay provide essential maritime access and port capacity and must, therefore, be retained for port uses if the objectives of the Masterplan are to be achieved. It is proposed that the existing terminal will be redeveloped as a Ro-Ro freight terminal and the existing Lo-Lo container terminal will be relocated.
- **Area L** The existing South Bank Quay supports a range of bulk commodities including: petroleum coke imports; cement and cement raw materials; and scrap metal exports. All are businesses with low growth potential and, in the case of petroleum coke, with a future life likely shorter than the duration of the Masterplan. Over the remaining period of the Masterplan, Dublin Port will consider any opportunities that may arise to redevelop these lands for more intensive cargo handling activities. This area's usage was reviewed and advanced as part of the 3FM Project final option (section 4.4.2).
- **Area M** This area is currently a brownfield site. A new deepwater multi-purpose berth is proposed as an eastwards extension of the existing South Bank Quay.
- **Area N** If the existing MTL container terminal located at Area K is redeveloped for Ro-Ro, then the port will have a shortage of container terminal capacity for Lo-Lo. It is proposed, therefore, that a new deepwater Lo-Lo container terminal be developed by the creation of deepwater berths along the River Liffey in front of the ESB's Poolbeg Power Station. In doing this, provision will be made for the power station's cooling water intake and outfall and also for NORA's petroleum loading and offloading requirements.
- **Area O** These lands will be redeveloped to support cargo handling activities at sites K, L, M and N. In 2018, the primary planned use of these lands was to provide, in conjunction with Area N, sufficient land capacity for the throughput of the new 600 metre long container terminal quay wall in Area N, however its usage was reviewed following extensive community engagement and advanced, in conjunction with Area K, as part of the 3FM Project final option (section 4.4.2). The Masterplan notes that provision may also have to be made in this area for infrastructure (pipes and a peak boiler) required as a part of DCC's Dublin District Heating Scheme.

Figure 4.8, also extracted from the Masterplan, shows the indicative navigation layout of channel and berth facilities at Dublin Port by 2040. Notably this figure illustrates the location of a proposed vessel turning circle, needed to ensure operational safety within the Port, located to the eastern end of the port in the vicinity of the Great South Wall (within the added highlighted red outline).

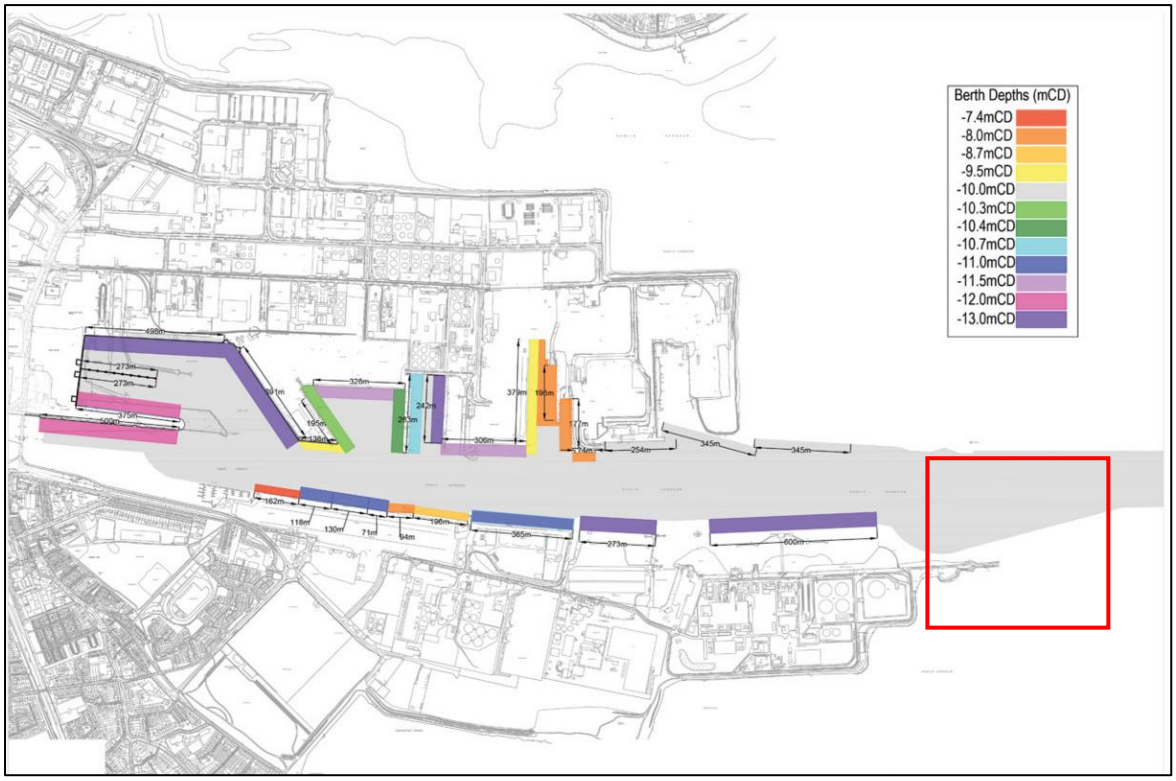


Figure 4.9 Indicative Channel and Berth Layout (Masterplan Reviewed 2018 Figure 5)

The 3FM Project aims to make optimum and efficient use of port lands in the South Port Estate through upgrade of facilities on its brownfield sites to “future proof” the port by facilitating changes in trade flows, transport modes and technologies.

Data on the movements of all vessels both to and from the port and internally, were provided for the period 2017 to 2020 from the Harbour Master’s records of shipping activity. The data was analysed to allow examination of the vessel movements and berth usage patterns, noting that the Covid pandemic impacted on port usage during 2020 and that construction work on the ABR project also changed the pattern of use of some of the berth facilities during construction (which commenced in 2016). The typical pattern of vessel mooring at these facilities over the data period is shown in Figure 4.9, (black indicates a vessel at the berth/blank is an unoccupied berth).

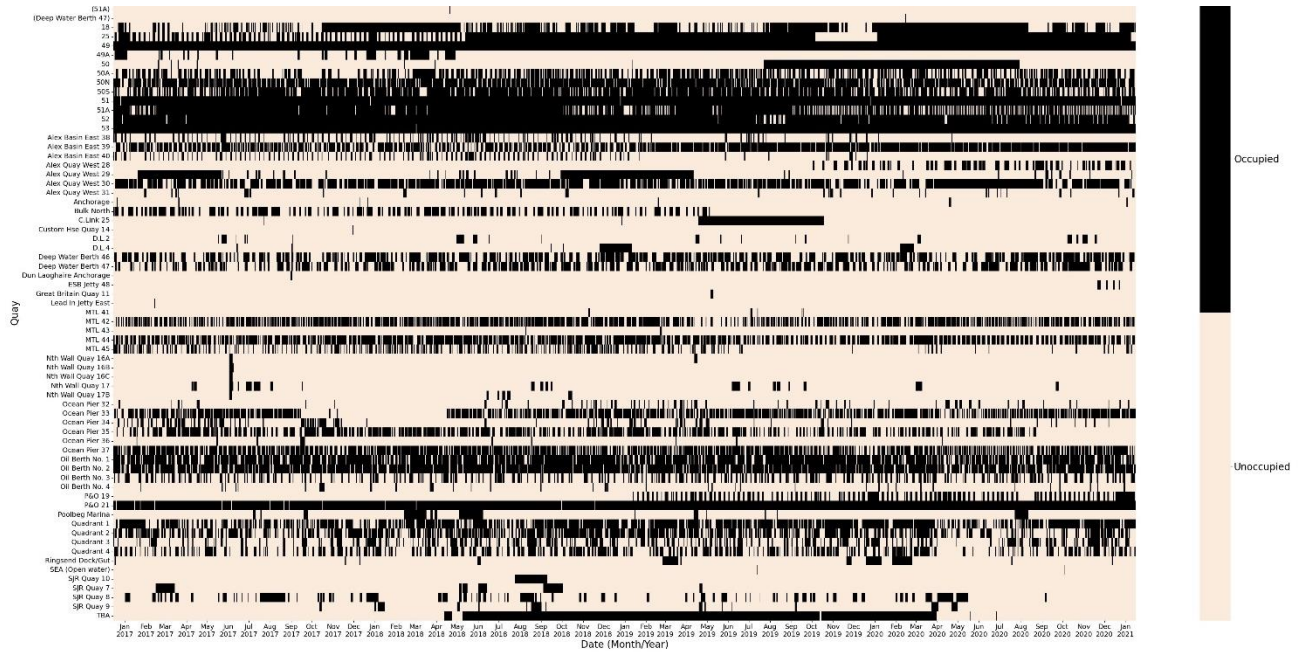


Figure 4.10 Indicative Berth Usage 15 December 2016 to 16 January 2021

In terms of shipping movements, over 24,000 shipping movements take place annually, representing an average of one trip every 22 minutes (based on a 24-hour day, with day-time activity levels more frequent than night-time). The provision of a turning circle will provide for safe, and efficient, manoeuvring of vessels attending both the north and south port quays, reducing idling time for other vessels whilst vessels are turning.

- The most frequent movements over the data period were to and from berths 49, 51 and 53. Berths 49, 51 and 53 are typically occupied 60% of the time.
- At Area K, where berths 41-45 are located and the current MTL container operations take place, there are 800-1200 movements to and from these berths each year (generally equating to between two or three ship movements daily). The proportion of time when a vessel is resident on these berths ranged from 86% of the year in 2020 to 124% in 2018 (meaning multiple vessels were present along the extent of this site throughout the year).
- At Area N, where the current ESB jetty is located the current annual movements are low (single figures) and the occupancy is low (<2% of the year).

The 3FM Project will transfer the Lo-Lo activities from Area K to Area N, allowing for increased movements and throughput (through the usage of different vessels), this, supported by the facilities at Area O, will accommodate the growing trend of Lo-Lo which is currently constrained by the facilities available at Berths 41-45. This enables the repurposing of the facilities at Area K to Ro-Ro to create additional capacity again to accommodate the growing trend in this transport mode. These developments thus maximise the usage of brownfield port owned lands, and in turn support the Masterplan's, reviewed 2018, objective of meeting the projected additional capacity demand.

A series of do-something alternatives were developed during the 3FM Project feasibility study and outline design. The rationale for carrying out the 3FM Project feasibility and outline design stage considered:

- Maximising the potential of the existing port property in the context of the Dublin Port Masterplan 2040, reviewed 2018;
- Upgrading facilities to allow for future use as a Ro-Ro and Lo-Lo berths;
- Providing sufficient water depth at each berth for the design vessels proposed;
- Minimising the impact of construction on the operation of existing berths;
- Providing a sufficiently wide channel to accommodate the piloting of vessels;
- Minimising the impact of proposed structures on existing port navigation;
- Taking full cognisance of environmental constraints and where feasible provide mitigation through engineering design; and
- Ensuring the integrity and stability of the Great South Wall is maintained.

The initial general arrangement (Option 1) for the 3FM Project was presented for stakeholder consultation in March 2020. During the period 2020 to early 2024, the feasibility study and outline design process further developed the 3FM Project general arrangement into a more detailed layout for public and stakeholder consultation and for further detailed level development. At each key stage further stakeholder engagement was maintained and a public engagement was held via a series of consultation rooms and meetings and these comments fed into the evolution of the 3FM Project design and process design alternative progressions summarised as follows:

Do-nothing Baseline

- Option 0 – pre-Masterplan

Do-something Alternatives

- Option 1 – March 2020, Masterplan and SEA Consultation
- Option 2 – November 2021, Consultation Room 1
- Option 3 – March 2023, Consultation Room 2
- Option 4 – June 2024, Final Consultation Room.

The following section details the progression and evolution of these alternatives across the overall 3FM Project (incorporating its six key elements) and provides an assessment of the environmental impacts associated with each design evolution. Project design and process design aspects are considered by the assessment of construction and operational environmental impact for each option.

4.4.2 Summary of Project Design and Process Design Alternative Assessments

4.4.2.1 Do-nothing - Option 0

The do-nothing option (Option 0) shown in Figure 4.10, represents the current South Port Estate general arrangement and the consented ABR and MP2 schemes.

In the do-nothing scenario, the existing usage of these brownfield areas continues, and the lands will remain at their current level of throughput, meaning the capacity of Dublin Port to accommodate Ro-Ro vessels would be limited. It is important to note that without provision of the 3FM Project turning circle, the new berths at MP2 will restrict manoeuvring space and the overall navigation will not function efficiently, therefore the absence of this element of the 3FM Project impacts on the efficient operation of the northern port, in addition to lacking the development opportunities of the Southern Port lands.

Table 4.3 provides a summary of predicted impacts of the do-nothing general arrangement (Option 0) as a baseline for assessment.

As the do-nothing scenario is largely representative of existing activities already taking place within this location; this scenario will not significantly impact upon the environmental factors at the site in terms of the construction phase impacts. However, with regard to operation phase impacts, the absence of the 3FM Project would have a critical impact upon national and regional economies, particularly by way of trade, employment and associated taxes for societal benefit. This in turn, would undermine the port's ability to contribute towards achieving the sustainable transport objectives of National Port Policy. This would inhibit the attainment of objectives specified within the Masterplan including the integration of the port with the city, by way of the promotion of sustainable linkages, and the amelioration of the visual impact of the port upon its landward surroundings. It would also further hinder the growth of the port's existing vessel operators and prohibit any potential for new operators from residing at the port.

In addition to these noteworthy societal, economic and human wellbeing impacts, with the port lands becoming increasingly under capacity there would be maritime and vehicular traffic congestion, adverse environmental impacts on other material assets (energy and services) and disruption with associated operation phase impacts in terms of noise, climate, air quality, and population & human health issues in the vicinity of the Port.

This do-nothing scenario fails to deliver on the port's strategic objectives without redevelopment of the South Port Estate's (Poolbeg Peninsula) brownfield sites' opportunities. Therefore, the do-nothing scenario is not considered to be a practicable alternative and is presented to provide context for do-something project design and process design alternatives which can deliver the project's required capacity and objectives.

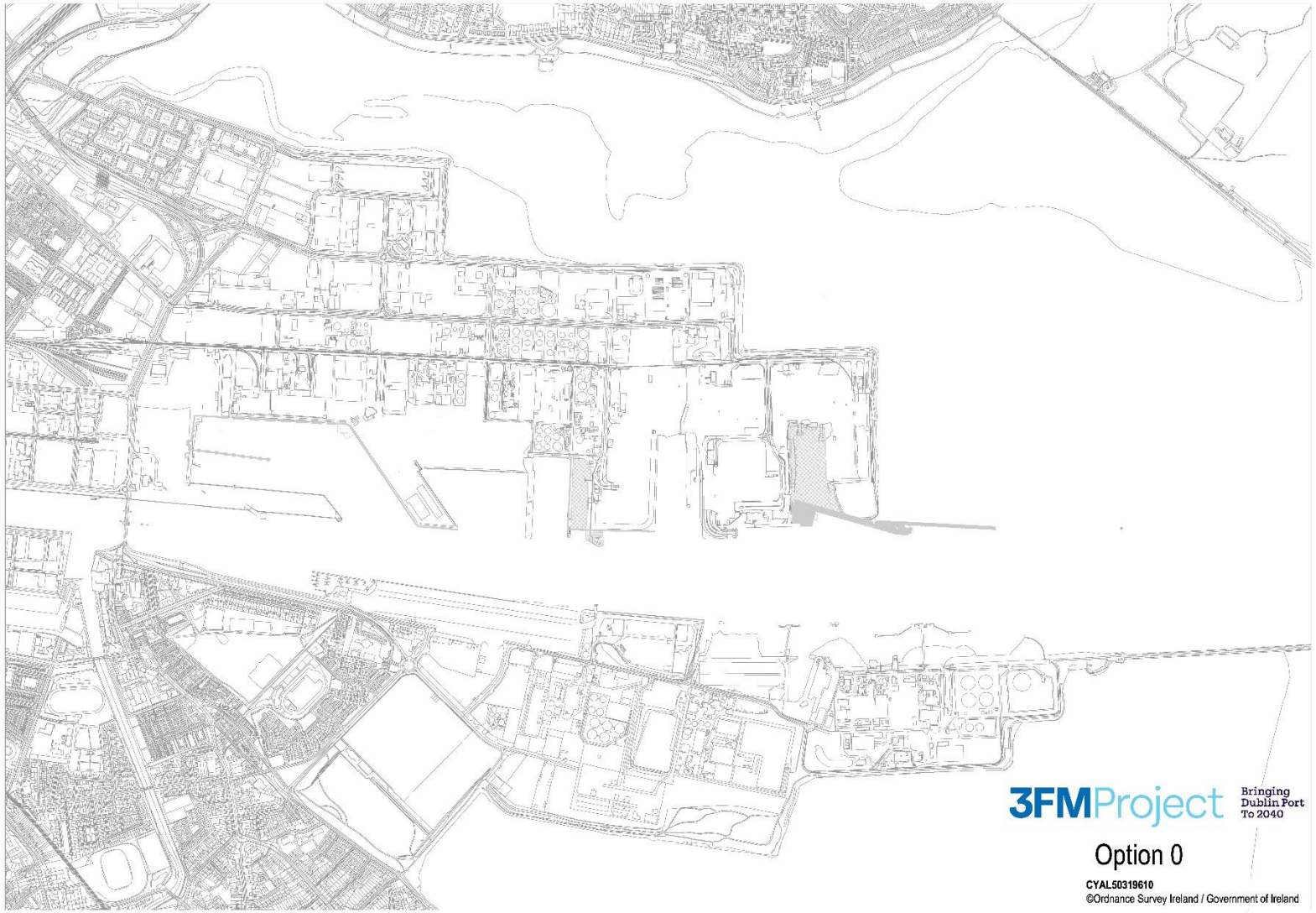


Figure 4.11 Do-nothing General Arrangement **Option 0**

Table 4.3 Summary of Predicted Impacts of Do-nothing General Arrangement **Option 0**

Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
Biodiversity, Flora & Fauna				
Terrestrial	0	No impacts anticipated.	0	No impacts anticipated.
Aquatic	0	No impacts anticipated.	0	No impacts anticipated.
Ornithology	0	No impacts anticipated.	0	No impacts anticipated.
Land, Soils, Geology and Hydrogeology				
	0	No impacts anticipated.	0	No impacts anticipated.
Water Quality and Flood Risk Assessment				
Water Quality	0	No impacts anticipated.	0	No impacts anticipated.
Flood Risk Assessment	0	No impacts anticipated.	0	No impacts anticipated.
Air Quality				
	0	No impacts anticipated.	-	Potential for negative impacts due to increased congestion as Dublin port experiences increased demand.
Climate				
	0	No impacts anticipated.	-	Negative impacts due to the inability to achieve the sustainable transport objectives of the National Port Policy.
Noise and Vibration				
Noise	0	No impacts anticipated.	-	Potential for negative impacts due to increased congestion as Dublin port experiences increased demand.
Vibration	0	No impacts anticipated.	-	No impacts anticipated.
Material Assets				
Coastal Processes	0	No impacts anticipated.	0	No impacts anticipated.
Roads / Traffic	0	No impacts anticipated.	-	Potential for negative impacts due to keeping port related traffic on existing roads, leading to increased congestion as Dublin Port demand grows.
Navigation	0	No impacts anticipated.	-	Potential for negative impacts as Do-Nothing scenario fails to provide adequate navigation for the growth of the existing Port's vessel operators and not able to accommodate predicated port needs.
Water / Drainage	0	No impacts anticipated.	0 / -	Potential for minor negative impacts due to no updating of the existing drainage systems.

Energy / Power	0	No impacts anticipated.	-	Potential for negative impacts due to the utility pressures in the Poolbeg Peninsula Area will not be addressed.
Cultural Heritage				
Industrial Heritage	0	No impacts anticipated.	0	No impacts anticipated.
Marine Archaeology	0	No impacts anticipated.	0	No impacts anticipated.
Great South Wall	0	No impacts anticipated.	0	No impacts anticipated.
Landscape & Visual				
	0	No impacts anticipated.	0	No impacts anticipated.
Population & Human Health				
Population	0	No impacts anticipated.	-	Capacity would be limited and would have critical negative impacts on trade and employment which is in increasing demand due to the rise of population within Dublin.
Human Health	0	No impacts anticipated.	-	Negative impacts associated with the integration of the port with the city, included public walkways, use of green spaces and social amenity areas.
Waste				
	0	No impacts anticipated.	0	No impacts anticipated.

4.4.2.2 Do-something - Option 1

The feasibility and outline design process used the reviewed Masterplan as a starting point to generate an initial draft general arrangement in March 2020, as shown in Figure 4.11.

The 3FM Project's location and layout are consistent with the Masterplan strategic layout for the Poolbeg Peninsula with the progression focus moving towards project design and process design alternatives. This first, do-something, draft general arrangement (Option 1) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), by providing the six key elements as envisaged by the Masterplan.

- A new public road and bridge called the **Southern Port Access Route (SPAR)** to link the north and south port areas, via a new bridge corridor across the River Liffey immediately east of the Tom Clarke Bridge, an embankment along the shoreline adjacent to the east link toll plaza, a series of existing road upgrades and a new access road to the south of Area O.
- A new **Lift-on Lift-off (Lo-Lo) container terminal** with an annual throughput capacity of 550,000 Twenty-foot Equivalent Units (TEU) with a deep water berthage terminal abutting the Great South Wall (Area N) and a freight terminal (Area O).
- A **new Roll-On Roll-Off (Ro-Ro) freight terminal** with an annual throughput capacity of 360,000 Ro-Ro units with a terminal (providing two berths, each with a single tier Ro-Ro ramp), plus associated cargo handling facilities (redevelopment of Area K).
- Creation of a 325m diameter **ship turning circle** in the vicinity of the Great South Wall.
- A new **Maritime Village** at Pigeon House Road and Berth 41 to accommodate local rowing, sailing, and boat clubs and the relocation of Port Harbour Operations from the North Port.
- **Community Gain,** integrating Dublin Port with Dublin City and its people as a core objective of the Masterplan for Dublin Port by enhancing:
  - **recreational** amenity through provision of Active Travel Paths and footways, a sailing, rowing and maritime campus, Open Spaces and extension to Irishtown Nature Park
  - **public realm** through development of a new public plaza within the Maritime Village and boundary softening works adjacent to the development sites
  - **community support** through a new Community Benefit Fund for Education, Heritage & Maritime Training Skills projects within the Poolbeg area
  - **heritage & biodiversity** through a new Public Access Feasibility Study regarding the Great South Wall with funding to implement its recommendations and an additional permanent marine structure (dolphin) to expand the available habitat and range of the Dublin Port Tern Colonies.

During the early feasibility study key themes emerged regarding roads and transport, marine and environmental topics. These themes were explored to understand the issues and minimise environmental, design and planning concerns during the feasibility study, resulting in development of further project design and process design alternatives for the 3FM Project. The themes focussed on during feasibility were:

Roads and Transport

- Theme 1 SPAR Connecting Port Centre to Liffey
- Theme 2 Along the R131
- Theme 3 SPAR, Commercial Zone & Area K

- Theme 4 Port Park, Area O & Amenity Road
- Theme 5 Pigeon House Road
- Theme 6 Greenway and Great Southern Wall

Marine

- Theme 1 Area Usage
- Theme 2 Area K1 and K2
- Theme 3 Area L
- Theme 4 Area M
- Theme 5 Area N
- Theme 6 Marina Works
- Theme 7 Additional Tern Colony
- Theme 8 Interaction with Existing Permissions (ABR & MPs Projects)

Environmental

- Theme 1 Capital Dredging
- Theme 2 Natura 2000 sites
- Theme 3 Terrestrial Biodiversity
- Theme 4 Benthic Biodiversity
- Theme 5 Cultural Heritage
- Theme 6 People
- Theme 7 Flood Risk
- Theme 8 Cooling Water intakes and discharges to the Liffey
- Theme 9 COMAH impacts

This Option 1 had been considered under the Masterplan, reviewed 2018, and SEA consultation process, and was also developed by initial consultations on the general arrangement which were held with key stakeholders prior to March 2020. Table 4.4 provides a summary of predicted construction phase and operation phase impacts of the general arrangement (Option 1).

There are potential negative construction phase impacts associated with some environmental topics in the early stages of the project, compared with the do-nothing option. These topics are biodiversity, flora & fauna, water quality & flood risk, air quality, climate, noise & vibration, material assets and cultural heritage. However, these are generally temporary and/or short term negative impacts which can be further mitigated by design and process constraints such as working hours, timing/phasing of operations, method of construction and rate of construction.

There are potential positive construction phase benefits due to employment opportunities for population & human health.

Potential negative operational phase impacts on biodiversity, flora & fauna and cultural heritage were identified in relation to three key aspects of the Option 1 general arrangement:

- Great South Wall – potential construction and operation phase impacts associated with the location of the turning circle on cultural heritage of this listed archaeological feature;

- Infilling of Lo-Lo container terminal and SPAR foreshore – assumed solid structure abutted to the Great South Wall at Area N and infilled foreshore embankment with potential construction and operation phase impacts on biodiversity, flora & fauna due to infilling and on cultural heritage of this listed archaeological feature; and
- Access road to Lo-Lo container terminal – potential construction and operation phase impact on biodiversity, flora & fauna due to disturbance of the Brent geese landing strip.

There are potential minor negative impacts in the operation phase associated with climate, and noise & vibration associated with the increased operations. However, notably operation phase impacts associated with congestion issues in the vicinity of the port in terms of noise & vibration, climate, air quality are reduced in comparison to the do-nothing option.

Operationally the positive impacts are that, in contrast to the do-nothing (Option 0), this draft general arrangement (Option 1) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually). Thus providing noteworthy societal, economic and human health benefits, with associated operation phase environmental benefits in terms of material assets, population & human health, air quality (via installation of shore to ship power at new berths and electrification of operational vehicles and cranes) and improved flood risk management (due to the design levels of new infrastructure).

There are no construction phase, or operation phase impacts anticipated on land, soil, geology & hydrogeology, landscape & visual and waste.

These environmental construction and operation phase impacts were explored during initial consultation with key stakeholders. This feedback enabled further consideration of these potential impacts during the feasibility and outline design process; mitigation by design was achieved by refining the layout, project design and process design of these elements.

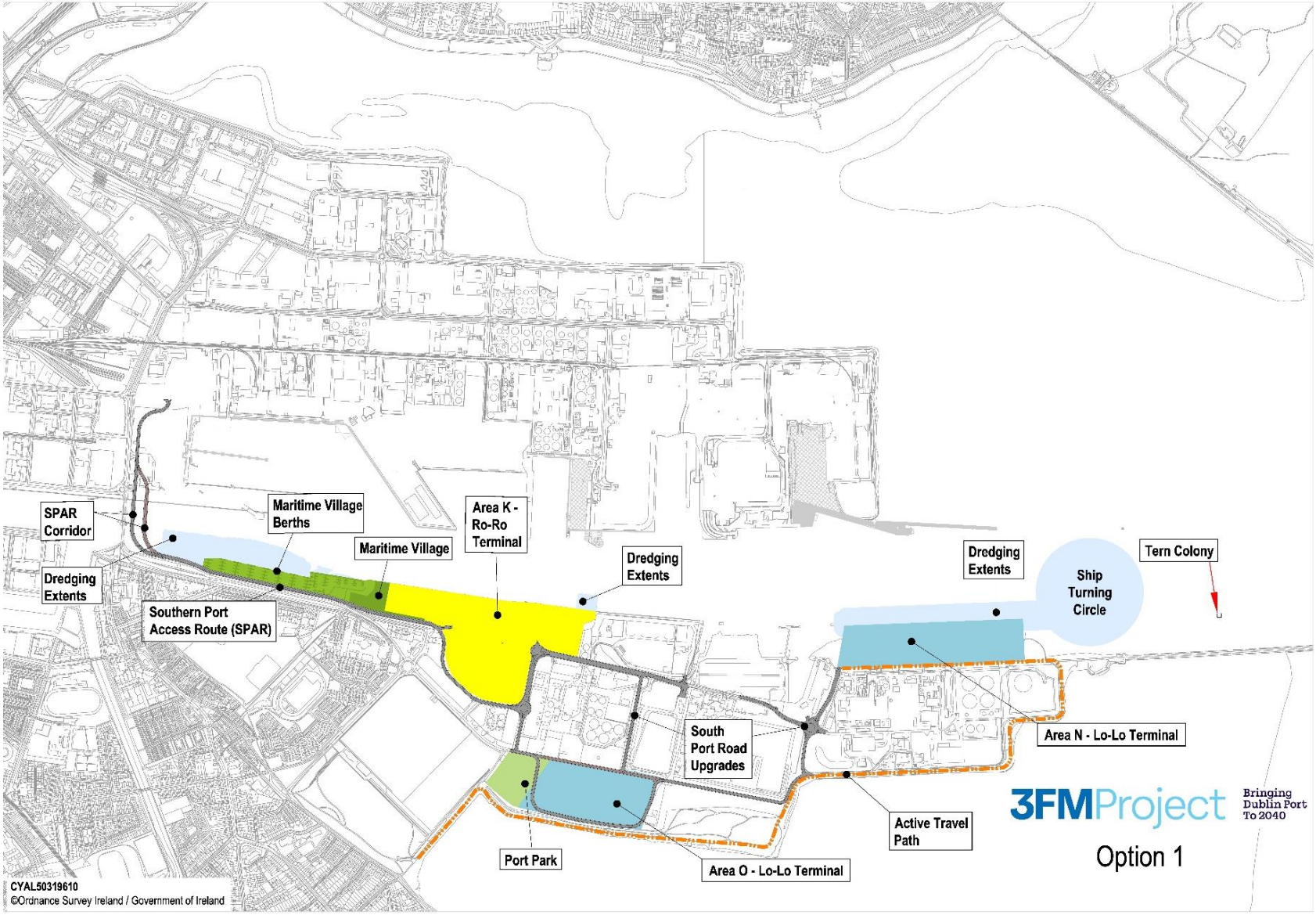


Figure 4.12 General Arrangement **Option 1 March 2020**

Table 4.4 Summary of Predicted Environmental Impacts of General Arrangement **Option 1** March 2020

Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
Biodiversity, Flora & Fauna				
Terrestrial	0 / -	Potential for minor negative impacts associated with the spread of invasive species due to construction activities.	0	No impacts anticipated.
	0 / -	Potential for minor negative impacts associated with the disturbance of terrestrial species (badger stoat, bat) due to construction activities.	0	No impacts anticipated.
Aquatic	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to capital dredging within the turning circle and berths.	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to maintenance dredging within the turning circle and berths.
	0 / -	Potential for minor negative impacts associated with the loss of marine habitats at the disposal site due to changes in suspended sediments from sea disposal.	0	No impacts anticipated.
	-	Potential for negative impacts associated with the loss of marine habitats due to pile footprint and infill locations.	0	No impacts anticipated.
	-	Potential for negative impacts to marine mammals associated with construction activities (capital dredging, piling).	0 / -	Potential for minor negative impacts to marine mammals associated with operational activities (maintenance dredging, increased vessel numbers).
	-	Potential for negative impacts to fish species associated with loss of habitat and reduction in food availability.	0	No impacts anticipated.
Ornithology	-	Potential for negative impacts to wintering bird populations (Brent geese) associated with construction of Area O perimeter road.	-	Potential for negative impacts to wintering bird populations (Brent geese) associated with operation of Area O perimeter road.
	-	Potential for negative impacts through the disturbance associated with the relocation of protected species at Area M (Tern colony).	0	No impacts anticipated.
Land, Soils, Geology and Hydrogeology				
	0	No impacts anticipated.	0	No impacts anticipated.
Water Quality and Flood Risk Assessment				
Water Quality	0 / -	Potential for minor negative impacts associated with increased suspended sediments due to capital dredging and disposal operations.	0	No impacts anticipated.
Flood Risk Assessment	0	No impacts anticipated.	+	Potential for positive impacts to flood risk associated with the design of future development for flood risk and climate change.
Air Quality				
	0 / -	Potential for minor negative impacts to air quality associated with increased marine and terrestrial traffic during construction works.	0 / +	Potential for minor positive impacts to local air emissions associated with the installation of shore to ship power at new berths and electrification of operational vehicles and cranes.
Climate				

	0 / -	Potential for minor negative impacts associated with increased GHG emissions due to increased marine and terrestrial traffic during construction.	0 / -	Potential for minor negative impacts to air quality associated with increased GHG emissions due to increased marine and terrestrial traffic during the operational phase.
Noise and Vibration				
Noise	0 / -	Potential for minor negative impacts associated with increased noise during the construction phase due to piling and construction traffic.	0 / -	Potential for minor negative impacts associated with increased noise during the operational phase due to increased marine and terrestrial traffic.
Vibration	0 / -	Potential for minor negative impacts associated with vibration during the construction phase (piling).	0	No impacts anticipated.
Material Assets				
Coastal Processes	0	No impacts anticipated.	0	No impacts anticipated.
Roads / Traffic	0 / -	Potential for minor negative impacts to traffic due to disturbances during construction works.	0 / +	Potential for minor positive impacts associated with the use of the SPAR.
Navigation	0	No impacts anticipated.	+	Potential positive impacts associated with the use of the turning circle.
Water / Drainage	0	No impacts anticipated.	0	No impacts anticipated.
Energy / Power	0	No impacts anticipated.	0 / +	Potential for minor positive impacts associated with provision for utilities in the Poolbeg Peninsula Area.
Cultural Heritage				
Industrial Heritage	0 / -	Potential for minor negative impacts associated with the disturbance to industrial heritage – fort and precinct.	0	No impacts anticipated.
Marine Archaeology	0 / -	Potential for minor negative impacts associated with the disturbance to marine archaeology - shipping debris and/or shipwrecks.	0	No impacts anticipated.
Great South Wall	-	Potential for negative impacts associated with the disturbance to and loss of heritage value of the Great South Wall.	-	Potential for negative impacts associated with the disturbance to and loss of heritage value of the Great South Wall
Landscape & Visual				
	0	No impacts anticipated.	0	No impacts anticipated.
Population & Human Health				
Population	+	Potential for positive impacts associated with the creation of employment due to construction activities.	+	Potential for positive impacts due to the creation of employment directly associated with expansion of Dublin Port.
Human Health	0	No impacts anticipated.	0 / +	Potential for minor positive impacts associated with the extension/upgrade of the Southern Greenway and increased social amenity areas including a Maritime Village.
Waste				
	0	No impacts anticipated.	0	No impacts anticipated.

4.4.2.3 Do-something - Option 2

The integrated feasibility and outline design process further refined options which mitigated environmental and planning risk by design (applying the hierarchy of avoidance, prevention, reduction, and offsetting). Key technical and environmental studies and further consultation, which had to be paused during the Covid pandemic, yielded a refined draft general arrangement for Option 2 in November 2021, as shown in Figure 4.12.

This refined draft do-something general arrangement (Option 2) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), by providing the six key elements as envisaged by the masterplan.

- A new public road and bridge called the **Southern Port Access Route (SPAR)** to link the north and south port areas, via a new bridge alignment across the River Liffey immediately east of the Tom Clarke Bridge, an embankment along the shoreline adjacent to the east link toll plaza and series of existing road upgrades and new alignments for roads and access junctions.
- A new **Lift-on Lift-off (Lo-Lo) container terminal** with an annual throughput capacity of 550,000 TEU with a deep water berthage terminal abutting the Great South Wall (Area N) and a transit container freight terminal (Area O) where the boundary was modified following exclusion of the dedicated new access road.
- A **new Roll-On Roll-Off (Ro-Ro) freight terminal** with an annual throughput capacity of 360,000 Ro-Ro units with a terminal plus associated cargo handling facilities (redevelopment of Area K). The layout considered loading ramp design configuration and avoidance of placing operation facilities on the line of the Great South Wall.
- Creation of a 325m diameter **ship turning circle** relocated to in front of Pigeon House Harbour.
- A new **Maritime Village** at Pigeon House Road and Berth 41, berth and village facilities layouts were developed.
- **Community Gain,** studies were undertaken to identify how to enhance the 3FM Project's recreational amenity, public realm, community support and heritage & biodiversity aspects.

The following key technical and environmental studies were undertaken to support the feasibility assessment and outline design, addressing the 3FM Project's key themes in more detail and therefore informing the Option 2 alternative general arrangement:

- Coastal Processes – computational modelling was undertaken to assess the potential impact of the 3FM Project on thermal, sediment and water quality regimes and also to consider potential climate change impacts. This study also considered the potential impact of navigation facilities on the existing port infrastructure, in particular the positioning of the turning circle in the vicinity of the Great South Wall.

- Flood Risk – a preliminary flood risk assessment was advanced in order to provide a policy context for design water levels of the proposed infrastructure and also, coupled with the computation modelling, to assess any potential impact that the proposed project could have on flood levels.

- Tern Colony Management – the Masterplan identified the potential impact on the tern colony at Area M. A Tern Colony Management Plan was progressed in order to gather more data on these colonies and their sensitivities and also on the success factors in earlier roosting facilities provided by DPC for terns. This resulted in a Management Plan that would create net habitat gain alongside a modified layout which avoided the need to remove the colonies at Area M.

- Dublin Port Heritage - Conservation Strategy – a strategy was developed to consider the potential for enhancing the heritage value of assets on the Poolbeg Peninsula by offering an overall vision to support future spatial planning. Key aspects of the strategy informed the subsequent detailed design stages of the 3FM Project ensuring avoidance and reduction of impact on key assets of heritage interest.
- Origin and Destination Study – an updated origin and destination study was undertaken to provide information of vehicle movements to and from the port's hinterland and thus inform transportation strategies and traffic impact assessments.

These studies were used to refine the 3FM Project through a series of internal project team workshops, follow up consultations with statutory bodies and other stakeholders, and subsequent wider engagement with the public and stakeholders through the first 3FM Project virtual consultation room. Consultations on the Option 2 general arrangement were held with key stakeholders via a consultation room in November 2021.

Table 4.5 provides a summary of predicted construction and operational impacts of the general arrangement (Option 2).

Both the construction and operational phase impacts for Option 2 are lesser than those associated with Option 1 due to the key project design and process design changes identified during this evolution. The key project design and process design progression within the period (March 2020 – November 2021), relating to the turning circle, infilling, access road and transportation and utilities, are summarised as follows:

- Relocation of the proposed turning circle westwards from the Great South Wall to the vicinity of Area M. Whilst this reduces the opportunity to intensify the future use of this area/or to provide a community facility the environmental benefits are the avoidance of impact on the heritage value of the Great South Wall and the avoidance of removal of the term colony at Area M. This move requires the demolition of the sludge jetty affording a visually improved seascape. This option improves the 3FM Project with regard to cultural heritage, biodiversity, flora & fauna and landscape & visual environmental topics.
- Consideration of the Lo-Lo container terminal and SPAR foreshore project design was advanced by identification of the need for marine site investigation information.
- Removal of the proposed dedicated access road in the vicinity of Area O, alternative routes were identified, by upgrade of existing road infrastructure, which avoids the introduction of traffic adjacent to the Brent geese "landing strip" within the adjacent SPA, thus avoiding impact on wintering bird populations. This allows release of lands to add to the Ringsend Nature Reserve and also allows additional landscaping by planting of the site perimeter and other opportunity locations. This design change therefore improves the 3FM Project with regard to biodiversity, flora & fauna and landscape & visual topics due to this alternative option.
- Creation of a future proofed potential LUAS crossing of the Liffey, comprising two LUAS tracks, to be constructed by others. Refinement of road upgrades, active travel facilities and pathways was also undertaken. At an early stage, the COMAH assessment identified that reopening public access to the Great South Wall, in the vicinity of the ESB generating station, posed an unacceptable risk to the public. This alternative option further improves potential future accessibility and movement for the Poolbeg Peninsula, as well as reducing potential impact on human health.
- Provision of an area for district heating facilities was identified within the Port Park Area on request of DCC.

There are negative construction phase impacts associated with some environmental topics in the early stages of the project which are generally similar to, but lesser than, those for the Option 1 general arrangement. The topics impacted are again biodiversity, flora & fauna, water quality & flood risk, air quality, climate, noise & vibration, material assets and cultural heritage. However, noteworthy improvements are gained by the avoidance of impacts on cultural heritage due to the relocation of the turning circle, and also reduction of the biodiversity, flora & fauna impacts associated with avoidance of the new access road to the south of Area O and introducing the Tern colony management measures. The remaining negative construction phase impacts are generally reduced to minor, temporary and/or short term and can be further mitigated by design and process constraints such as working hours, timing/phasing of operations, method of construction and rate of construction.

There remain positive construction phase benefits due to employment opportunities for population & human health.

Minor negative operational phase impacts were identified in relation to Option 2 biodiversity, flora & fauna, climate, and noise & vibration associated with the increased operations. Again, notably operation phase impacts associated with congestion issues in the vicinity of the port in terms of noise & vibration, climate, and air quality are reduced in comparison with the do-nothing option.

Operationally, the draft general arrangement (Option 2) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), offering the associated positive impacts that this affords in terms of material assets, population & human health, air quality and improved flood risk management.

There are no construction phase, or operation phase, impacts anticipated on land, soil, geology & hydrogeology, landscape & visual and waste. There are no changes in construction phase impacts with regards to cultural heritage and material assets, however there are positive operation phase impacts due to screening on relevant site boundaries and active travel routes, and the improved seascape.

The remaining/emerging impacts were developed during consultation with key stakeholders and from feedback from the first consultation room:

- Infilling of Lo-Lo container terminal and SPAR foreshore – assumed solid structure abutted to the Great South Wall at Area N and infilled foreshore embankment with potential construction and operation phase impacts on biodiversity, flora & fauna due to infilling and on cultural heritage of this listed archaeological feature;
- The need to further refine the movements of traffic, commuters and pedestrians on the road, potential future light rail, cycleways and pathways throughout the 3FM Project; and
- The future consideration of the configuration of the Maritime Village.

This feedback enabled further consideration of these potential impacts during the feasibility and outline design process and further mitigation by design was achieved by refining the project design and process design of these elements alongside the more detailed design evolution of the other elements of key infrastructure.

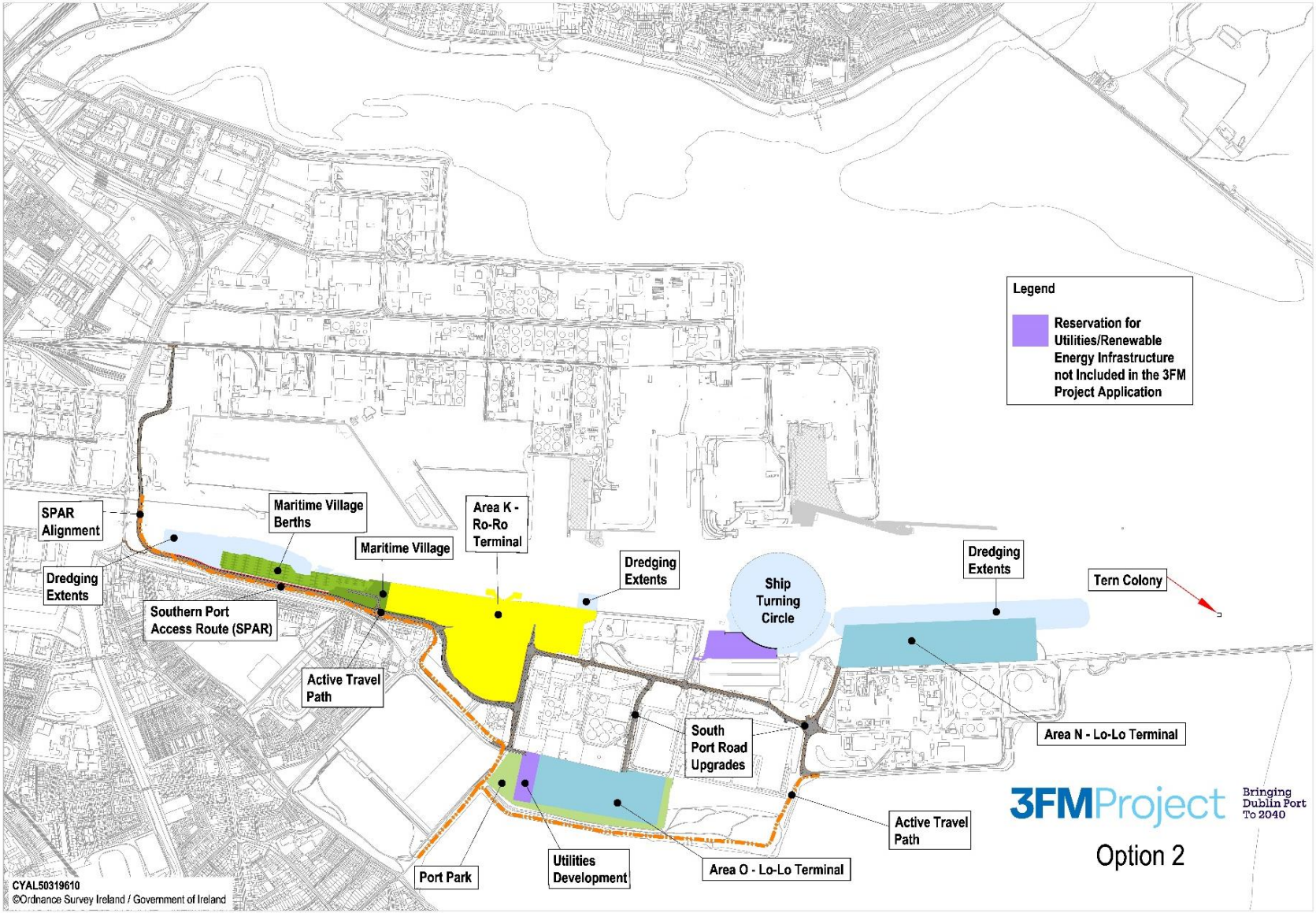


Figure 4.13 General Arrangement **Option 2 November 2021**

Table 4.5 Summary of Predicted Environmental Impacts of General Arrangement **Option 2 November 2021**

Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
Biodiversity, Flora & Fauna				
Terrestrial	0 / -	Potential for minor negative impacts associated with the spread of invasive species due to construction activities.	0 / +	Potential for minor positive impacts to terrestrial habitats through the landscaping of site perimeter planting areas.
	0 / -	Potential for minor negative impacts associated with the disturbance of terrestrial species (badger stoat, bat) due to construction activities.	0 / +	Potential for minor positive impacts as part of Area O has been given to the Ringsend Nature Reserve. Positive impacts due to the retention of the existing southern berm.
Aquatic	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to capital dredging within the turning circle and berths.	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to maintenance dredging within the turning circle and berths.
	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to changes in suspended sediments from sea disposal.	0	No impacts anticipated.
	-	Potential for negative impacts associated with the loss of marine habitats due to pile footprint and infill locations.	0	No impacts anticipated.
	-	Potential for negative impacts to marine mammals associated with construction activities (capital dredging, piling).	0 / -	Potential for minor negative impacts to marine mammals associated with operational activities (maintenance dredging, increased vessel numbers).
	-	Potential for negative impacts to fish species associated with loss of habitat and reduction in food availability.	0	No impacts anticipated.
Ornithology	0	No impacts anticipated.	0	No impacts anticipated.
	0	No impacts anticipated.	0 / +	Potential for minor positive impacts by creation of additional tern colony site.
Land, Soils, Geology and Hydrogeology				
	0	No impacts anticipated.	0	No impacts anticipated.
Water Quality and Flood Risk Assessment				
Water Quality	0 / -	Potential for minor negative impacts associated with increased suspended sediments due to capital dredging and disposal operations.	0	No impacts anticipated.
Flood Risk Assessment	0	No impacts anticipated.	+	Potential for positive impacts to flood risk associated with the design of future development for flood risk and climate change.
Air Quality				
	0 / -	Potential for minor negative impacts to air quality associated with increased marine and terrestrial traffic during construction works.	0 / +	Potential for minor positive impacts to local air emissions associated with the installation of shore to ship power at new berths and electrification of operational vehicles and cranes.
Climate				

	0 / -	Potential for minor negative impacts associated with increased GHG emissions due to increased marine and terrestrial traffic during construction.	0 / -	Potential for minor negative impacts to air quality associated with increased GHG emissions due to increased marine and terrestrial traffic during the operational phase.
Noise and Vibration				
Noise	0 / -	Potential for minor negative impacts associated with increased noise during the construction phase due to piling and construction traffic.	0 / -	Potential for minor negative impacts associated with increased noise during the operational phase due to increased marine and terrestrial traffic.
Vibration	0 / -	Potential for minor negative impacts associated with vibration during the construction phase (piling).	0	No impacts anticipated.
Material Assets				
Coastal Processes	0	No impacts anticipated.	0	No impacts anticipated.
Roads / Traffic	0 / -	Potential for minor negative impacts to traffic due to disturbances during construction works.	+	Potential for positive impacts associated with the use of the SPAR and due to replacing roundabouts with signalised junctions to accommodate increased traffic. The 3FM Project has been designed so that it does not compromise potential future LUAS route alignments.
Navigation	0	No impacts anticipated.	+	Potential positive impacts associated with the use of the turning circle.
Water / Drainage	0	No impacts anticipated.	0	No impacts anticipated.
Energy / Power	0	No impacts anticipated.	0 / +	Potential for minor positive impacts associated with provision for utilities in the Poolbeg Peninsula Area.
Cultural Heritage				
Industrial Heritage	0 / -	Potential for minor negative impacts associated with the disturbance to industrial heritage – fort and precinct.	+	Potential for positive impacts associated with the improved seascape by demolition of sludge jetty.
Marine Archaeology	0 / -	Potential for minor negative impacts associated with the disturbance to marine archaeology - shipping debris and/or shipwrecks.	0	No impacts anticipated.
Great South Wall	0 / -	Potential for minor negative impacts due to works in the vicinity of the Great South Wall along Pigeon House Road.	0	No impacts anticipated.
Landscape & Visual				
	0	No impacts anticipated.	0	No impacts anticipated.
Population & Human Health				
Population	+	Potential for positive impacts associated with the creation of employment due to construction activities.	+	Potential for positive impacts due to the creation of employment directly associated with expansion of Dublin Port.
Human Health	0	No impacts anticipated.	0 / +	Potential for minor positive impacts associated with the extension/upgrade of the Southern Greenway and increased social amenity areas including a Maritime Village.
Waste				
	0	No impacts anticipated.	0	No impacts anticipated.

4.4.2.4 Do-something - Option 3

The 3FM Project was further refined, taking on board the feedback from the stakeholder engagement and the first virtual consultation room, and progressing more detailed feasibility and outline design tasks (informed by land and marine site investigation) which formally commenced in March 2022. Further, more detailed, environmental assessment was also progressed throughout this period via screening, scoping and initiating a series of environmental impact assessments to inform the project design and process design. This resulted in a revised general arrangement, Option 3, in March 2023, as shown in Figure 4.13.

This resulting refined do-something layout was again released for wider consultation and stakeholder engagement via a second virtual consultation room in March 2023. This refined draft general arrangement (Option 3) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), by providing the six key elements as envisaged by the masterplan.

- A new public road and bridge called the **Southern Port Access Route (SPAR)** to link the north and south port areas, via a new opening bridge structure across the River Liffey immediately east of the Tom Clarke Bridge (presented in Appendix 4-2), an embankment along the shoreline adjacent to the east link toll plaza, a refined series of existing road upgrades and new roads and access junctions. Alternative road designs considered road levels, active travel and potential future light rail configurations and junction type/configuration details. The active travel requirements were improved on this section by moving the pathways and cycleways to the water side of the cross section.
- A new **Lift-on Lift-off (Lo-Lo) container terminal** with an annual throughput capacity of 550,000 TEU. The deep water berthage terminal operational layout was developed to accommodate environmental constraints for cultural heritage, biodiversity (bird roosting and feeding populations) and also existing services (Area N). The project design of this element developed alternatives of open piled, fully infilled and hybrid (partially infilled partially open piled) sub structure pending the results of the marine site investigation information that was being gathered at this stage. An operational layout was also developed within the modified boundary at the transit container freight terminal (Area O).
- A **new Roll-On Roll-Off (Ro-Ro) freight terminal** with an annual throughput capacity of 360,000 Ro-Ro units with a terminal plus associated cargo handling facilities (redevelopment of Area K). An operational layout was developed to accommodate boundaries modified to the west (giving a larger public amenity area at the Maritime Village) and the east (reflecting land ownership and operational needs). Consideration was given to an alternative site access and freight/container configuration to reduce traffic movements across the line of the Great South Wall and to locate the container stack operations remote from receptors.
- Creation of a 325m diameter **ship turning circle** with consideration given to the Port's navigation movements, roosting bird populations and its structural form (to suit operational requirements enabling Codling Wind Park Substation to utilise Area M which is subject to a separate planning application) and therefore to accommodate the offshore wind sector.
- A new **Maritime Village** at Pigeon House Road and Berth 41, berth and village facilities layouts were progressed with an increased village area provided by moving the boundary into Area K.
- **Community Gain,** aspects were progressed to identify how to enhance the 3FM Project's recreational amenity, public realm, community support and heritage & biodiversity aspects. Consideration was given to Health and Safety and amenity of path and footways, heritage, biodiversity and recreational benefits.

A series of integrated engineering, planning and environmental studies were ongoing at this stage. The feasibility and outline design engineering team progressed Design Stage 1, followed by Design Stage 2, studies/drawings/reports for marine, highways, civil, structural, and mechanical and electrical elements. This was supported by specialist opening bridge design, navigation simulations and terminal operation simulations. Planning studies were ongoing in relation to policy developments and adjacent applications. A full suite of detailed environmental impact assessments was progressing as per the 3FM Project Scoping (Chapter 3).

These studies were used to refine the 3FM Project through further internal project team workshops, follow up consultations with statutory bodies and other stakeholders, and subsequent wider engagement with the public and stakeholders through the second 3FM Project virtual consultation room.

Consultations on the Option 3 general arrangement continued with key stakeholders via a consultation room in March 2023. Table 4.6 provides a summary of predicted construction and operational impacts of the general arrangement (Option 3).

The Option 3 impacts improved compared to those associated with Option 2 due to the key design changes identified during this evolution for the access road and transportation, Maritime Village and Lo-Lo container terminal. The key project design and process design changes within this evolution period (November 2021 – March 2023) were less significant in terms of layout alternatives but reflected the more detailed consideration of each element of the scheme to offer alternatives with additional environmental enhancements which are summarised as follows:

- Further refinement of road upgrades including the SPAR and active travel configuration with increased width for greater amenity the ATR moved to the riverside of the SPAR to enhance its amenity. The road layout was also refined in order to distribute HGV movements more uniformly on the existing and proposed road network. This improves the amenity of the development, further enhancing the human health scheme benefits, with reduced impacts on traffic movement, and associated noise and air quality topics. The COMAH risk assessment showed that there would be an unacceptable risk to the public on the proposed ATR on Pigeon House Road in the vicinity of Synergen, therefore the ATR was removed in this section of the scheme enhancing the scheme's overall human health benefits. Rerouting of the access and ATR in the vicinity of Area K also resulted in human health benefits, with buildings positioned away from the line of the Great South Wall to further enhance cultural integrity. The Maritime Village was increased in size to provide additional amenity facilities and benefit, by reducing the size of Area K again, further enhancing the human health scheme benefits.
- Refinement of the layout of Area N to accommodate services and environmental constraints of bird feeding areas, tern colonies and cultural heritage. Also, the provision of an emergency route to ensure operational safety. This further reduced potential impacts on cultural heritage, biodiversity, flora & fauna and human health.

Negative construction phase impacts associated with some environmental topics in the early stages of the project remain and are generally similar to the Option 2 general arrangement. The topics impacted are again biodiversity, flora & fauna, water quality & flood risk, air quality, climate, noise & vibration, material assets and cultural heritage. However, improvements are gained by the avoidance of construction impacts on both cultural heritage and biodiversity, flora & fauna due to redesign of the Lo-Lo container terminal and the enhanced human

health amenity and screening aspects of this alternative general arrangement. The remaining negative construction phase impacts are generally minor, temporary and/or short term and can be further mitigated by design and process constraints such as working hours, timing/phasing of operations, method of construction and rate of construction.

Positive construction phase benefits due to employment opportunities for population & human health remain.

Similar to Options 1 and 2, minor negative operational phase impacts were identified for Option 3 in relation to biodiversity, flora & fauna, climate, and noise & vibration associated with the increased operations. Again, notably operation phase impacts associated with congestion issues in the vicinity of the port in terms of noise & vibration, climate, air quality are reduced in comparison to the do-nothing option.

Operationally, the draft general arrangement (Option 3) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), offering the associated positive impacts that this affords, in particular, improvements in amenity and active travel result in improved operational phase human health impacts.

There are no construction phase, or operation phase, impacts anticipated on land, soils geology & hydrogeology, landscape & visual and waste.

Project design and process design uncertainty in relation to Option 3 remained due to the outstanding marine site investigation results and the boundary of Area O was further refined:

- The need to further consider the infilling of Lo-Lo container terminal – the project design of this element developed alternatives of open piled, fully infilled and a hybrid (partially infilled partially open piled) sub structure pending the results of the marine site investigation information that was being gathered at this stage for Area N, potential construction and operation impacts on biodiversity (Benthic habitat) due to infilling were considered alongside other environmental topics (including noise, water quality and fisheries) and the constructability of this element were further considered.
- The structural form supporting the SPAR Road along the shoreline adjacent to the east link toll plaza had been assumed to be a solid embankment pending the results of the marine site investigation information that was being gathered at this stage. Similarly, to Area N, potential construction and operation impacts on biodiversity (Benthic habitat) due to infilling were considered alongside other environmental topics (including noise, water quality and fisheries) and the constructability of this element were further considered.
- At Area O a further boundary refinement was also identified for consideration during consultations to enhance the adjacent nature area and reinforce the spatial planning strategy, thus increasing the benefits to biodiversity associated with the location's boundary treatment.

The ongoing environmental assessments were developing further avoidance, prevention, reduction, or offsetting mitigations, to be accommodated within the final outline design. During consultation with key stakeholders and from feedback from the second consultation room, further consideration was given to Area O usage and visual screening and operation noise associated with the 3FM Project.

This feedback enabled further consideration of these potential impacts during the final stages of the feasibility and outline design process and further mitigation by design was achieved by refining layout alternatives, project design and process design of these elements, alongside the more detailed design evolution of the other

elements of key infrastructure, by taking on board the mitigations developed by the environmental impact assessment process.

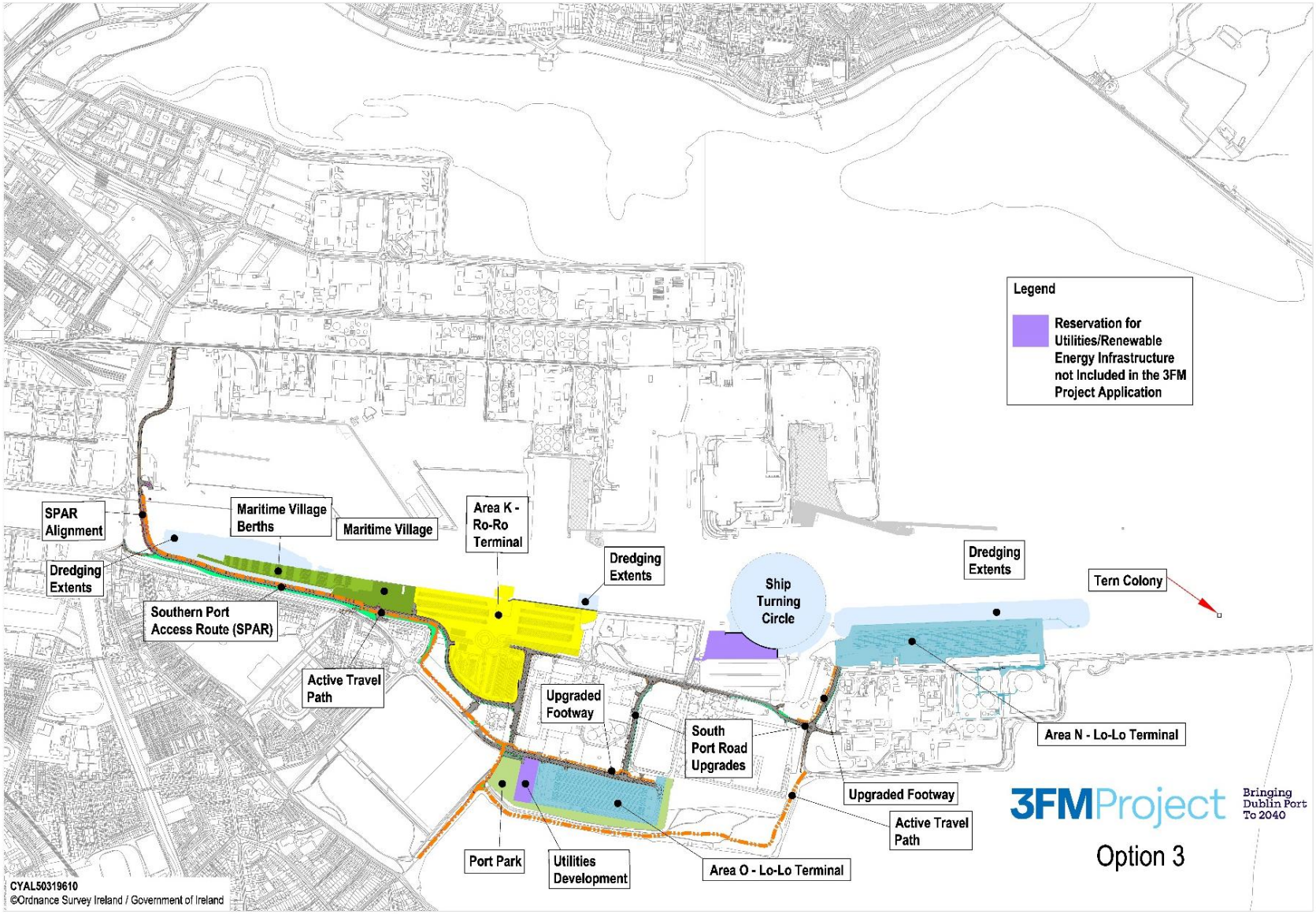


Figure 4.14 General Arrangement **Option 3 February/March 2023**

Table 4.6 Summary of Predicted Environmental Impacts of General Arrangement **Option 3 February/March 2023**

Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
Biodiversity, Flora & Fauna				
Terrestrial	0 / -	Potential for minor negative impacts associated with the spread of invasive species due to construction activities.	+	Potential for positive impacts to terrestrial habitats through the landscaping of site perimeter planting areas.
	0 / -	Potential for minor negative impacts associated with the disturbance of terrestrial species (badger stoat, bat) due to construction activities.	0 / +	Potential for minor positive impacts as part of Area O has been given to the Ringsend Nature Reserve. Positive impacts due to the retention of the existing southern berm.
Aquatic	0 / -	Potential for minor negative impacts associated with the minor loss of marine habitats due to capital dredging within the turning circle and berths.	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to maintenance dredging within the turning circle and berths.
	0 / -	Potential for minor negative impacts associated with the loss of marine habitats at the disposal site due to changes in suspended sediments from sea disposal.	0	No impacts anticipated.
	-	Potential for negative impacts associated with the loss of marine habitats due to pile footprint and infill locations.	0	No impacts anticipated.
	-	Potential for negative impacts to marine mammals associated with construction activities (capital dredging, piling).	0 / -	Potential for minor negative impacts to marine mammals associated with operational activities (maintenance dredging, increased vessel numbers).
	-	Potential for negative impacts to fish species associated with loss of habitat and reduction in food availability.	0	No impacts anticipated.
Ornithology	0	No impacts anticipated.	0	No impacts anticipated.
	0	No impacts anticipated.	0 / +	Potential for minor positive impacts by creation of additional tern colony site.
Land, Soils, Geology and Hydrogeology				
	0	No impacts anticipated.	0	No impacts anticipated.
Water Quality and Flood Risk Assessment				
Water Quality	0 / -	Potential for minor negative impacts associated with increased suspended sediments due to capital dredging and disposal operations.	0	No impacts anticipated.
Flood Risk Assessment	0	No impacts anticipated.	+	Potential for positive impacts to flood risk associated with the design of future development for flood risk and climate change.
Air Quality				
	0 / -	Potential for minor negative impacts to air quality associated with increased marine and terrestrial traffic during construction works.	0 / +	Potential for minor positive impacts to local air emissions associated with the installation of shore to ship power at new berths and electrification of operational vehicles and cranes.
Climate				

	0 / -	Potential for minor negative impacts associated with increased GHG emissions due to increased marine and terrestrial traffic during construction.	0 / -	Potential for minor negative impacts to air quality associated with increased GHG emissions due to increased marine and terrestrial traffic during the operational phase.
Noise and Vibration				
Noise	0 / -	Potential for minor negative impacts associated with increased noise during the construction phase due to piling and construction traffic.	0 / -	Potential for minor negative impacts associated with increased noise during the operational phase due to increased marine and terrestrial traffic.
Vibration	0 / -	Potential for minor negative impacts associated with vibration during the construction phase (piling).	0	No impacts anticipated.
Material Assets				
Coastal Processes	0	No impacts anticipated.	0	No impacts anticipated.
Roads / Traffic	0 / -	Potential for minor negative impacts to traffic due to disturbances during construction works.	+	Potential for positive impacts associated with the use of the SPAR and due to replacing roundabouts with signalised junctions to accommodate increased traffic. The 3FM Project has been designed so that it does not compromise potential future LUAS route alignments.
Navigation	0	No impacts anticipated.	+	Potential positive impacts associated with the use of the turning circle.
Water / Drainage	0	No impacts anticipated.	0	No impacts anticipated.
Energy / Power	0	No impacts anticipated.	0 / +	Potential for minor positive impacts associated with provision for utilities in the Poolbeg Peninsula Area.
Cultural Heritage				
Industrial Heritage	0 / -	Potential for minor negative impacts associated with the disturbance to industrial heritage – fort and precinct.	+	Potential for positive impacts associated with the improved seascape by demolition of sludge jetty.
Marine Archaeology	0 / -	Potential for minor negative impacts associated with the disturbance to marine archaeology - shipping debris and/or shipwrecks.	0	No impacts anticipated.
Great South Wall	0 / -	Potential minor negative impacts due to works in the vicinity of the Great South Wall along Pigeon House Road.	0	No impacts anticipated.
Landscape & Visual				
	0	No impacts anticipated.	0	No impacts anticipated.
Population & Human Health				
Population	+	Potential for positive impacts associated with the creation of employment due to construction activities.	+	Potential for positive impacts due to the creation of employment directly associated with expansion of Dublin Port.
Human Health	0	No impacts anticipated.	+	Potential for positive impacts associated with the extension/upgrade of the Southern Greenway and avoidance of COMAH sites together with increased social amenity areas including a larger Maritime Village.
Waste				
	0	No impacts anticipated.	0	No impacts anticipated.

4.4.2.5 Do-something - Option 4 (Final 3FM Layout)

The 3FM Project was further refined, taking on board the feedback from the stakeholder engagement and second virtual consultation room, the findings of the outline design (informed by land and marine site investigation) and environmental impact assessment to inform layout alternatives, project design and process design alternatives and to develop mitigations. This resulted in a revised general arrangement, Option 4, in June 2024, as shown in Figure 4.14.

This resulting refined and finalised do-something layout accompanies this application and was released for wider consultation and stakeholder engagement via a final virtual consultation room in June 2024. This general arrangement (Option 4) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), by providing the six key elements as envisaged by the masterplan.

- A new public road and bridge called the **Southern Port Access Route (SPAR)** to link the north and south port areas, via a new opening bridge structure across the River Liffey immediately east of the Tom Clarke Bridge, a viaduct along the shoreline adjacent to the east link toll plaza, a refined series of existing road upgrades and new roads and access junctions, including those to connect via the North Port to the Dublin Tunnel. Alternative road designs considered road levels, active travel and potential future light rail configurations and junction type/configuration details.
- A new **Lift-on Lift-off (Lo-Lo) container terminal** with an annual throughput capacity of 550,000 TEU. An open piled deep water berthage terminal design was developed to accommodate environmental constraints for biodiversity, flora & fauna, water quality, cultural heritage, and also existing services (Area N). The project design of this element considered the results of the marine site investigation information alongside construction timelines and environmental constraints. A layout alternative was progressed, the transit container storage yard was relocated to Area L and an operational layout was developed within the new site's boundary.
- A **new Roll-On Roll-Off (Ro-Ro) freight terminal** with an annual throughput capacity of 360,000 Ro-Ro units with a terminal plus associated cargo handling facilities (redevelopment of Area K). An operational layout was refined to accommodate the modified boundaries and alternative site access and freight/container configuration to accommodate noise and cultural heritage constraints. Cargo handling facilities were supplemented with a transit Ro-Ro freight terminal (Area O) to improve operation efficiencies, an operational layout was developed within a modified boundary releasing additional lands to the Irishtown Nature Reserve, Open Spaces and providing reservation for utilities within Area O.
- Creation of a 325m diameter **ship turning circle** which accommodated Port's navigation movements, roosting bird populations and structural form to accommodate the offshore wind sector.
- A new **Maritime Village** at Pigeon House Road and Berth 41, berth and village facilities layouts were refined providing recreation and public realm community gain benefits.
- **Community Gain,** aspects enhanced:
  - **recreational amenity** through provision of Active Travel Paths (7km) and footways (4.9km), a sailing, rowing and maritime campus, Open Spaces (4.1ha) and extension to Irishtown Nature Park (1.6ha).
  - **public realm** through development of a new public plaza within the Maritime Village and boundary softening works adjacent to the development sites.

- **community support** through a new €2 million Community Benefit Fund for Education, Heritage & Maritime Training Skills projects within the Poolbeg area.
- **heritage & biodiversity** through a new Public Access Feasibility Study regarding the Great South Wall with up to €1 million funding to implement its recommendations and an additional permanent marine structure (dolphin) to expand the available habitat and range of the Dublin Port Tern Colonies.

The integrated engineering, planning and environmental studies were completed at this stage. The feasibility and outline design engineering team finalised Design Stage 2, studies/drawings/reports for marine, highways, civil, structural, and mechanical and electrical elements. Planning studies were completed in relation to policy developments and adjacent applications. A full suite of detailed environmental impact assessments was finalised, as presented in this EIAR.

A series of outline design reports were prepared at this stage, these are available as under separate cover:

- SPAR (South Port Access, Road Opening) Bridge, Preliminary Design Report (COWI)
- SPAR Viaduct, Preliminary Design Report (RPS)
- Proposed 3FM Maritime Village for DPC, Architectural Design Statement (Darmody Architecture)
- Proposed 3FM Active Travel Route for DPC, Architectural Design Statement (Darmody Architecture)
- Proposed 3FM Port Park for DPC, Architectural Design Statement (Darmody Architecture)
- Great South Wall Overview of Impacts, Mitigation & Interpretation (Darmody Architecture)
- 3FM Project, Maritime Village - Landscape Design Report (thirtythreetrees)
- 3FM Project, Port Park - Landscape Design Report (thirtythreetrees)
- 3FM Project, Active Travel Route - Landscape Design Report (thirtythreetrees).

In response to feedback from consultations, which raised concerns about the noise and visual impact potential associated with the usage of Area O as a Ro-Ro freight terminal, an alternative layout was identified and progressed.

This alternative layout offers both engineering and planning advantages. This alternative considered the redevelopment of DPC-owned lands at Area L which currently host a small number of tenants (usage of these lands was noted to be revisited during the lifespan of the Masterplan). DPC would take possession of these sites prior to commencement of the 3FM Project construction phase. DPC is the owner and lessor of these lands. DPC would negotiate with each of the tenants, and give as much notice as possible, to reach a settlement prior to the sites being vacated. Ultimately DPC has the authority to seek Compulsory Purchase Orders (CPO) in respect of these sites if a negotiated settlement is not possible, but would only initiate the CPO process as a last resort. This could release suitable lands for container storage at Area L. This facility would be adjacent to the portion of Area K proposed for container storage and would consolidate these activities in a location remote from residents and receptors sensitive to visual and noise impacts. Area L affords better site conditions as it has a pre-existing concrete slab base, in industrial use, whereas Area O is the location of a former municipal waste site which may have potential engineering/geotechnical issues with settlement and associated methane gas release. Again, in line with the Masterplan, this allows Area O to be used, longer term, in conjunction with Area K for transit Ro-Ro Freight Terminal, having been initially made available to accommodate site compounds for DPC, Codling Wind Park and Uisce Éireann.

The use of Area O for Ro-Ro freight storage will result in a much less significant visual impact than its previously proposed use as a storage area for stacked Lo-Lo containers. In addition, lands east of Area O can, as a result of the refinement of the layout design, now be allocated to the Nature Reserve (in accordance with zoning requirements), with a further portion made available to Dublin City Council to facilitate the provision of a District Heating Scheme adjacent to the Waste to Energy plant (subject to DCC application). Lands west of Area O (which had been previously identified provisionally for the District Heating Scheme) will become a wildflower meadow directly adjacent to the new Port Park. All of these alternative layout proposals conform with the appropriate zoning for the Area O lands under the Poolbeg West SDZ and, with all areas of the Poolbeg Peninsula redeveloped, this completes the Masterplan's full scope.

The environmental impacts are also largely supportive of progressing this alternative layout; in terms of construction, by redeveloping the concrete slabbed industrial Area L, whilst enabling construction compound opportunities at Area O, and also in terms of operation, by placing the container storage in Area L in a less sensitive setting in terms of noise and visual impact, by replacing industries with the storage activities offering reduced potential of air/water/soil pollution, and by releasing additional portions of lands at Area O for biodiversity, recreation, amenity and future utilities. Therefore, the preferred option is to place the container storage at Area L, linked to Area N, and ultimately to have freight/container storage at Area O, associated at Area K.

These studies were used to finalise the 3FM Project through further internal project team workshops, follow up consultations with statutory bodies and key stakeholders, and subsequent wider engagement with the public and stakeholders through the final 3FM Project virtual consultation room.

Consultations on the Option 4 general arrangement were continued with key stakeholders. Table 4.7 provides a summary of predicted construction and operational impacts of the general arrangement (Option 4).

The Option 4 construction and operation impacts improved compared to those associated with Option 3 due to the key design changes identified during this evolution. The key layout change undertaken between March 2023 – June 2024 was to redevelop Area L for container storage and Area O for as a Ro-Ro Freight Terminal (following a period of construction site compound use). The key project design and process design changes within this evolution period were the selection of open piled design, for both the new Lo-Lo container terminal (Area N) and the SPAR viaduct, which reduced potential negative biodiversity, flora & fauna construction phase impacts, coupled with the inclusion of further mitigation such as providing a noise barrier at Area K, restoration of sections of the Great South Wall and further enhancing the landscaping treatments to improve screening and enhance visual benefits. These key changes reflect the final detailed consideration of each element of the scheme to offer a refined alternative with additional environmental enhancements which are summarised as follows:

- Redevelopment of Area L to accommodate container storage meaning these activities are consolidated with the container storage on the east portion of Area K, where they are remote from sensitive noise and visual impact receptors and tie in with the port seascape. The site is concrete slabbed allowing a design which facilitates the construction programme. Area L also offers reduced settlement or gas release potential compared to Area O which previously was used as a municipal landfill. The use of Area L as container storage rather than industrial use also offers reduced potential of air/water/soil contamination in the operational phase. The site access and egress will be improved offering safe operation for existing and future road users.
- Refinement of Area O to allow additional lands in the Irishtown Nature Reserve, open space and enhanced screening and planting, including a wildflower meadow to enhance biodiversity, flora & fauna, and reduce landscape & visual impact. The alternative layout with the freight terminal usage in Area O also allows a suitable area to be reserved for the DCC's District Heating Scheme. The site affords opportunity to locate construction facilities for the early stages of the 3FM Project thus supporting the construction phase and in the longer term becomes a R-Ro Freight Terminal (with no requirement for container cranes) reducing operational noise and visual impact whilst supporting efficient usage of the berthage in Area K
- Further refinement of road and active travel upgrades including the open piled SPAR viaduct and selection of noise reduction measures. The road layout was refined to distribute HGV movements uniformly on the existing and proposed road network and to enhance connectivity throughout the north and south port network.
- Refinement of Area N to allow an open piled structure to reduce impact on biodiversity, flora & fauna, water quality and human health.
- Incorporation of low carbon alternative construction methods and materials in infrastructure elements including the SPAR and other terminal facilities.
- The development of the community gain aspects of the 3FM Project creates positive environmental impacts and scheme benefits:
    - **recreational amenity** through provision of Active Travel Paths (7km) and footways (4.9km), a sailing, rowing and maritime campus, Open Spaces (4.1ha) and extension to Irishtown Nature Park (1.6ha) enhance the biodiversity, flora & fauna, material assets, landscape & visual and population & human health aspects of the project.
    - **public realm** through development of a new public plaza within the Maritime Village and boundary softening works adjacent to the development sites also enhance the biodiversity, flora & fauna, material assets, landscape & visual and population & human health aspects of the project.
    - **community support** through a new €2 million Community Benefit Fund for Education, Heritage & Maritime Training Skills projects within the Poolbeg area provide benefits to population & human health
    - **heritage & biodiversity** through a new Public Access Feasibility Study regarding the Great South Wall with up to €1 million funding to implement its recommendations and an additional permanent marine structure (dolphin) to expand the available habitat and range of the Dublin Port Tern

Colonies, enhancing the biodiversity, flora & fauna, material assets, cultural heritage, landscape & visual and population & human health aspects of the project.

There remain minor negative construction phase impacts associated with some environmental topics in the early stages of the project which are generally similar, but lesser than those of the Option 3 general arrangement. The topics potentially impacted are again biodiversity, flora & fauna, water quality & flood risk, air quality, climate, noise & vibration, material assets and cultural heritage. However, improvements are gained by the offsetting of construction impacts on cultural heritage by wall restoration on other stretches and biodiversity, flora & fauna due to redesign of the Lo-Lo container terminal and SPAR viaduct. The remaining potential negative construction phase impacts are all minor, short lived and can be mitigated by design and process constraints contained in the CEMP such as working hours, timing/phasing of operations, method of construction and rate of construction.

There remain potential positive construction phase benefits due to employment opportunities for population & human health.

Potential minor negative operational phase impacts were identified again in relation to Option 4 biodiversity, flora & fauna and climate associated with the increased operations. Again, notably operation phase impacts associated with congestion issues in the vicinity of the port in terms of noise & vibration, climate and air quality are reduced in comparison to the do-nothing option.

Operationally general arrangement (Option 4) achieves the port's ultimate capacity by 2040 (73.8 million tonnes of cargo throughput annually), potentially offering the associated positive impacts that this affords, in particular the inclusion of mitigation measures improve operational phase impacts for biodiversity, flora & fauna and visual & landscape and also improve noise, land, soils, geology & hydrogeology, air quality and water quality.

There are no construction phase, or operation phase, impacts anticipated on waste.

The environmental assessments developed a suite of avoidance, prevention, reduction, or offsetting mitigations, to be accommodated within the final outline design as summarised in Chapter 21. These have reduced potential negative impacts during construction and operational phases to minor potential impacts. The minor negative construction impacts are addressed by developed mitigation measures. The minor negative operation phase impacts on aquatic ecology and climate are mitigated by ongoing monitoring and substitution of materials respectively. The climate impacts are reduced in comparison to Port demand increase without the infrastructural investment as represented in the do-nothing scenarios (Option 0). Option 4 has also developed potential positive impacts due to construction phase employment and those in the operational phase associated with the following environmental topics: biodiversity, flora & fauna; water quality & flood risk; air quality; noise; land, soils, geology & hydrogeology; material assets; cultural heritage; landscape & visual; and population & human health.

The environmental assessment of each do-something alternative design shows a progression of improved impacts (either by reduced negative impacts or increased positive impacts) from Option 1 to Option 4. This progression is summarised in Section 4.4.4 of this Chapter combined with consideration of construction methods for dredging, disposal and piling detailed in the following section.

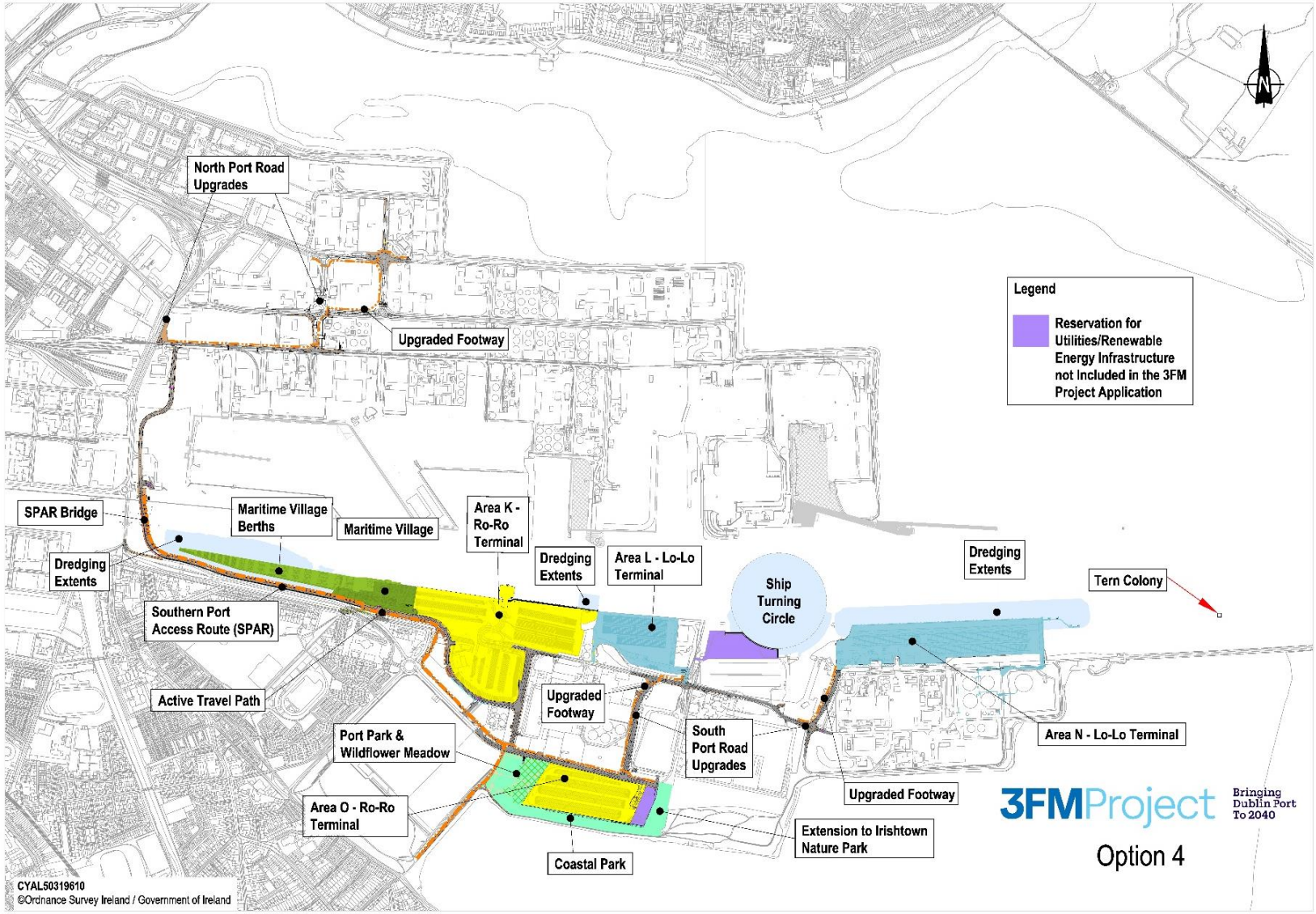


Figure 4.15 General Arrangement **Option 4 December 2023**

Table 4.7 Summary of Predicted Environmental Impacts of General Arrangement **Option 4 (Final Layout) June 2024**

Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
Biodiversity, Flora & Fauna				
Terrestrial	0	The spread of invasive species due to construction activities mitigated by measures developed during the assessment process.	+	Potential for positive impacts to terrestrial habitats through the landscaping of site perimeter planting areas and additional open space at Port Park and Wildflower Meadow (2.5ha), Coastal Park (1.6ha), extension to Irishtown Nature Park (1.1ha)
	0	The disturbance of terrestrial species (badger stoat, bat) due to construction activities reduced by the developed mitigation measures.	+	Potential for positive impacts due to 5.2 Ha given to nature conservation and open space. Positive impacts due to the retention of the existing southern berm.
Aquatic	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to capital dredging within the turning circle and berths.	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to maintenance dredging within the turning circle and berths.
	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to changes in suspended sediments from sea disposal.	0	No impacts anticipated.
	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to pile footprint and infill locations.	0 / +	Potential for minor positive impacts associated with the gain of marine habitats due to pile faces and minor excavation location.
	0 / -	Potential for minor negative impacts to marine mammals associated with construction activities (capital dredging, piling) due to construction activities mitigated by developed measures.	0 / -	Potential for minor negative impacts to marine mammals associated with operational activities (maintenance dredging, increased vessel numbers).
	0 / -	Potential for minor negative impacts to fish species associated with loss of habitat and reduction in food availability.	0	No impacts anticipated.
Ornithology	0	No impacts anticipated.	0 / +	Potential for minor positive impacts associated with the extension of the Nature Park.
	0	No impacts anticipated.	0 / +	Potential for minor positive impacts by creation of additional tern colony site.
Land, Soils, Geology and Hydrogeology				
	0	No impacts anticipated.	0 / +	Potential for minor positive impacts by reduced industrial usage associated with potential leachate to groundwater and also reduced risk of settlement and methane gas release at Area O.
Water Quality and Flood Risk Assessment				
Water Quality	0 / -	Potential for minor negative impacts associated with increased suspended sediments due to capital dredging and disposal operations.	0 / +	Potential for minor positive impacts by reduced industrial usage associated with bulk coal/scrap metal transfers.
Flood Risk Assessment	0	No impacts anticipated.	+	Potential for positive impacts to flood risk associated with the design of future development for flood risk and climate change.
Air Quality				
	0 / -	Potential for negative impacts to air quality associated with increased marine and terrestrial traffic during construction works.	0 / +	Potential for minor positive impacts by reduced industrial usage associated with dust potential and positive impacts to local air emissions associated with the installation of shore to ship power at new berths and electrification of operational vehicles and cranes.

Climate				
	0 / -	Potential for minor negative impacts associated with increased GHG emissions due to increased marine and terrestrial traffic during construction, mitigated by the use of low carbon methods and materials.	0 / -	Potential for minor negative impacts to air quality associated with increased GHG emissions due to increased marine and terrestrial traffic during the operational phase.
Noise and Vibration				
Noise	0 / -	Potential for minor negative impacts associated with increased noise during the construction phase due to piling and construction traffic.	0	No impacts anticipated. Developed mitigation measures include cargo handling equipment and terminal trailer tractors will be electrified, low noise road surfacing and a noise barrier where required.
Vibration	0 / -	Potential for minor negative impacts associated with vibration during the construction phase (piling).	0	No impacts anticipated.
Material Assets				
Coastal Processes	0	No impacts anticipated.	0	No impacts anticipated.
Roads / Traffic	0 / -	Potential for minor negative impacts to traffic due to disturbances during construction works.	+	Potential for positive impacts associated with the use of the SPAR and due to replacing roundabouts with signalised junctions to accommodate increased traffic. The 3FM Project has been designed so that it does not compromise potential future LUAS route alignments.
Navigation	0	No impacts anticipated.	+	Potential positive impact associated with the use of the turning circle.
Water / Drainage	0	No impacts anticipated.	0	No impacts anticipated.
Energy / Power	0	No impacts anticipated.	0 / +	Potential for minor positive impacts associated with provision for utilities in the Poolbeg Peninsula Area.
Cultural Heritage				
Industrial Heritage	0 / -	Potential for minor negative impacts associated with the disturbance to industrial heritage – fort and precinct.	+	Potential for positive impacts associated with the improved seascape by demolition of sludge jetty.
Marine Archaeology	0 / -	Potential for negative impacts associated with the disturbance to marine archaeology - shipping debris and/or shipwrecks.	0	No impacts anticipated.
Great South Wall	0	Great South Wall mitigated by implementing a heritage conservation strategy including repair works.	0	No impacts anticipated.
Landscape & Visual				
	0	No impacts anticipated.	+	Potential for positive impacts associated with design landscaping for the greenways, public realm amenity areas and the provision of open spaces.
Population & Human Health				
Population	+	Potential for positive impacts associated with the creation of employment due to construction activities.	+	Potential for positive impacts due to the overall creation of employment directly associated with expansion of Dublin Port.
Human Health	0	No impacts anticipated.	+	Potential for positive impacts associated with the extension/upgrade of the Southern Greenway and avoidance of COMAH sites together with increased social amenity areas including a larger Maritime Village.
Waste				
	0	No impacts anticipated.	0	No impacts anticipated.

4.4.3 Consideration of Project Construction Alternatives

This section summarises the consideration of alternative construction methods for dredging and disposal activities and for piling activities which apply across several of the 3FM Project key infrastructure elements.

4.4.3.1 Dredging, Disposal and Re-use Works – Design and Process Alternatives

The 3FM Project requires capital dredging to achieve the required design depths to safely berth and turn vessels within the inner Liffey channel. The total volume of marine sediment to be dredged is 1,259,000 m^3 of which 1,189,000m^3 can be classified as Class 1 (Uncontaminated: no biological effects likely), subject to the formal approval of the Marine Institute, and is therefore suitable for disposal at sea in the absence of a more sustainable alternative.

The Marine Institute however considered the top 1.0m of material at the Maritime Village to contain widespread levels of Class 2 material making it unsuitable for disposal at sea, equating to 70,000m^3 or 6% of the total volume required to be dredged. The underlying sediments were considered suitable for disposal at sea.

A full description of the sediment chemistry sampling and analysis plan which led to the above classifications is described in Chapter 8.

Loading and disposal alternatives for the Class 1 material

Loading Alternatives

Capital dredging is undertaken by experienced dredging contractors using specialist equipment to remove sediments from the seabed to achieve the required design depth of water. This dredging operation is known as 'Loading' in accordance with the Dumping at Sea Act 1996 (as amended). There are a number of alternative methods of undertaking the loading process:

Mechanical Dredging

- Backhoe dredger - uses an open-faced excavator bucket to pick up sediment.
- Bucket-ladder dredger - picks up sediment using many circulating buckets attached to a wheel chain.
- Clamshell dredger - picks up sediment with a "clamshell" bucket, operated by a crane or fixed-arm excavator.
- Plough dredger - blade pulled behind a suitable vessel.

Hydraulic Dredging

- Trailing Suction Hopper Dredger (TSHD) - sucks up the sediment as a slurry which is held in a hopper.
- Pipeline dredger - sucks up the sediment slurry and pumps it through a pipeline directly to its destination.
- Injection dredger – water jets fluidise the sediment and it flows under gravity to settle in deeper water.

Assessment of mechanical dredging options

Of the alternative mechanical dredging options, a backhoe dredger is preferred over a bucket-ladder dredger or clamshell dredger because it is better suited to remove stiff material (gravels and stiff clays) at the 3FM Project site and accurate dredging of embankment slopes. The backhoe dredger is also more mobile to allow the dredger to move a safe distance from vessels operating at the port.

The backhoe dredger usually operates in conjunction with one or more hopper barges. The backhoe dredger loads the dredged sediment into the hopper barge which sits alongside the backhoe dredger and is exchanged for an empty barge when filled. The hopper barge transports the dredged material to its final destination.

A plough dredger would not be suitable at the 3FM Project site on environmental grounds. This is because it has the potential to release large volumes of sediment into the water column which has the potential to settle in the adjacent South Dublin Bay and Tolka Estuary SPA.

Assessment of hydraulic dredging options

Of the alternative hydraulic dredging options, a trailing suction hopper dredger (TSHD) is the preferred option. A TSHD is a self-propelled, fully contained vessel which uses a drag head to pump dredged sediment directly into a hopper. When the hopper is full, the TSHD transports the dredged material to its final destination.

A Pipeline dredge is not suitable due to the distance between the loading area and the final destination at this site (see Section 4.3.3).

Injection dredging would also not be suitable at the 3FM Project site on environmental grounds. This is because it has the potential to release large volumes of sediment into the water column which could settle in the adjacent South Dublin Bay and Tolka Estuary SPA.

Loading Final Design

Further to the assessment of mechanical and hydraulic dredge options, the final design comprises the following:

- Use of a backhoe dredger and/or a TSHD. A TSHD requires to work in relatively straight lines with sufficient water depth and access to be able to operate. A TSHD often works in conjunction with a backhoe dredger to reach areas in confined spaces.

Other ancillary vessels include the following:

- Survey vessel; and
- Bed leveller to flatten the peaks and troughs created by the main dredger.

No over-spill will be permitted whilst loading within the inner Liffey channel (Dublin Harbour). The quantity of dredged material entering the water column as a sediment plume is therefore expected to be very low and similar for both types of dredger. Monitoring undertaken during the ABR Project and MP2 Project has shown that loading operations within Dublin Harbour has had no significant impact on water quality (see Chapter 9).

It is therefore likely that both a TSHD and a backhoe dredger will be used for the loading operations in different parts of the overall project but with no difference in environmental impact.

Disposal and Re-use Alternatives

The total volume of marine sediment to be dredged is 1,259,000 m^3 of which 1,189,000m^3 can be classified as Class 1 (Uncontaminated: no biological effects likely). A number of disposal options were examined. The preferred option identified was a combination of disposal at sea and re-use with computational modelling undertaken to determine appropriate method, rate, timing and location of these activities.

The 3FM Project will require the disposal of 1,117,000$m^{3.}$ of Class 1 marine sediments (Uncontaminated: no biological effects likely). The marine sediments comprise a mixture of clay, silt, sand, gravel and cobbles. No rock will be dredged.

The following disposal and re-use alternatives for the dredged marine sediments were considered:

- Do-Nothing Scenario;
- Beneficial Re-use;
- Disposal on Land;
- Incineration; and
- Disposal at Sea.

Do-Nothing Scenario

Capital dredging is an integral element of the 3FM Project, required to achieve the charted depth of water within the Turning Circle and berths as described in Chapter 5. In the absence of the capital dredging works, the 3FM Project would not be able to accommodate the range of Lo-Lo and Ro-Ro vessels expected to operate within the port. Investment would therefore fail to deliver the required increase in usage identified by the Masterplan.

The localised deepening and widening of a section of the navigation channel to create the Turning Circle is required for the safe manoeuvring of vessels entering and leaving the port, accommodating large vessels into the future.

The berthing pockets are required to provide sufficient depth of water at all stages of the tide, to vessels berthed at the port. This is also essential for the safe and effective operation of the proposed port facilities. Should the pockets not be dredged to the required depths then this would result in the limited capacity of these berths to accommodate large vessels into the future.

The overall consequence of this is the port would fail to provide for future anticipated growth. This would have a critical impact upon national and regional economies, particularly by way of trade, employment and associated taxes for societal benefit. This in turn, will undermine the port's ability to contribute towards achieving the sustainable transport objectives of National Port Policy.

Additionally, the absence of the proposed capital dredging works would result in limits to future port investment resulting from a loss of predicted revenue following capacity constraints. This would inhibit the attainment of objectives specified within the Masterplan; including the integration of the port with the city, by way of the promotion of sustainable linkages, and the amelioration of the visual impact of the port upon its landward surroundings. It would further hinder the growth of the port's existing vessel operators and prohibit any potential for new operators from residing at the port.

The Do-Nothing scenario, in the absence of these elements, is largely representative of existing activities already taking place within Dublin Harbour. Therefore, this scenario would not impact upon the construction environmental factors such as biodiversity, flora & fauna, air and water quality etc. at the site.

In the event that Burford Bank is not used to deposit sediment from Dublin Port as part of the 3FM Project, then there will be no significant environmental, social or economic consequences. Dredge disposal activities currently undertaken at Burford Bank, in relation to Dublin Port, will continue to take place in compliance with existing Foreshore Licences and Dumping at Sea Permits. The environmental, social and economic consequences of this will continue as they presently exist.

However, the absence of the 3FM Project would have a critical economic impact thus undermining the Port's ability to attain the objectives specified within the Masterplan.

Beneficial Re-use

The options for beneficial uses of the sandy silt/clay marine sediments to be dredged are limited. The potential uses for the dredged marine sediments are:

- Engineering Uses
  - Using the dredged material as construction material
  - Beach nourishment
  - Land creation/reclamation/capping as part of port development
  - Flood and coast protection (above the level of mean high water springs)
- Environmental Enhancement
  - Wetland habitat creation/enhancement
  - Sediment cell maintenance
- Agricultural Uses
  - Improve land of poor agricultural quality.

Engineering Use - Construction Material: The physical characteristics of the material which makes up the dredged marine sediments renders them unsuitable for forms of engineering works, other than for reclamation purposes which is discussed later.

Engineering Use - Beach Nourishment: Beneficial re-use of the dredged marine sediments was considered for beach re-nourishment, particularly at sites along the northern shoreline of Dublin Bay where erosion is taking place. However, the grading of the marine sediments to be dredged is too fine to be suitable for this type of use.

Engineering Use - Land Creation/Reclamation: DPC is focussed on the redevelopment of brown-field sites within the Dublin Port Estate. Consequently, there is no further requirement for significant volumes of fill material within the Dublin Port Estate.

Engineering Use – Flood/Coastal Protection Works: Again, the grading of the marine sediments to be dredged is too fine to be suitable for coastal protection works.

Environmental Enhancement - Wetland Habitat Creation/Enhancement: Fine dredge material can be used for habitat creation and re-nourishment projects such as mudflat recharge or salt marsh restoration. These types of projects, however, typically require small quantities of sediment (e.g. 1,000m^3 - 5,000m^3) (UKMSAC, 2001). A search of the greater Dublin area did not identify any suitable sites for this type of beneficial re-use.

Environmental Enhancement - Sediment Cell Maintenance: The 3FM Project has been designed to ensure that the sand and gravel fractions of the marine sediments to be dredged are not lost from the natural Dublin Bay sediment cell. The offshore disposal site to the west of the Burford Bank has been selected to keep the sands and gravels deposited at the site within the natural Dublin Bay sediment cell. Over time, the fine sand fraction will migrate from the site, particularly as a result of storm action, and will remain part of the natural coastal processes regime of Dublin Bay. The site is also dispersive with respect to silts and clays. Silts and clays deposed of at the offshore disposal site will be dispersed in a north-south direction to the wider Irish Sea.

The use of this site to dispose of sand and gravel fractions as part of the 3FM Project would result in no environmental impacts, given its current use for this purpose under the MP2 Project and previously for the ABR Project. Whilst the extent to which sand and gravel fraction are deposited within Burford Bank would be greater, this would have no discernible environmental impact within Dublin Bay or on the qualifying interests of the Rockabill to Dalkey Island SAC.

This has been identified as a feasible re-use option for the coarser portion of the dredged materials, as these will remain within the cell to replenish its coastal processes. It is a partial technology alternative as it is not suitable for the finer materials.

Agricultural Use - Improve land of poor agricultural quality: Again, the physical characteristics of the marine sediments to be dredged makes them unsuitable for agricultural use.

Beneficial re-use forms a partial technology suitable for the coarser portions of the dredged materials through Environmental Enhancement - Sediment Cell Maintenance technology.

Disposal on Land

This disposal option would require the dredger to bring the dredge spoil ashore, either by barge or by pumping. The material would then be temporarily stored in a designated hard standing or lagoon area to allow for dewatering/drying before subsequent transfer by road to a landfill site.

Even following a period of settlement, the dredged sediment would be likely to be considered a wet material for the purposes of landfilling. Landfill space is in very short supply and it is often the case that landfill sites are only licensed to receive relatively small volumes of wet waste (e.g. 500m^3) per week. Due to the large quantity of material arising from the dredging activities, this option is considered to be unfeasible on a technical basis.

Incineration

There are no suitable incineration facilities in Ireland capable of accepting the proposed type or quantity of dredge spoil. The dredge spoil would therefore need to be transported to mainland Europe. This option is considered to be unreasonable and has been ruled out due to prohibitive cost and having regard to the proximity principle.

Disposal at Sea

A chemical sediment sampling and analysis programme, described in Chapter 8, confirmed that the marine sediments can be classified as Class 1 (uncontaminated, no biological effects likely) in accordance with the Guidelines for the Assessment of Dredge Material for Disposal at Sea (Marine Institute, 2006). The dredged marine sediments are therefore suitable for disposal at sea.

The closest licensed offshore disposal site is located at the approaches to Dublin Bay to the west of the Burford Bank as presented in Figure 4.16. The site lies within the Rockabill to Dalkey Island SAC for which the qualifying interests are Harbour Porpoise and Reefs. This site is currently being used to dispose of dredge spoil arising from the MP2 Project under Dumping at Sea Permit S0024-02. The site is also used by DPC for the disposal of dredge spoil arising from maintenance dredging under Dumping at Sea Permit S0004-03. The site is similarly used for the disposal of dredged spoil from Dun Laoghaire and Howth Harbours.

As discussed under the technology of Environmental Enhancement - Sediment Cell Maintenance, the use of this site to dispose of sand and gravel fractions as part of the 3FM Project would result in no environmental impacts given its current use for this purpose under the MP2 Project and previously from the ABR Project. Whilst the extent to which sand and gravel fraction are deposited within Burford Bank would be greater, this would have no discernible environmental impact within Dublin Bay or on the qualifying interests of the Rockabill to Dalkey Island SAC.

Extensive environmental monitoring has been undertaken with respect to the dumping of dredged spoil from the ABR Project and MP2 Project. The results of the ABR Project monitoring undertaken during 2017-2021 are presented in the Annual Environmental Reports (AERs) which are available for download on the EPAs Website[2]. The results of the MP2 Project monitoring undertaken during 2022 is also presented in an AER which is available for download on the EPAs Website. During this period, capital dredging took place within the inner Liffey channel and Dublin Bay, and maintenance dredging took place within the inner Liffey channel including the majority of the 3FM Project area.

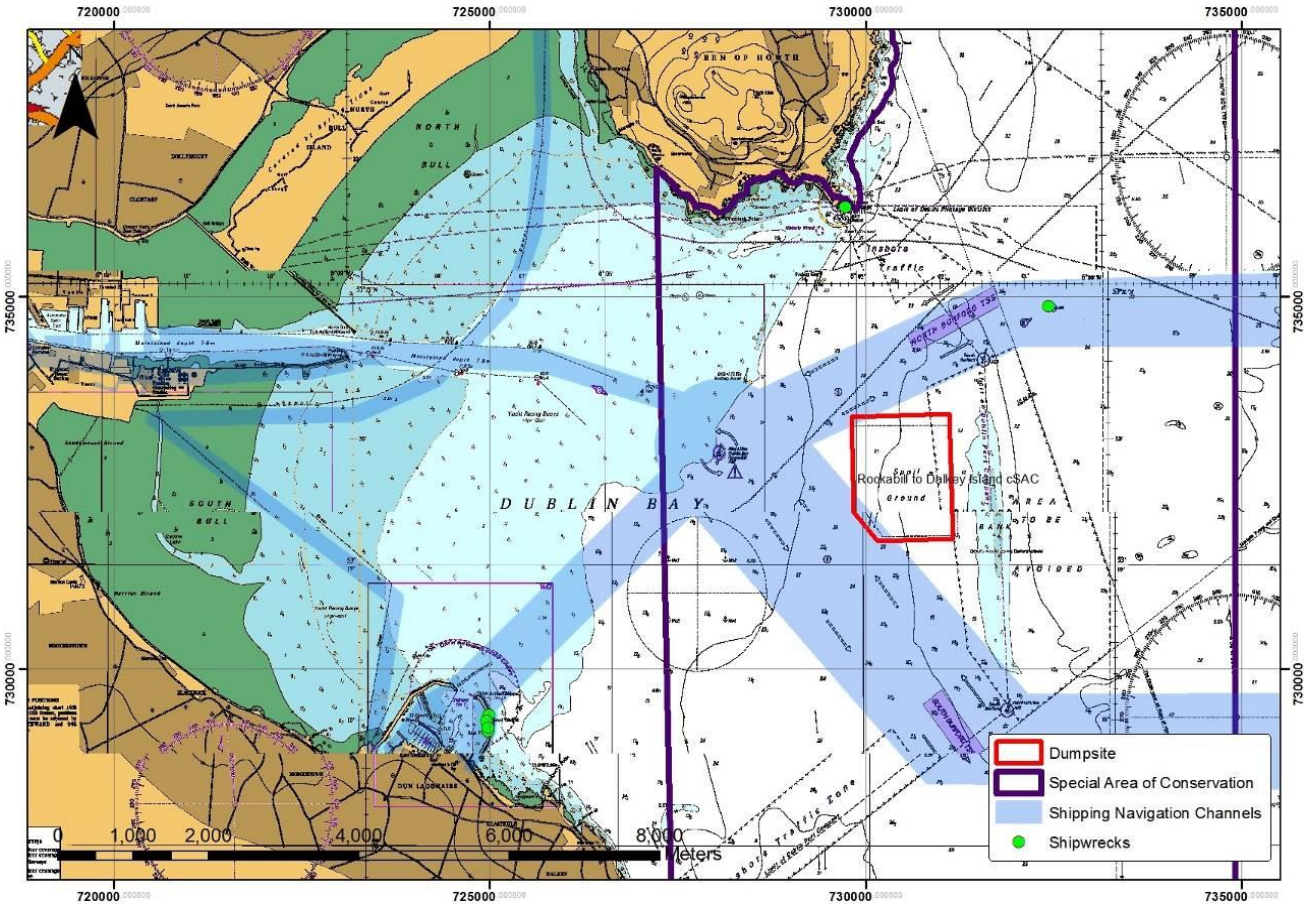


Figure 4.16 Location of the closest licenced offshore disposal site

The AERs concluded that measured turbidity results demonstrated that both the maintenance dredging campaigns and the ABR Project and MP2 Project capital dredging campaigns did not cause any discernible increase in turbidity above recorded background levels (see Chapter 9 Water Quality).

[2] https://leap.epa.ie/confirm?returnUrl=https%3A%2F%2Fleap.epa.ie%2Flicence-profile%2FS0024%2Fcompliance

The environmental impact of dredging and the disposal activities is described in detail within the EIAR (see Chapter 7 Biodiversity, Flora & Fauna, Chapter 9 Water Quality, Chapter 12 Underwater Noise, Chapter 13 Coastal Processes and Chapter 16 Cultural Heritage). The assessments have concluded that disposal of the dredged marine sediments will have no discernible environmental impact within Dublin Bay or on the qualifying interests of the Rockabill to Dalkey Island SAC.

The licensed offshore disposal site has been proven to be suitable for the safe disposal of dredge spoil arising from the 3FM Project. The site also has the advantage that it is dispersive for clays and silts, but sands and gravel are retained within the natural Dublin Bay sediment cell (see section on Environmental Enhancement - Sediment Cell Maintenance above).

There are no other licenced offshore disposal sites within the Greater Dublin Bay Area. The opening of a new disposal site further offshore would have no additional environmental benefit. On the contrary, it would lead to unnecessary increases in energy usage to transfer the dredged marine sediments from the dredging area to the disposal site; it would lose sands and gravels from the natural Dublin Bay sediment cell, and it may have a greater impact on fisheries interests.

Disposal Final Design

The Disposal at Sea method, in combination with Environmental Enhancement - Sediment Cell Maintenance technology, has been selected as the disposal final design with no environmentally better alternative.

Loading and disposal alternatives for material not suitable for disposal at sea (Class 2)

The following options have been considered for dealing with the dredge sediments that are deemed unsuitable for disposal at sea.

Loading Alternatives

In this case the material to be dredged needs to be taken ashore prior to disposal. A mechanical dredge option such as a Backhoe dredger is therefore necessary to minimize the amount of latent water generated by the dredging activity.

Again, no over-spill will be permitted whilst loading within the inner Liffey channel (Dublin Harbour). The quantity of dredged material entering the water column as a sediment plume is therefore expected to be very low.

Disposal Alternatives

Set out below are some of the issues that affect the disposal alternatives considered.

Alexandra Basin Redevelopment (ABR) Project

The ABR Project was granted planning permission in 2015 and included for the treatment of approximately 470,000 m^3 of sediment that was unsuitable for disposal at sea. Graving dock no.2 and an area at berth 52/53 were identified as receptors for the sediments after undergoing stabilisation or solidification treatment. This activity was subject to an Industrial Emissions (IE) licence from the EPA which was granted in November 2016. Phase 1 of these works is completed and involved the dredging and stabilising of sediments for fill within the graving dock no.2 and storage at berth 52/53 for future placement into berth 52/53.

Phase 2 of the works will involve dredging, stabilisation, and placement of the remaining sediment from Alexandra basin at the berth 52/53 receptor. This can only be done after the construction of a new quay wall at berth 52/53. Based on the bulking factors experienced in the phase 1 works, the volume of bulked dredge remaining in Alexandra basin is likely to be close to the receptor capacity at berth 52/53. Several factors influence the final receptor volume including design mixes of the stabilised material, design of the quay wall and the pavement design.

Waste Hierarchy

DPC recognise the waste hierarchy ranks waste management options in terms of sustainability and environmental impact. Prevention is given top priority as it aims to stabilise and reduce waste generation whilst disposal to landfill is the lowest priority. Recycling and recovery sit above disposal in the hierarchy. DPC endorses the principles of the waste hierarchy.

Maritime Village / Marina

Recovery of treated sediment within Dublin Port lands and specifically at the EPA licensed berth 52/53 site may not be feasible due to capacity as outlined above. It is acknowledged that if any contaminated sediments from outside of the ABR scope be placed at berth 52/53, then it would be subject to a revision of the IE licence which limits filling to sediment arising from the Alexandra basin. If capacity is available at berth 52/53 then it is proposed that the dredge sediment, or part thereof, will be treated and placed in the berth 52/53 receptor.

Off Site Options

In line with the waste hierarchy, the preference for any sediments to be removed off site is for the sediments to be recovered. There are several soil recovery facilities in Ireland which are authorised to accept uncontaminated soil and stone. In some cases, soil recovery facilities are also permitted to accept dredging spoil (waste code 17 05 06). If an operator proposes to accept dredging spoil at their facility, they must submit details of the source material and the proposed waste acceptance procedures on a case-by-case basis to the EPA or local authority for their consideration. Further testing would be required to confirm the suitability of the sediment for recovery at these facilities.

If receptor capacity is not available at Berth 52/52 and if the sediment is not suitable for recovery at a soil recovery or a soil treatment facility in Ireland, then the dredge sediments would be sent to a suitable soil treatment facility outside of Ireland.

In these facilities contaminated soils and sediments are processed, treated and subsequently recovered/ re-used on development projects and/or reintroduced into the market as secondary raw materials for new projects. There are several such facilities close to ports in England and in northern Europe.

Summary

In summary, the disposal of the Class 2 element of dredged sediment from the Maritime Village / Marina will, in order of preference, be:

1. Filled to Berth 52/53 under a revised IE licence subject to availability of receptor capacity;

2. Recovered at a soil recovery or soil treatment facility in Ireland subject to testing of the sediments in line with the selected facility licence at the time of the works;

3. Recovered at a soil treatment facility in Great Britain or northern Europe;

4. Disposed of at a licenced landfill facility in Ireland.

4.4.3.2 Piling Works – Design and Process Alternatives

The 3FM Project includes piling works to provide structural support for the following elements, which are described in Chapter 3:

- Open piled Jetty Structures and Dolphins, including tern colony Dolphin Structures, temporary and permanent structures to prevent ship impact, access bridges, in-river Bridge, viaduct structures, and temporary access structure for in-river bridge pier construction;
- Infilled Jetty Structures and Quay Walls, including refacing, piled anchor walls and temporary cofferdams for in-river bridge piers;
- Foundations for Crane Rails and Landside Structures, including gantries, substations, high mast lighting and bankseats;
- Foundations for Landside Buildings, including club houses, office-style administration buildings, and portal-frame style maintenance sheds; and
- Restraints/guides for leisure, commercial and Ro-Ro linkspan Pontoons, and temporary mooring for construction of Viaduct.

The engineering design of each of these marine and landside elements considers the feasibility of both the construction and operational phases of the 3FM Project, also taking into consideration potential environmental impacts to evolve the design process.

The new terminal at Area N is proposed as an open type structure, which will provide free flow of the River Liffey around the intakes and outfalls supplying existing utilities, whilst allowing a pathway outside of the main navigation channel for migrating fish.

The refacing of the repurposed caisson section of berth at Area K is required to prevent scour by larger Ro-Ro vessels undermining the caissons, which would be detrimental to their structural integrity. Refacing with a closed pile wall structure is the preferred option to best protect the existing structures and prolong the lifespan of the berth.

Providing a new retaining structure to the Maritime Village (return portion of Berth 41) is required to facilitate the port operations and rowing club basin. A closed piled structure is necessary to retain the land and allow the required dredge depth for the basin, in the space available.

A Turning Circle is required to cater for the largest class of vessels served by the port (240m in length). A closed pile, retaining quay wall structure accommodates the depth required within the space available adjacent to Codling Wind Park.

To create a new crossing of the River Liffey, and the SPAR viaduct alongside the R131, piled structures are required. The ground conditions are not suitable for a ground bearing revetment structure to support the SPAR route parallel to the R131, and the river crossing must be open piled to minimise disturbance to the river flows.

Piles are required as supporting foundations for crane rails, buildings, gantries, high mast lights and other heavily loaded structures required across the various areas. As the South Port Estate is entirely reclaimed land, utilising infill material of varying quality, piles are the preferred solution to mitigate settlement, and adequately transfer the loads into suitable bearing stratum.

The proposed berths and Turning Circle are essential for the safe and effective operation of the proposed port facilities and are therefore an integral part of the 3FM Project. In the absence of these developments, the port investment would fail to deliver the required increase in usage identified by the port's Masterplan, reviewed 2018.

Section 4.4.2 focussed on the alternatives for the sizing, scale and location, and also the design, of these marine and landside elements, and their environmental progressions. For example, the design of Area N was selected as an open piled jetty structure with evolution of its size, scale and location, in order to mitigate impacts on nearby habitat, bird populations and migrating fish.

The further design and process alternatives considered within this section are those associated with selecting the piling materials and piling technologies. Materials and technologies are considered in parallel within the design evolution process as they interact, for example the selection of material influences the technology used to install foundations.

The following piling works options were therefore considered for the relevant elements of the 3FM Project:

- Do-Nothing Scenario;
- Alternative Materials - the key technical factors influencing alternative piling materials considered are:
- Structural properties with regard to design loadings, impacts, shear and bending forces;
- Suitability for site specific ground/marine conditions and selected design format;
- Constructability including ease of handling, installation, adaptation, construction rate, availability; and
- Ease of maintenance and durability to operate within the port, and particularly the marine environment.
- Alternative Technologies - the key technical factors influencing alternative piling installation technologies considered are:
    - Suitability for site specific ground/marine conditions, the underlying ground conditions at the 3FM Project, are firm clays with dense granular materials; and
    - Pile length for those elements requiring deeper foundations.

Do-Nothing Scenario

Piling and foundations are needed for the safe construction, and operation, of these project elements. All of the 3FM Project quay walls, dolphins, bridges, crane rails, landside structures and buildings operate as integral parts of the project. As set out in Section 4.4.2, the do-nothing scenario, in the absence of these elements, is largely representative of existing activities already taking place within this location. Therefore, this scenario will not impact upon the construction phase environmental factors such as biodiversity, flora & fauna, noise and water quality etc. at the site. However, the absence of the 3FM Project would have a critical economic impact thus

undermining the Port's ability to attain the objectives specified within the Masterplan. Further to this, without the 3FM Project's Turning Circle, the new berths at MP2 will operate with restricted manoeuvring space and the overall navigation will not function efficiently.

Alternative Materials

The options for materials are dependent on the structural element, influenced by key technical factors.

Open Piled Jetty Structures and Dolphins

The alternative materials considered for these structures were tubular steel, timber or concrete.

Tubular steel piles were selected as the vertical and raking piles, the open jetty structure at Area N, various mooring and berthing dolphins, temporary dolphins to prevent impact to the bridge pier cofferdams, foundations for access bridges to Area N, foundations for the SPAR viaduct, and foundations of the temporary access structure for the River Liffey bridge pier construction for the following reasons:

- Standard form of construction;
- Suitable for impact and vibration hammering;
- High resistance to damage from accidental vessel impact;
- High bending moment and shear capacity;
- Ease of handling shorter lengths;
- Ease of extending and trimming;
- Speed of construction;
- Ease of maintenance and application of corrosion prevention;
- Readily available long lengths of steel piles; and
- Potential for reuse of temporary works elements.

The bridge pier foundations are proposed as bored piles, which will consist of a steel casing (for the reasons cited above), with the addition of a reinforced concrete core, to provide greater bearing, bending and buckling resistance. These are proposed to be constructed within a dewatered area, created by a steel sheet piled cofferdam. This will allow the tight geometric tolerances required by bridge structure foundations to be achieved.

Timber piles were not selected as they are potentially susceptible to marine borers and therefore subject to decay, with associated maintenance difficulties. In addition, they are unfeasible as they are not suitable for deep penetrations into the ground and are both difficult to adapt (extend or trim) and to source.

Similarly, concrete piles were considered as being unfeasible, due to unsuitability for deep penetrations into the ground, and therefore not selected. Concrete piles are also considered difficult to maintain and apply corrosion resistance within this setting and are difficult to adapt during construction. In addition, concrete piles would be a relatively heavy weight material to crane and load onto barges. Bored concrete piles, with permanent steel casings would be a possibility for the lengths required – but as the casings still require driving, and then infilling with concrete, this does not represent a more sustainable option.

Tubular sheet piles are therefore selected on the basis of their feasibility to support the open jetty and dolphin structures at this site, with no suitable, or environmentally better, alternative material identified.

Infilled Jetty Structures and Quay Walls

The alternative designs, and associated materials, considered were Steel Sheet Pile Walls, Steel Combi-Walls, King Post Walls (steel posts with steel, concrete or timber infill elements) or Gravity Concrete Quay Walls.

Steel Combi-Walls in this instance comprise steel tubular (king) piles, with interlocking steel sheet piles infilling between. Steel Combi-Walls are proposed for the Area K refacing and the quayside at the Turning Circle. Twin Steel Sheet Piled Walls are proposed at the Maritime Village. Steel sheet piled cofferdams are proposed to facilitate the construction of the bridge pier foundations of the River Liffey crossing.

Steel was selected for the following reasons:

- Standard form of construction;
- Suitable for impact and vibration hammering;
- High resistance to damage from accidental vessel impact;
- High bending moment and shear capacity;
- Ease of handling shorter lengths;
- Ease of extending and trimming;
- Speed of construction;
- Ease of maintenance and application of corrosion prevention;
- Readily available long lengths of steel piles;
- Smaller footprint of structure; and
- Potential for reuse of temporary works elements.

Neither concrete, nor timber infill elements, were selected as they are generally not suitable for deep foundations.

Gravity Concrete Quay Walls have not been selected as the retention height is too high and the seabed material would not have adequate bearing capacity. These also occupy a substantial footprint and would require a greater area of seabed reclamation.

Steel Combi-Walls are therefore selected on the basis of their feasibility to support the closed jetty structures at Area K and the Turning Circle and form the Quay Walls at those sites, with no suitable, or environmentally better, alternative material identified.

At the Maritime Village where the retained height is less, a twin steel sheet piled structure is instead proposed, with justification as above.

A single steel sheet piled cofferdam will be an appropriate temporary structure to facilitate the construction of the bridge pier foundations of the River Liffey crossing, with similar justification.

Foundations for Crane Rails and Landside Structures

The foundation construction for landside crane rails, gantries, high mast lights, substations, bridge abutments and bankseat structures is considered to be conventional techniques.

Driven tubular steel pile foundations have been selected generally for the following reasons:

- Standard form of construction;

- Ensures sufficient embedment to resist overturning moments in particular for High Mast Lighting and Gantries;
- Minimises footprint of the foundation;
- Suitable for impact and vibration hammering;
- High bearing capacity;
- High buckling capacity;
- Ease of handling shorter lengths;
- Ease of extending and trimming;
- Speed of construction; and
- Readily available long lengths of steel piles.

However bored reinforced concrete piles have been selected at the North SPAR Bridge abutment, to minimise disturbance at this location.

Conventional driven tubular sheet pile, or bored reinforced concrete foundations are therefore selected on the basis of their feasibility as foundation support for the crane rails, gantries and other landside structures, with no suitable, or environmentally better, alternative material identified.

Foundations for Landside Buildings

The construction of the foundations for these landside buildings are considered to be conventional techniques, using piled foundations due to the unpredictable nature of the underlying reclaimed fill material across the sites.

Precast driven pile foundations have been selected for the Area K office-style administration buildings and portal-frame style maintenance sheds for the following reasons:

- Standard form of construction;
- Provides required resistance to loads;
- Minimises footprint of the foundation; and
- Relatively quick to install when compared with other piling methods.

Conventional precast driven pile foundations are therefore selected at Area K on the basis of their feasibility as landside building foundations, with no environmentally better alternative construction form identified.

Continuous-flight auger (CFA) concrete piles are proposed for the Club Houses and other structures in the Maritime Village for the following reasons:

- Standard form of construction;
- Minimises footprint of the foundations;
- Relatively quick to install, when compared to bored piling (though relies on infill material used for reclamation of the area being suitable); and
- Minimises noise disturbance associated with driving piles.

Conventional CFA pile foundations are therefore selected at the Maritime Village on the basis of their feasibility as landside building foundations, with no environmentally better alternative construction form identified.

Restraints/Guides for Pontoons

The alternative materials considered were tubular steel, or a separate mooring arrangement of concrete mooring blocks and chains. Neither timber nor concrete piles offer the required load capacity and deflection characteristics required to make them suitable alternatives for pontoon mooring restraints or guides.

Tubular steel piles have been selected as the mooring restraints or guides for the leisure and commercial pontoons in the Maritime Village, the Ro-Ro linkspan pontoons and the temporary mooring points to facilitate the construction of the SPAR viaduct, for the following reasons:

- Standard form of construction;
- Suitable for impact and vibration hammering;
- Ease of handling shorter lengths;
- Ease of extending and trimming;
- Speed of construction;
- High resistance to damage from accidental vessel impact;
- High bending moment and shear capacity;
- Readily available long lengths of steel piles;
- Minimises footprint of the restraint system; and
- Potential for reuse of temporary works elements.

Concrete mooring blocks and chains were not considered suitable for providing pontoon restraint in this area, as chains offer a more flexible restraint system, which would not be compatible with the usage in the River Liffey.

Tubular sheet piles are therefore selected generally on the basis of their feasibility as restraints or guides for the pontoons and viaduct construction, with no suitable, or environmentally better, alternative material identified.

Alternative Technologies

The consideration of materials identified tubular sheet piles as the preferred material for the open jetty structures and crane rails, with Steel Sheet Pile twin and Combi-Walls selected for closed jetties and quay walls. Landside structures and buildings utilise conventional driven and bored pile foundations. Having selected these materials, their method of installation can then be considered. The following alternative piling methodologies were assessed for the installation of the tubular and sheet piles:

Vibrodriving

Vibrodriving comprises attaching a vibration hammer to the tubular pile or sheet pile head. The system works best in cohesionless soils but becomes ineffective in the firm clays and dense granular materials found underlying Dublin Port. Vibrodriving was therefore not feasible as a standalone piling technology.

Press-in Piling

Press-in piling utilises static forces for the installation of sheet piles. It is generally used in confined sites or soft cohesive and granular materials. This method of piling is ineffective in the firm clays and dense granular materials found underlying Dublin Port unless water-jetting is used. The proposed pile lengths for the 3FM Project will be

in excess of 35m. Pile pressing is generally limited to circa 22m in practice. Press-in piling was therefore not feasible as a standalone piling technology.

Impact Driving

Impact driving comprises drop hammers which strike the top of the pile. They are most commonly used for large diameter or long piling elements. It is also suitable for driving piles through the firm clays found underlying Dublin Port. Previous experience in the Port has found that impact driving is the most efficient form of pile driving. Impact driving was therefore identified as a feasible technology.

Combined Piling Methods

Vibrodriving can be used to drive tubular piles through the softer upper layers of sediment at the seabed before deploying impact driving for the deeper firmed layers. Vibrodriving is also suitable for the driving of steel sheet piles where they are driven to a specified depth and not required to achieve a high bearing capacity.

Similarly press-in piling and impact driving can be combined, however the combined vibro-piling and impact piling solution is preferred as these construction methods are more compatible, and better suited to the pile lengths required for the 3FM Project.

A combination of vibrodriving and impact driving has been successfully used for the ABR and MP2 Projects and is therefore tried and tested in similar ground conditions. This combined solution is feasible and preferred in terms of potential noise and vibration impacts and will therefore be used, where ground conditions are suited, alongside impact driving.

Of the technologies available to install these piles, a combination of vibrodriving and impact driving methods was selected with no suitable, or environmentally better, alternative technology identified.

Environmental Effects

This further alternatives assessment addresses the interaction of piling materials and piling technologies considered within the design evolution process. The full environmental effect of the 3FM Project elements, including various piled foundations, has been assessed in Section 4.4.2 (and is summarised in Section 4.4.4). Within the full assessment each of these elements, the potential impacts of the foundation works, on Flora & Fauna, Fisheries, Landscape & Visual, Cultural Heritage, Material Assets, Human Beings, Water, Coastal Processes, Air Quality/Noise and Vibration are taken into account.

Piling Works Design

The preferred materials are tubular sheet piles for the open piled jetty structures and crane rails, with Steel Sheet Pile or Steel Combi-Walls selected for infilled jetties and quay walls. A combination of vibrodriving and impact driving methods was selected as the preferred installation method. The following marine piling works are required:

- Area N – 650m long and 135m wide wharf structure, dolphins and access bridges, all with vertical and raking steel tubular piles;
- Tern Colony Dolphin, with vertical and raking steel tubular piles;
- SPAR River Liffey Crossing Dolphins, with vertical steel tubular piles;

- SPAR Viaduct – 595m long and 18m wide structure with bored reinforced concrete piles, and tubular steel piles as temporary mooring supports;
- SPAR River Liffey Crossing – 265m long steel sheet piled temporary cofferdam structures, to allow construction of bored reinforced concrete bridge pier foundations in the dry;
- Area K – 235m of steel combi wall refacing;
- Area K – steel tubular piles to restrain the proposed double linkspan;
- Turning Circle – 225m long steel combi retaining wall;
- Turning Circle – steel tubular piles to restrain the temporary linkspan structure, and provide a berthing line for barges.
- Maritime Village – 255m long twin steel sheet piled retaining walls; and
- Maritime Village – steel tubular piles to restrain the commercial and recreational mooring pontoons.

Landside structures and buildings utilise conventional driven, bored or CFA pile foundations – as is most appropriate for the loading, ground conditions and environs.

The selection of feasible materials and technologies, and therefore the final design, has been largely dictated by the site ground conditions with no better environmental alternative. These options have been incorporated into the design of the 3FM Project owing to the absence of technically feasible alternatives.

There would be potential temporary and/or short term negative impacts during construction on biodiversity and in relation to noise & vibration. There would also be potential temporary and/or short term minor disruption to navigation during the works. In the operational phase there would be a loss of benthos in the pile footprint, offset by increased pile surface area as a potential benthos habitat. Whilst the piling works final design has some potential environmental effects which are comparatively less favourable than those associated with the do-nothing scenario, the positive long-term impacts of this development upon the economy; particularly with regard to the creation of jobs and the prosperity of the region through trade, tax and other investment, is the principal reason for this decision. The negative environmental effects of the works can be mitigated.

These piling and foundation works are of a similar nature and magnitude to recent construction works within the ABR Project and for that proposed for the consented MP2 Project. The detailed environmental assessment of the 3FM Project as set out within this EIAR will ensure that appropriate environmental mitigation is included based on the experience gained through monitoring of the ABR Project.

Extensive environmental monitoring is ongoing with respect to the ABR Project activities and is reported to Dublin City Council on a monthly basis. Annual Environmental Monitoring Reports are also submitted to Dublin City Council and are available for the seven year period 2017 to 2023. The results of the monitoring to date shows that there have been no noise breaches associated with piling activity for the ABR underwater noise surveys undertaken during the piling activity has also demonstrated the accuracy of underwater noise levels used in the environmental impact assessments with respect to marine mammals and fish life. The residual environmental effects of the 3FM Project foundation works, which are not significant, can therefore be mitigated as demonstrated by the ABR Project.

4.4.4 Comparison of Project Design and Process Design Alternatives

Assessment of the project design and process design alternatives was undertaken in comparison to environmental factors established for a baseline do-nothing scenario, to determine the potential impacts of each design evolution. The revised layout change, applied to Areas O and L in the development of Option 4, was also included in this assessment.

The do-nothing scenario describes existing port activity or activity that incorporates previously consented development, in particular the ABR and MP2 projects. This do-nothing scenario in respect of the 3FM Project, is described in accordance with the EU Commission's Guidance on the preparation of the EIAR, 2017 and section 3.4.2 of the EPA's Guidelines on Information to be contained in EIARs, 2022 as follows: Dublin Port is currently experiencing increased growth trends. Initiatives to optimise existing operations and throughput have already been implemented in order to maximise the port's capacity using the existing facilities. Rapid economic post-recession recovery, increasing population and an increase in patterns of trade between Dublin and Continental Europe have created a need for port expansion to cater for increasing demand. The various infrastructure elements within the 3FM Project all integrate to provide a third and final tranche (after the ABR and MP2 Projects) of the additional capacity required to provide for the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually). This is specifically achieved by the 3FM Project elements providing the necessary additional facilities and maximising land-use to increase throughput.

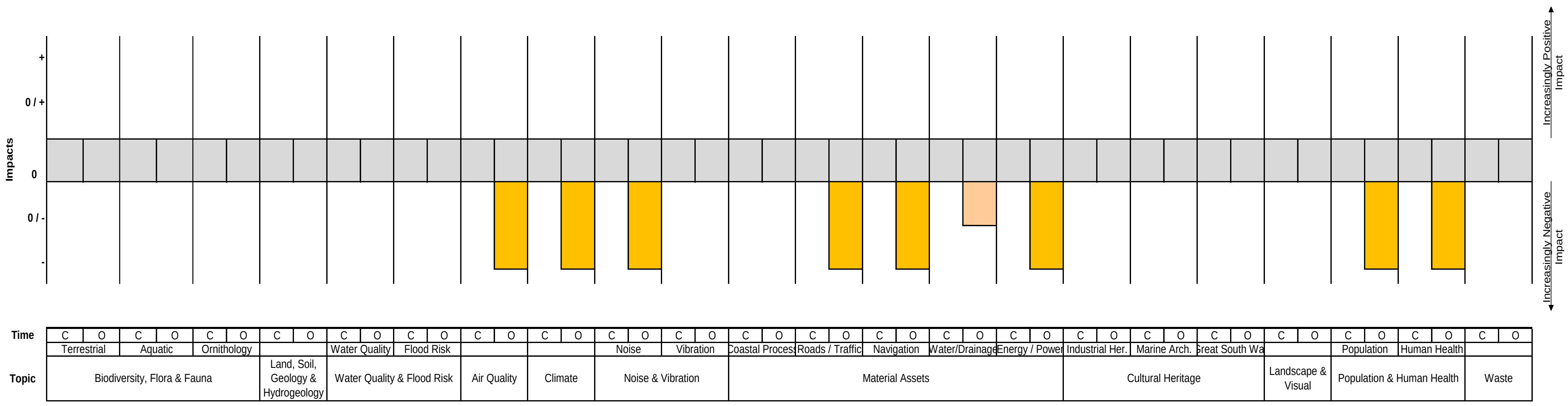
In the do-nothing scenario, the existing usage of these brownfield areas continues and the capacity of Dublin Port to accommodate Ro-Ro and Lo-Lo vessels would be limited. The do-nothing scenario is largely representative of existing activities already taking place within the Poolbeg Peninsula, therefore this scenario will not impact upon the environmental factors at the site during the construction phase. However, the absence of the 3FM Project would have a critical impact upon national and regional economies, particularly by way of trade, employment and associated taxes for societal benefit. This in turn, would undermine the Port's ability to contribute towards achieving the sustainable transport objectives of National Port Policy. This would inhibit the attainment of objectives specified within the Masterplan; including the integration of the Port with the city, by way of the promotion of sustainable linkages, and the amelioration of the visual impact of the port upon its landward surroundings. It would also further hinder the growth of the Port's existing vessel operators and prohibit any potential for new operators from residing at the Port. The failure to provide infrastructure to support the growth in demand would lead to congestion of existing infrastructure which in turn would create operational phase environmental impacts for the do-nothing scenario.

This do-nothing scenario fails to deliver on the port's strategic objectives without redevelopment of the Southern Port (Poolbeg Peninsula) brownfield site's opportunities. Therefore, the do-nothing scenario is not considered to be a practicable alternative and is presented to provide context for do-something project design and process design alternatives which can deliver the project's required capacity and objectives.

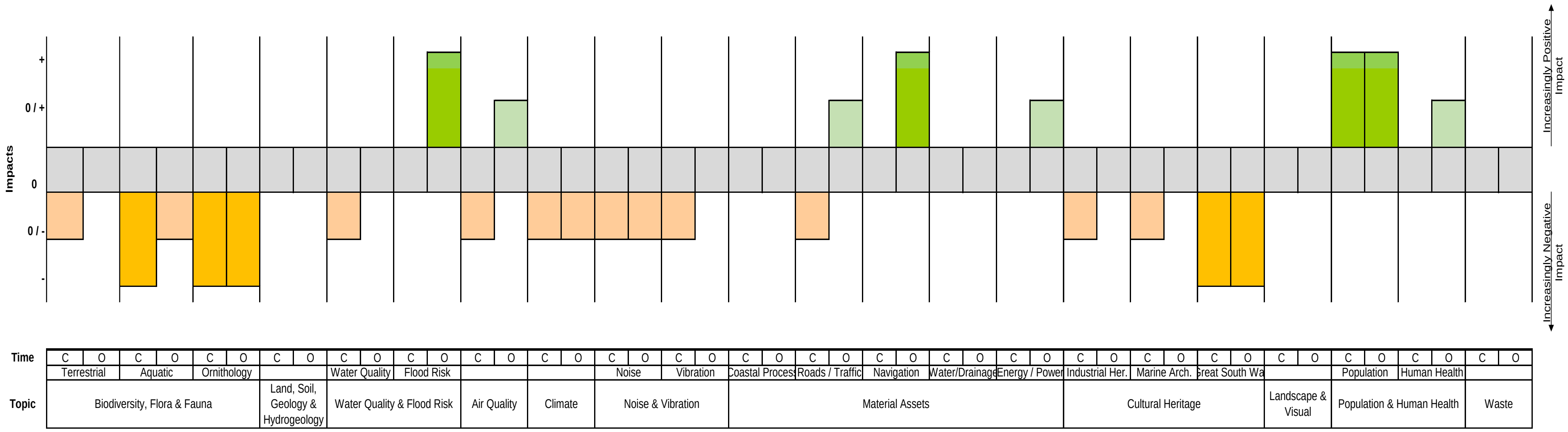
A summary of the predicted effects of each of the project design and process design options is provided in Figure 4.17. This shows potential negative and positive impacts for each environmental topic during the short term construction phase and the operational phase for Option 0 to Option 4.

Key for all Summary Impacts Tables:

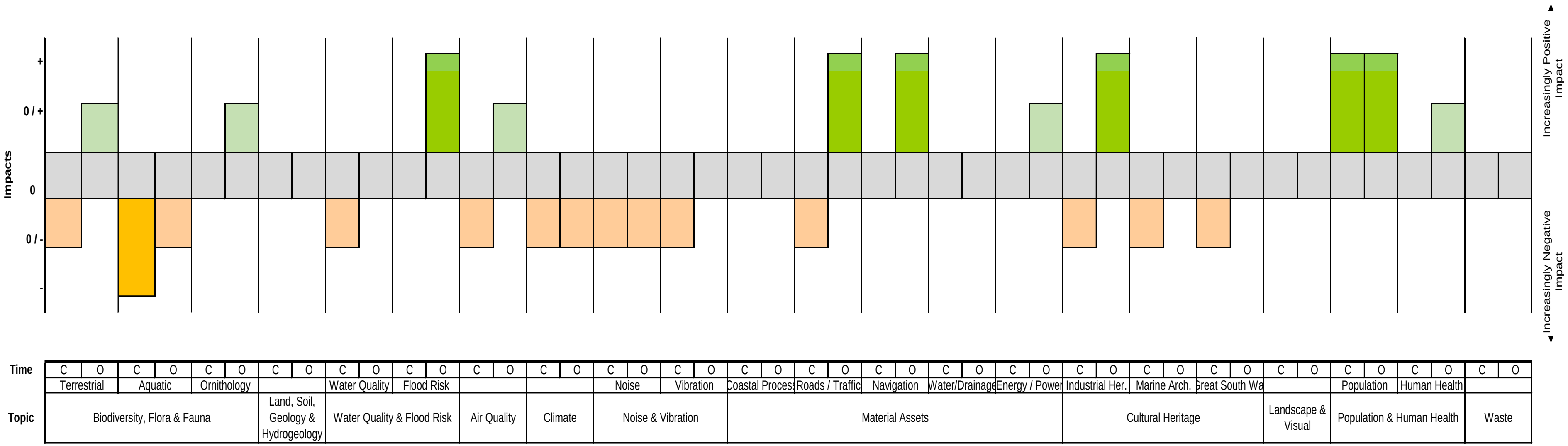
+	***positive potential impacts***
0 / +	***positive to neutral potential impacts***
0	***neutral potential impacts***
0 / -	***neutral to negative potential impacts***
-	***negative potential impacts.***



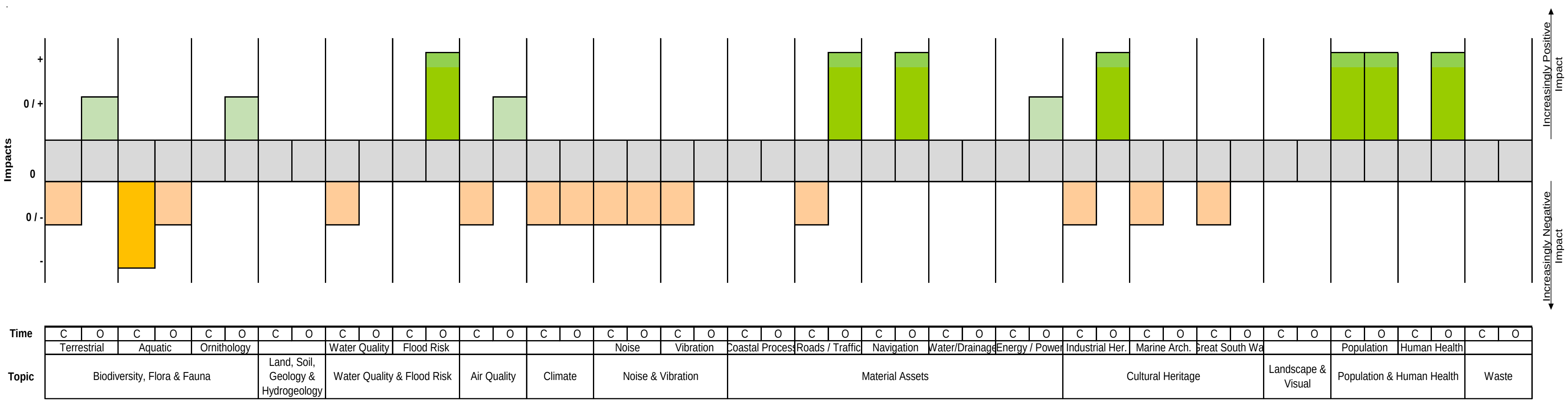
a) Option 0



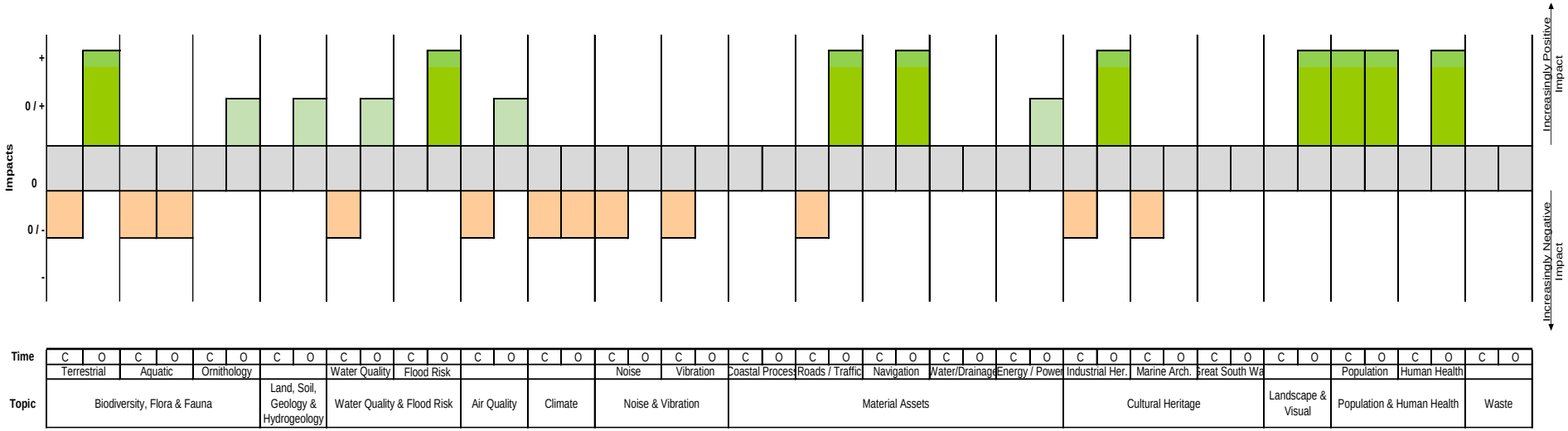
b) Option 1



c) Option 2



d) Option 3



e) Option 4

Figure 4.17 (a-e) Project Design and Process Design Evolution Environmental Assessment

This illustrates the potential negative impacts associated with the operational phase under the do-nothing scenario.

The trend in progressing do-something options shows a reduction in potential negative impacts due to layout, project design and process design changes and also the inclusion of mitigation measures developed by the environmental impact assessment process. The layout, project design and process design evolution has also enhanced potential positive environmental benefits, noting that these are linked to the long term positive impacts that the 3FM Project affords in terms of material assets, population & human health, air quality and improved flood risk management.

Option 4 is considered the best environmental option due to its delivery of the most positive potential benefits combined with the least minor negative potential impacts. Assessment of the project design and process design progressions demonstrates a number of environmental benefits and no additional potential impacts.

Potential construction phase impacts for Option 4 are associated with biodiversity, flora & fauna, water quality & flood risk, air quality, climate, noise and vibration, material assets and cultural heritage. However, these are all minor, temporary and/or short term and can be mitigated by design and process constraints such as working hours, timing/phasing of operations, method of construction and rate of construction. There remain potential positive construction phase benefits due to employment opportunities for population & human health.

Potential minor negative operational phase impacts were identified in relation to Option 4 for biodiversity, flora & fauna and climate associated with the increased operations. Again, notably operation phase impacts associated with congestion issues in the vicinity of the port in terms of noise & vibration, climate, air quality are reduced in comparison to the do-nothing option. Operationally, Option 4 achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), offering the associated positive impacts that this affords, in particular the inclusion of mitigation measures improve operational phase impacts for biodiversity, flora & fauna and landscape & visual and also improve noise, land, soils, geology & hydrogeology and water quality.

There are no construction phase, or operation phase, impacts anticipated on waste.

A comparative summary of the predicted effects of Option 1 and Option 4 was undertaken to show the changes in potential impacts through the do-something project design and process design evolutions. This comparative assessment is summarised in Table 4.8 and using the graphic in the Figure 4.18. The key differences are:

Biodiversity, flora & fauna

- increased benefit via the provision of additional lands to the Irishtown Nature reserve, plus inclusion of landscaped areas and open spaces including a wildflower meadow.
- reduction in potential impacts due to the monitoring regime putting in place for marine mammals throughout the construction period.
- reduction in potential impacts due to the selection of open piled design on the SPAR viaduct and Area N also with reduction of potential impact on bird roosting and feeding areas due to layout changes at the wharf in Area N.

- reduction in potential impacts due to the relocation of the turning circle to Area M (avoiding relocation of the tern colony and also reducing dredging and infill footprints and associated marine habitat and food source impacts) and development of an additional Tern Colony site.
- reduction of potential impact on the SPA for Brent geese (due to repositioning of access arrangements), this layout change also increased the opportunity to introduce perimeter landscaping with planted strips increasing biodiversity.
- avoidance of drainage impacts within the SPA by use of existing outfalls and attenuation storage.

Land, Soils, Geology and Hydrogeology

- reduced industrial usage associated with potential leachate to groundwater and also reduced risk of settlement and methane gas release at Area O.

Water Quality and Flood Risk Assessment

- reduced industrial usage associated with bulk coal/scrap metal transfers.

Noise

- reduced potential impact by adopting a layout change during the design stages and by providing noise mitigation at Area K.

Material Assets - Coastal Traffic and Transportation

- positive operation phase impact associated with the use of the SPAR and to the public road network associated with improved distribution of port related traffic on the road network and improved active travel of the Poolbeg Peninsula and the 3FM Project has been designed so that it does not compromise potential future LUAS route alignments. COMAH assessment has also resulted in avoidance of areas where the public would be at risk from existing facilities in refining these transportation assets.

Cultural Heritage

- reduced potential impact on the heritage value of the area by moving the turning circle to Area M, avoiding the risk of ships turning and causing erosion at the Great South Wall, keeping the line of the wall clear of permanent structures and restoring sections of the wall in Dublin Port Company ownership, and also the removal of the sludge jetty improving the seascape.

Landscape & Visual

- positive operation phase impacts associated with design of enhanced screening for the greenways, open spaces and public realm amenity areas which ensure that views of industrial port activity are screened from public view and also the removal of the sludge jetty improving the seascape.

Population & Human Health

- positive operation phase impacts associated with the extension/upgrade of the Southern Greenway and increased social amenity areas including a larger Maritime Village, park areas and the active travel routes.

Whilst some areas have been offered to alternative uses in the greater public interest, the Masterplan throughput has still been achieved by intensification of the use on remaining lands therefore not reducing the Project's

societal benefits. It should also be noted that all Do-Something options offer benefits in terms of relocation of the Lo-Lo activities away from residents, improved road infrastructure avoiding HGV congestion and the addition of amenity facilities (the Maritime Village, Port Park and the active travel corridors).

Table 4.8 Comparison of Potential Impacts of Option 1 and Option 4

Topic	Potential Impacts Option 1		Potential Impacts Option 4		Comment
	Construction Phase	Operation Phase	Construction Phase	Operation Phase	
Biodiversity, Flora & Fauna					
Terrestrial	-1	0	0	2	Potential for positive impacts due to 5.2ha given to nature conservation and open space, retention and enhancement of landscaping site perimeter planting areas. Reduced potential for negative impacts associated with the loss of marine habitats due to piles and infill. Potential for positive impacts associated with the gain of marine habitats due to pile faces. Potential for negative impacts to marine mammals associated with construction activities mitigated by developed measures. Avoidance of designated biodiversity and Tern Sites plus enhancement by providing additional Tern Colony Site.
Aquatic	-2	-1	-1	-1	
Ornithology	-2	-2	0	1	
Land, Soils, Geology & Hydrogeology					
	0	0	0	1	Potential for minor positive impacts by reduced industrial usage associated with potential leachate to groundwater and also reduced risk of settlement and methane gas release at Area O.
Water Quality and Flood Risk Assessment					
Water Quality	-1	0	-1	1	Potential for minor positive impacts by reduced industrial usage associated with bulk coal/scrap metal transfers.
Flood Risk Assessment	0	2	0	2	
Air Quality					
	-1	1	-1	1	No change.
Climate					
	-1	-1	-1	-1	No change.
Noise & Vibration					
Noise	-1	-1	-1	0	Mitigation measures include cargo handling equipment and electrified terminal tractors, low noise road surfacing and a noise barrier where required.
Vibration	-1	0	-1	0	
Material Assets					
Coastal Processes	0	0	0	0	Potential for positive impacts associated with the use of the SPAR and due to replacing roundabouts with signalised junctions to accommodate increased traffic. The 3FM Project has been designed so that it does not compromise potential future LUAS route alignments plus the inclusion of attractive travel routes and mitigation measures.
Roads/Traffic	-1	1	-1	2	
Navigation	0	2	0	2	
Water/Drainage	0	0	0	0	
Energy/Power	0	1	0	1	
Cultural Heritage					
Industrial Heritage	-1	0	-1	2	Potential for positive impacts associated with the improved seascape by demolition of sludge jetty. Movement of turning circle from the vicinity of the Great South Wall.
Marine Archaeology	-1	0	-1	0	
Great South Wall	-2	-2	0	0	
Landscape & Visual					
	0	0	0	2	Potential for positive impacts associated with design landscaping for the greenways, public realm amenity areas and the provision of open spaces.
Population & Human Health					
Population	2	2	2	2	Potential for positive impacts associated with improved active travel routing and increased social amenity areas including a larger maritime village.
Human Health	0	1	0	2	
Waste					
	0	0	0	0	No change.

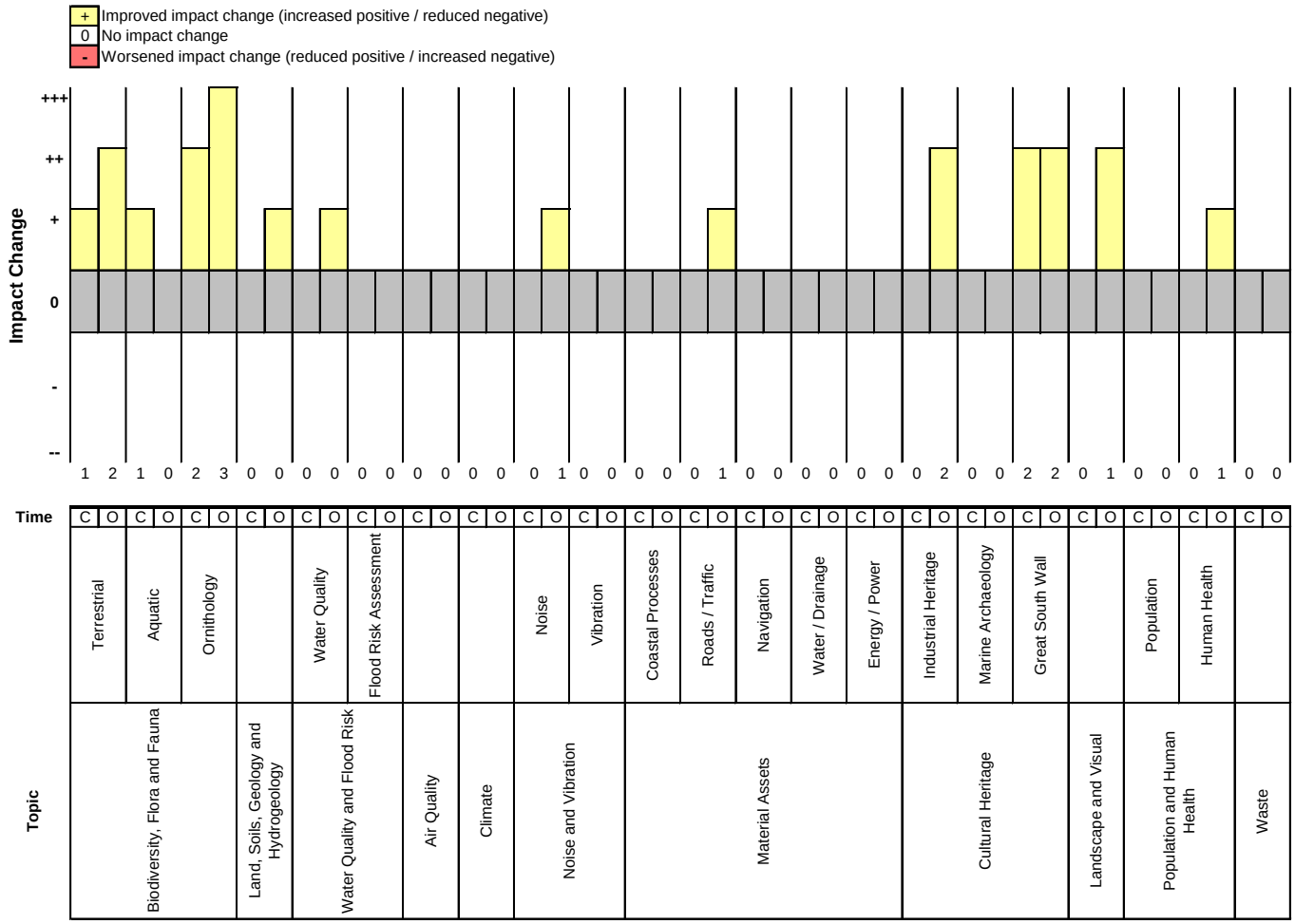


Figure 4.18 Comparison of Option 1 and Option 4

Option 4 represents the optimum project design and process design in terms of assessment of alternatives by providing greater potential positive benefit and minimum negative impact.

This preferred layout was developed following consultation, outline design, planning and environmental assessment to finalise the 3FM Project which is the basis of this EIAR.

This finalised layout therefore remains consistent with environmental assessment of the preferred design alternative (Option 4) as presented within this assessment and therefore offers the preferred project having thoroughly considered all environmental aspects and reasonable alternatives.

4.5 Summary of Consideration of Alternative Options

At strategic level, the Dublin Port Post-2040 Dialogue papers and the Masterplan identified the 3FM Project as a key element to implement, and underpin, the Masterplan's fundamental approach of providing the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), by maximising the utilisation of Dublin Port's brownfield lands. The assessment process in support of the Port's dialogue papers and the Masterplan identified that the development at this site and in this area of the Port is the most sustainable location and layout and therefore the desired approach from a strategic point of view.

The 3FM Project is concluded to be an essential final step in achieving Dublin Port's throughput objective. The provision of the Southern Port Access Route, Lo-Lo container terminal, Ro-Ro unaccompanied freight terminal, ship Turning Circle, public amenities and utilities infrastructure would allow optimisation of land-use on the port's land in the South Port Estate. Such facilities need access to berths and must therefore be located accordingly.

At outline design level, the evolution of both the proposed marine and landside structural works, and the associated dredging works, was considered to achieve the 3FM Project's objectives. The 3FM Project design evolution was carried out by RPS, supported by navigational and operational studies and with an integrated approach alongside the RPS planning and environmental teams.

The design team's approach to developing and progressing the scheme design was based on examining layouts of key infrastructure elements that avoided or minimised any adverse environmental impacts while meeting the requirements of the project brief. This design process and evolution was carried out in the context of a do-nothing (Option 0) scenario as a baseline case with stakeholder engagement, specialist planning and environmental inputs, specialist studies and site investigation information used to refine the design layouts.

There is a strong relationship between the infrastructural elements of the 3FM Project which required that all these elements were examined considering a wide range of environmental matters along with navigational safety within the port. Design took place in parallel through the design progressions to determine interactions, particularly at boundaries, and also in combination, in order to also determine the needs of the dredging and disposal and piling activities.

- **Option 1** - The initial design was based on the Masterplan, reviewed 2018 and developed via an iterative process. There are potential negative construction phase impacts associated with some environmental topics in the early stages of the project, which are more than the do-nothing option. However, these are generally temporary and/or short term impacts which can be further mitigated by design and process constraints such as working hours, timing/phasing of operations, method of construction and rate of construction. There are potential positive construction phase benefits due to employment opportunities. Potential negative operational phase impacts were identified in relation to the turning circle, infilling and a new access road which were addressed in later design progressions. Potential minor negative impacts in the operation phase were associated with increased operations. However, notably operation phase impacts associated with congestion issues in the vicinity of the port are reduced in comparison to the do-nothing option. Operationally the positive impacts are that, in contrast to the do-nothing (Option 0), this draft general arrangement (Option 1) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), providing noteworthy societal, economic & human health benefits, with associated operation phase environmental benefits.

- **Option 2** - Both the construction and operational phase impacts for Option 2 are lesser than those associated with Option 1 due to key design for the turning circle, access road and transportation (including design that does not compromise potential future LUAS route alignments) and utilities. There are negative construction phase impacts associated with some environmental topics in the early stages of the project which are generally similar to, but lesser than, those for Option 1. However, noteworthy improvements are gained by the avoidance of impacts on cultural heritage and also reduction of the biodiversity, flora & fauna impacts. The remaining negative construction phase impacts are generally reduced to minor, temporary and/or short term and can be further mitigated by design and process constraints (working hours, timing/phasing of operations, method and rate of construction). There remain positive construction phase benefits due to employment opportunities. Minor negative operational phase impacts were identified again associated with increased operations, but in contrast, operation phase impacts associated with congestion issues in the vicinity of the port are reduced in comparison to the do-nothing option. Operationally Option 2 achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), offering the associated positive impacts that this affords. Emerging impacts were developed during consultation with key stakeholders and from feedback from the first consultation room which related to infilling (to be addressed on completion of site investigation) and traffic movements and the Maritime Village configuration which also were addressed in later design progressions.
- **Option 3** - The impacts improved compared to those associated with Option 2 due to the key design changes identified during this evolution for evolution of road and active travel route upgrades, Maritime Village and Lo-Lo container terminal design iterations to enhance amenity and reduce environmental impact. There remain negative construction phase impacts associated with some environmental topics in the early stages of the project which are generally similar to Option 2 which are generally minor, temporary and/or short term and can be further mitigated by design and process constraints (working hourss, timing/phasing of operations, method and rate of construction). There remain positive construction phase benefits due to employment opportunities. Minor negative operational phase impacts were identified again in relation to Option 3 increased operations, contrasted by reduced operation phase impacts associated with congestion issues. Operationally, Option 3 achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), offering the associated positive impacts that this affords. Design uncertainty remained due to the outstanding marine site investigation results which influenced the structural form of the Lo-Lo container terminal and the SPAR Road along the shoreline. At Area O a further boundary refinement was also identified for consideration during consultations.
- **Option 4** - The construction and operation impacts improved compared to those associated with Option 3 due to the key design changes identified during this evolution. The key design changes were: a layout alternative using Area L for container storage and Area O as a Ro-Ro Freight Terminal which reduced operational impact with reduced industrial usage and further enhanced biodiversity and visual aspects of the project by further enhancing landscaping treatments and giving a greater area over to the Irishtown Nature Reserve; the selection of open piled design for the Lo-Lo container terminal and SPAR viaduct, which reduced potential negative impacts; and, the inclusion of further mitigation such as providing a noise barrier and low carbon alternative construction methods and materials, restoration of sections of the Great South Wall. The remaining minor negative construction phase impacts associated with some environmental

topics in the early stages of the project are generally similar, but lesser than those of Option 3. Improvements are gained by the offsetting of construction impacts on cultural heritage by wall restoration on other stretches. These remaining minor, temporary and/or short-term impacts can be mitigated by design and process constraints contained in the CEMP such as working hours, timing/phasing of operations, method and rate of construction. There remain potential positive construction phase benefits due to employment opportunities. Potential minor negative operational phase impacts associated with increased operations contrasted to reduced operation phase impacts associated with congestion issues. Operationally Option 4 achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), potentially offering the associated positive impacts that this affords.

- The environmental assessments developed a suite of avoidance, prevention, reduction, or offsetting mitigations, to be accommodated within the final outline design which reduced potential negative impacts during construction and operational phases to minor potential impacts. The minor negative construction impacts are addressed by mitigation measures. The minor negative operation phase impacts on aquatic ecology and climate are mitigated by ongoing monitoring and substitution of materials respectively. The climate impacts are reduced in comparison to port demand increase without the infrastructural investment as represented in the do-nothing option. Option 4 has also developed potential positive impacts due to construction phase employment and those in the operational phase associated with the following environmental topics; biodiversity, flora & fauna and visual & landscape and also improve noise, land, soils, geology & hydrogeology and water quality.

- **Dredging & Disposal/Re-use Works** - A number of alternative dredging and disposal options were examined including: do-nothing; beneficial re-use; disposal on land; incineration and disposal at sea. The option identified for suitable (Class 1) materials was a combination of disposal at sea and re-use with computational modelling undertaken to determine appropriate method, rate, timing and location of these activities. The disposal of the Class 2 element of dredged sediment from the Maritime Village / Marina will, in order of preference, be:
  - Filled to berth 52/53 under a revised IE licence subject to availability of receptor capacity;
  - Recovered at a soil recovery or soil treatment facility in Ireland subject to testing of the sediments in line with the selected facility licence at the time of the works;
  - Recovered at a soil treatment facility in Great Britain or northern Europe; or
  - Disposed of at a licenced landfill facility in Ireland.

  No noteworthy environmental impacts of the design choices were identified.

- **Piling Works** – there are a number of 3FM Project elements that require piled foundations. Alternatives were examined including: do-nothing; alternative materials and associated alternative technologies, with different associated construction forms (such as concrete piles and gravity walls). The further alternatives assessment selected Tubular Steel Piles (open jetty structures and crane rails), with Steel Sheet Piles and Steel Combi-Walls (infilled jetties and quay walls) for the marine structures. A combination of vibrodriving and impact driving methods was selected. Landside structures and buildings utilise conventional driven and bored pile foundations. A number of potential environmental impacts of these choices are less favourable than the do-nothing scenario, however these may be mitigated with good practice, which is demonstrated by the ongoing ABR Project piling works. The positive impacts of this aspect of the Project upon the

prosperity of the population (regionally and nationally, as well as socially and economically) were the reason for choosing to pursue this design.

The key design evolutions, which were supported by environmental considerations under the assessment of alternatives for the 3FM Project elements, are set out below:

1. **Southern Port Access Route (SPAR)** a new opening bridge across the River Liffey was developed along with new and upgraded roads and junctions that considered a range of operational, construction and environmental factors. The route will facilitate HGVs, active travel users (pedestrians, cyclists, wheelers etc), blue light services and public transport users moving to and from the South Port Estate and Poolbeg Peninsula. The SPAR will allow the 3FM Project to be fully rail enabled through the rapid shunting of freight by electric vehicles from the South Port Estate, across the Liffey, to rail intermodal facilities in the vicinity of the North Port Estate. The SPAR will have a direct connection to the Dublin Tunnel via the North Port Estate road system. The proposed bridge is elevated above design flood levels, aesthetically considered, and importantly links the North and South Port Estates affording capacity for port growth. The SPAR section along the shoreline adjacent to the east link toll plaza changed in form from an embankment to a viaduct offering reduced construction time and environmental benefits due to minimisation of infill and permanent loss of habitat. Road vertical alignments also considered environmental factors, visual considerations meant a section was reduced in elevation to retain existing views of the seascape, and noise mitigations and low carbon alternative construction methods and materials were introduced into the final design iteration. A refined series of access junctions also considered movements within the port. Alternative designs considered active travel provision and potential future light rail configurations again to improve the amenity of the 3FM Project. Consideration of the crossing of the Great South Wall led to the proposals to restore stretches elsewhere within the Port owned lands and to develop a conservation management plan and vision for the Great South Wall through the 3FM Project.

2. **Lo-Lo container terminal** the new facility provides additional port capacity and evolved in terms of layout and structural form to address construction and environmental considerations. The layout of Area N which provides 650m of deep water berthage accommodated bird roosting and feeding constraints and cultural heritage concerns. The selected open piled structural form for the Terminal also minimised infilling avoiding permanent loss of habitat and impacts on coastal processes and water quality. In addition, the relocation of this facility (away from its former location in Area K) affords an improved environment to residents in the vicinity of Area K whilst not impacting receptors at Area N or Area L. The layout of the transit container storage yard (initially at Area O and then relocated to Area L) created opportunities to complete the Masterplan by reducing current industrial usage in Area L and therefore created environmental improvement opportunities at Area O whilst avoiding potential noise and visual impacts to receptors in that vicinity.

3. **Ro-Ro freight terminal** the new facility provides additional port capacity, its evolution provides for reinforcement and reuse of existing quay walls with an operational layout which accommodated boundaries modified to the west (increasing the Maritime Village) and the east (accommodating existing services). Alternative site access and freight/container configurations reduced traffic movements across the line of the Great South Wall and located container stack operations remote from receptors. A transit Ro-Ro freight terminal located in Area O, minimised settlement and methane gas release risk form this former municipal site and also created environmental improvement opportunities in accommodating DCC's district heating

scheme, augmenting Irishtown Nature Reserve (avoiding initial potential impacts by avoiding a new access road), open space including Port Park, a coastal park and a wildflower meadow and also provided landscaping and screening opportunities.

4. **Ship turning circle** this changed location to avoid impact to the Great South Wall and also accommodated the Port's navigation movements, roosting bird populations and structural form to accommodate the offshore wind sector. The consideration of the turning circle also resulted in the development of a Tern Management Plan and provision of an additional Tern colony. It is important to note that this element facilities the safe and efficient manoeuvring of the shipping to the north port as well as the proposed Southern port development.
5. **Maritime Village** was an environmental gain afforded as part of the 3FM Project, it was developed, in consultation with stakeholders, to accommodate local rowing, sailing, and boat clubs and will provide an enhanced public realm and facilities on the waterside. It will also accommodate the relocation of Port Harbour Operations from the North Port. The number of berths and water facilities have been increased for future use and the land based facilities enhanced to form a focal point of community gain. The initial concept for the Maritime Village considered environmental constraints including the location of the Great South Wall and the concept was developed to create a family of separate buildings for sailing, rowing, local boat owners, community and maritime training facilities. The overall facilities were architecturally designed incorporating high quality material finishes, public realm features and landscaping.
6. **Community Gain, i**ntegrating Dublin Port with Dublin City and its people is a core objective of the Masterplan for Dublin Port, these elements combine to form an environmental gain afforded as part of the 3FM Project. Development of proposed new public amenities on the Poolbeg Peninsula will provide **community gain** and contribute towards integrating the port with the city. These include:

   Enhanced **recreational amenity** through:

   - 7km of Active Travel Path (cycle, pedestrian, wheelers etc) and 4.9km of new or upgraded footway for the North Port, SPAR and Poolbeg Peninsula, which will link with the 1.4km Liffey Tolka Greenway in the North Port, and from there to the 4.0km Tolka Estuary Greenway currently under construction by Dublin Port. The design of the Active Travel Path considered planning criteria and movement policies as well as environmental constraints and opportunities to enhance the project for users and stakeholders. The routes included stop points and a character area, with designed surface and edge treatments and lighting and hard and soft landscaping. DPC will provide Dublin City Council with a €5million contribution for future upgrading of the existing coastal path along the southern perimeter of the Poolbeg Peninsula.
   - Development of a sailing, rowing and maritime training campus (Maritime Village) adjacent to the existing Stella Maris Rowing, Poolbeg Yacht and Boat Club in conjunction with local yacht and boating clubs and local boat owners, including a public slipway and facilities for maritime skills training.
   - Provision of Open Space with a Port architecturally design and landscaped to include parkland, sport pitch and pavilion features and Wildflower Meadow (2.5ha) and Coastal Park (1.6ha).
   - Provision of 1.1ha extension to Irishtown Nature Park.

   Enhanced **public realm** through:

   - Development of a new public plaza as a key part of the Maritime Village.
   - Extensive boundary softening works adjacent to the development sites forming part of the 3FM Project.

Community support through:

- Establishment of a new €2 million Community Benefit Fund for Education, Heritage & Maritime Training Skills projects within the Poolbeg area. The initial capital for the Fund will be administered by DPC in consultation with local stakeholders.

Heritage & Biodiversity enhancements through:

- Commissioning a new Public Access Feasibility Study regarding the Great South Wall so as to identify improved public interpretation, accessibility, facilities and conservation possibilities,
- Provision of up to €1 million funding to implement the study recommendations.
- Provision of an additional permanent marine structure (dolphin) to expand the available habitat and range of the Dublin Port Tern Colonies.

During the design evolution these changes resulted in an improving trend with each alternative reducing potential negative impacts due to layout and design changes and also the inclusion of mitigation measures developed by the environmental impact assessment process. These changes and mitigations also enhanced potential positive environmental benefits for each alternative, noting that the most noteworthy of these are linked to the positive impacts that the 3FM Project affords in terms of material assets, population & human health, air quality and improved flood risk management.

Option 4 is considered the best environmental option due to its delivery of the most positive potential benefits combined with the least minor negative potential impacts. Assessment of the design progressions demonstrates a number of environmental benefits and no additional potential impacts with this final alternative.

Potential construction phase impacts for Option 4 are associated with biodiversity, flora & fauna, water quality & flood risk, air quality, climate, noise & vibration, material assets and cultural heritage. However, improvements are gained by the offsetting of construction impacts on cultural heritage by wall restoration on other stretches and biodiversity, flora & fauna due to redesign of the Lo-Lo container terminal and SPAR viaduct. The remaining potential negative construction phase impacts are all minor, temporary and/or short term and can be mitigated by design and process constraints contained in the CEMP such as working hours, timing/phasing of operations, method of construction and rate of construction. There remain potential positive construction phase benefits due to employment opportunities for population & human health.

Potential minor negative operational phase impacts were identified again in relation to Option 4 biodiversity, flora & fauna and climate associated with the increased operations. Again, notably operation phase impacts associated with congestion issues in the vicinity of the port in terms of noise & vibration, climate, air quality are reduced in comparison to the do-nothing option. Operationally draft general arrangement (Option 4) achieves the port's ultimate capacity by 2040 (73.8m tonnes of cargo throughput annually), potentially offering the associated positive impacts that this affords, in particular the inclusion of mitigation measures improve operational phase impacts for biodiversity, flora & fauna and visual & landscape and also improve noise, land, soils, geology & hydrogeology, air quality and water quality.

The key environmental differences delivered by the design evolution are:

Biodiversity, Flora & Fauna

- increased benefit via the provision of additional lands to the Irishtown Nature reserve, additional open spaces and a wildflower meadow plus the inclusion of landscaped areas.
- reduction in potential impacts due to the monitoring regime putting in place for marine mammals throughout the construction period.
- reduction in potential impacts due to the selection of open piled design on the SPAR viaduct and Area N also with reduction of potential impact on bird roosting and feeding areas due to layout changes at to the wharf at Area N.
- reduction in potential impacts due to the relocation of the turning circle to Area M (avoiding relocation of the tern colony and also reducing dredging and infill footprints and associated marine habitat and food source impacts) and development of an additional Tern Colony site.
- reduction of potential impact on the SPA for Brent geese (due to repositioning of access arrangements), this layout change also increased the opportunity to introduce perimeter landscaping with planted strips increasing biodiversity.

Noise

- reduced potential impact by relocating existing container facilities to Areas N and L and providing noise mitigation at Area K.

Material Assets

- positive operation phase impact associated with the use of the SPAR and to the public road network associated with improved distribution of port related traffic on the road network and improved active travel of the Poolbeg Peninsula and the 3FM Project has been designed so that it does not compromise potential future LUAS route alignments. COMAH assessment has also resulted in avoidance of areas where the public would be at risk from existing facilities in refining these transportation assets.
- accommodation for future utilities within the Masterplan area.

Cultural Heritage

- reduced potential impact on the heritage value of the area by moving the turning circle to Area M, avoiding the risk of ships turning and causing erosion at the Great South Wall, reinforced by the development of a conservation management plan and vision for the Great South Wall through the 3FM Project, keeping the line of the wall clear of permanent structures and restoring sections of the wall in Dublin Port Company ownership, and also the removal of the sludge jetty improving the seascape.

Landscape & Visual

- positive operation phase impacts associated with design of enhanced screening for the greenways and public realm amenity areas which ensure that views of industrial port activity are screened from public view and also the removal of the sludge jetty improving the seascape.
- development of the active travel route with stop points and sections along the waterside, and in particular, the Maritime Village which includes community spaces and amenities.

Population & Human Health

- positive operation phase impacts associated with the extension/upgrade of the Southern Greenway and increased social amenity areas including a larger Maritime Village, park areas and the active travel routes.

Lands, Soil, Geology & Hydrogeology

- reuse of former industrial areas reduce potential pollution pathways and using the former municipal site for single height freight/container storage reducing the risk of settlement and methane gas release.

There are no impacts at construction or operational phases for waste. For air quality and climate there are improvements over the do-nothing option and also for water quality & floods whilst there are potential short term impacts during construction which can be mitigated (as has been demonstrated during previous Dublin Port construction projects) there is a gain in providing new infrastructure to accommodate increased flood levels in future climate change scenarios again compared to the do-nothing scenario.

Whilst some areas have been offered to alternative uses in the greater public interest, the Masterplan throughput has been achieved by intensification of the use on remaining lands therefore not reducing the Project's societal benefits. It should also be noted that all do-something options offer benefits in terms of relocation of the Lo-Lo activities away from residents, improved road infrastructure avoiding HGV congestion and the addition of amenity facilities (the Maritime Village, Port Park and the active travel corridors).

Option 4 is therefore the preferred option as it is considered the best environmental option due to its delivery of the most positive potential benefits combined with the least minor negative potential impacts. This is the option that the 3FM Project EIAR assesses.