Alexandra Basin Redevelopment 2

Bringing Dublin Port To 2040

Environmental Impact Assessment Report

Chapter 4 Assessment of Alternatives

Volume 2



CALAFORT ÁTHA CLIATH
DUBLIN PORT

TETRA TECH

4 Assessment of Alternatives

Chapter Contents

4 Assessment of Alternatives 4-1
4.1 Introduction 4-2
4.2 Strategic Level Options – is this the right site? 4-6
4.3 Strategic Level Options – is this the right site layout? 4-13
4.4 Project Level Options – is this the right project design and process design? 4-24
4.5 Summary of Consideration of Alternative Options 4-54

4.1 Introduction

The Environmental Impact Assessment (EIA) Directive requires an Environmental Impact Assessment Report (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 relevant project in order to meet its agreed objective. Dublin Port Company (DPC), as the developer of the ABR2 Project, has considered a range of practicable alternatives in relation to the ABR2 Project, including:

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

The assessment of alternatives for the ABR2 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 strategic or plan level (which the EU Commission guidance states *"it would likely be unnecessary to consider them again");* and
- those assessed at project level (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**.

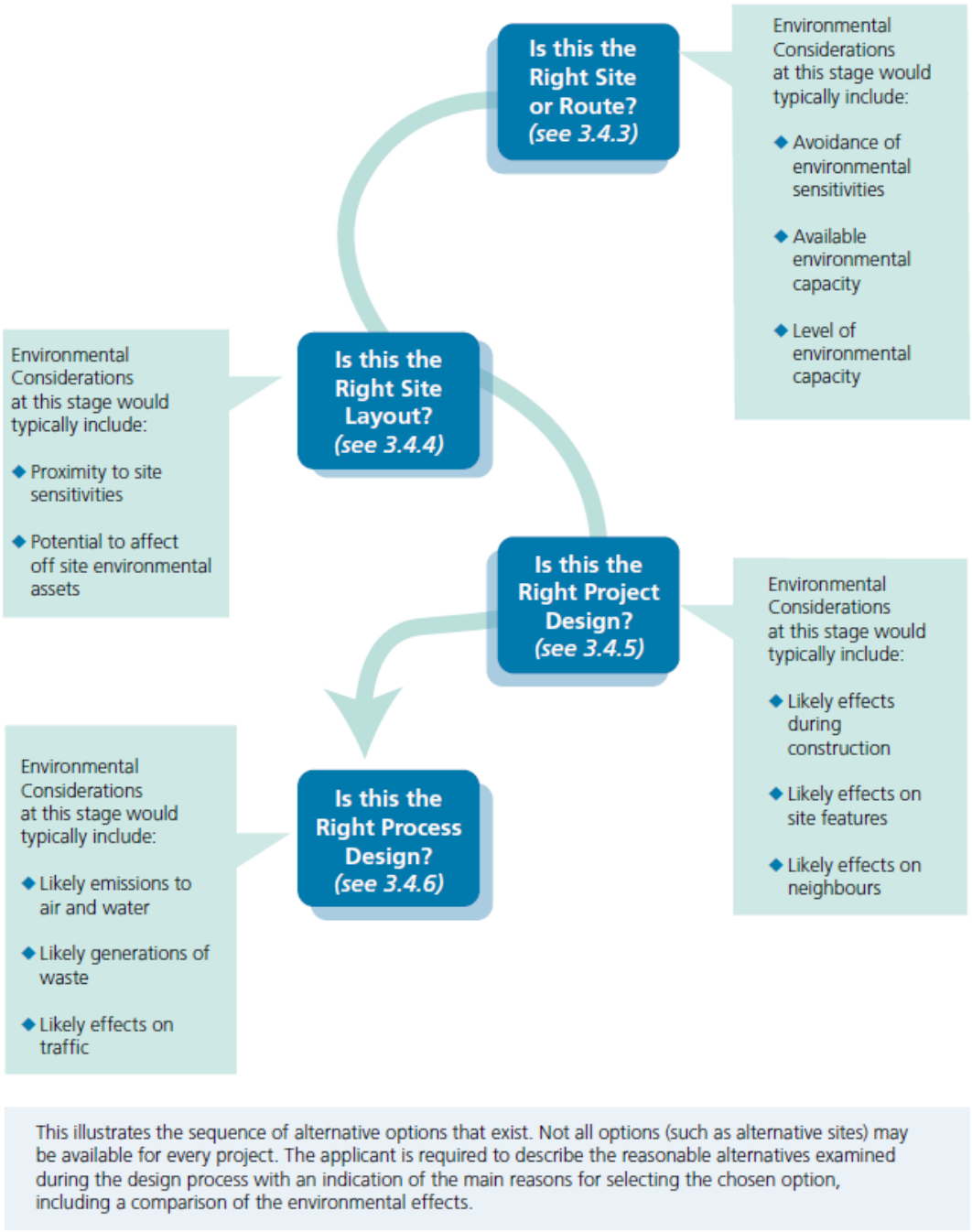


Figure 4-1: Consideration of Alternatives in an EIAR (excerpt from EPA Guidelines 2022 Figure 3.3)

Three capital development projects have been developed under the DPC Masterplan;

- The ABR Project – granted a 10-year permission in 2015;
- The MP2 Project – phased development in the northeastern part of the Port Estate granted a 15-year permission in 2020; and

- The 3FM Project – intended to deliver increased capacity primarily on Port lands on the Poolbeg Peninsula, currently before An Coimisiún Pleanála (the Commission).

The proposed ABR2 Project consists of the completion of DPCs first Strategic Infrastructure Development (SID) project, known as the ABR Project, which was not fully completed before the grant of planning permission expired in July 2025.

When completed by the ABR2 Project, alongside the two other SID and other associated projects, the ABR Project in its entirety will support the delivery of the full capacity for growth up to 2040 (termed the maximum throughput capacity) envisaged in the Dublin Port Masterplan 2040.

The ABR2 Project, which is not itself an SID project, consists of the completion of the remaining works permitted as part of the ABR Project, but which were not able to be completed during the currency of that permission. It consists of the following elements:

1. Final phase of dredging within Alexandra Basin West, including treatment of sediment.
2. Demolition of existing marine infrastructure and subsequent infilling of the Terminal 5 Ro-Ro basin using treated material.
3. Raising yard levels at Terminal 5 to facilitate the construction of the future Unified Ferry Terminal (already permitted under the MP2 Project).

No expansion beyond the existing port footprint is proposed.

The consideration of alternatives relating to the ABR2 Project have been addressed following the EPA guideline's logical sequential approach:

- The project's site location 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 ABR2 Project's site layout alternatives were addressed, at strategic level, in the Dublin Port Masterplan (reviewed 2018) with supporting high level environmental reports, available at Masterplan Documents - Dublin Port;
- The ABR2 Project's project design alternatives are a key part of this EIA process, these evolved at project level, during the feasibility and engineering outline design evolution as summarised within this chapter; and
- The ABR2's process design alternatives are also a key part of this EIA process at project level, similarly their evolution and consideration are summarised within this chapter.

This chapter of the EIAR 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 in 2018), and the subsequent, more detailed, project-level feasibility development and outline design evolution of the ABR2 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 evolution process primarily considered the design and process alternatives (including alternative locations, layouts, methods and materials), conducted on the basis of EIA topics.

This chapter should be read in conjunction with **Chapter 2 Project Justification**, as this provides the statement of need and land-use planning support for the ABR2 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. **This represents a do-nothing option at strategic, Dialogue Paper level, and would be a business-as-usual scenario which would not deliver the growth objectives.**

Even with the redevelopment of the Port Estate envisaged by the three capital development projects, and other projects, the existing port would have run out of capacity earlier than 2030. **Redevelopment of the existing Port Estate represents a baseline scenario for the purposes of this ABR2 Project strategic assessment of alternative site locations, however, it is a time limited option, only viable until 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 within the current confines of the Port Estate. 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. **These viable options therefore represent alternative site locations to the existing Port Estate for the purposes this ABR2 Project strategic assessment of alternative site locations.**

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 identified sites could be used as alternatives to, or in conjunction with the current Port Estate, dependant on growth projections, planning horizon and site scale and layout.

A series of origin and destination surveys of the Heavy Goods Vehicles (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 would have to be located on Ireland's eastern coast in order to serve Dublin Port's hinterland. Furthermore, these sites would have to 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.

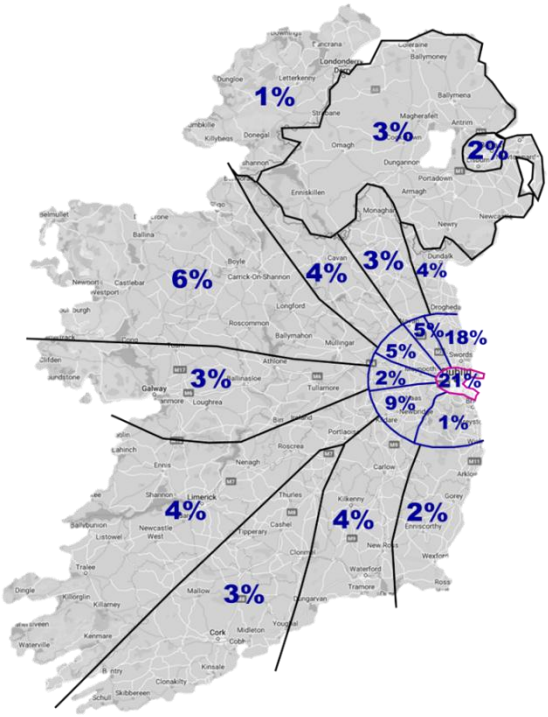


Figure 4-2: Dublin Port Origin Destination Study

4.2.1 Description of Strategic Site Alternative Scenarios

DPC's site selection process identified that, apart from the existing Dublin Port Estate, 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 were not considered as reasonable site alternatives for DPC to assess in the context of the ABR2 Project. If the operators of existing facilities were to develop them independently of DPC's proposed ABR2 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 ABR2 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" redevelopment of the existing Dublin Port estate, which the ABR2 Project forms a key element of.

The strategic site location 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 lands (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 identified the two appropriate alternative 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 would each represent a large project requiring substantial planning, consenting and construction.

The total area of the current Dublin Port Estate (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 options was undertaken by considering the headings in the SEA Directive:

- Biodiversity, Flora & Fauna
- Population & Human Health
- Geology, Soils and Landuse
- Water
- Air, Noise & Vibration
- Climatic Factors
- Material Assets & Infrastructure
- Cultural, Architectural & Archaeological Heritage
- Landscape & Visual Amenity.

All were found to have similar levels of potential negative environmental impact. While the environmental impacts associated with the smaller DP1.5 development were lesser when compared to the DP2.0 project, these were still considered to be either of moderate or significant scale during construction.

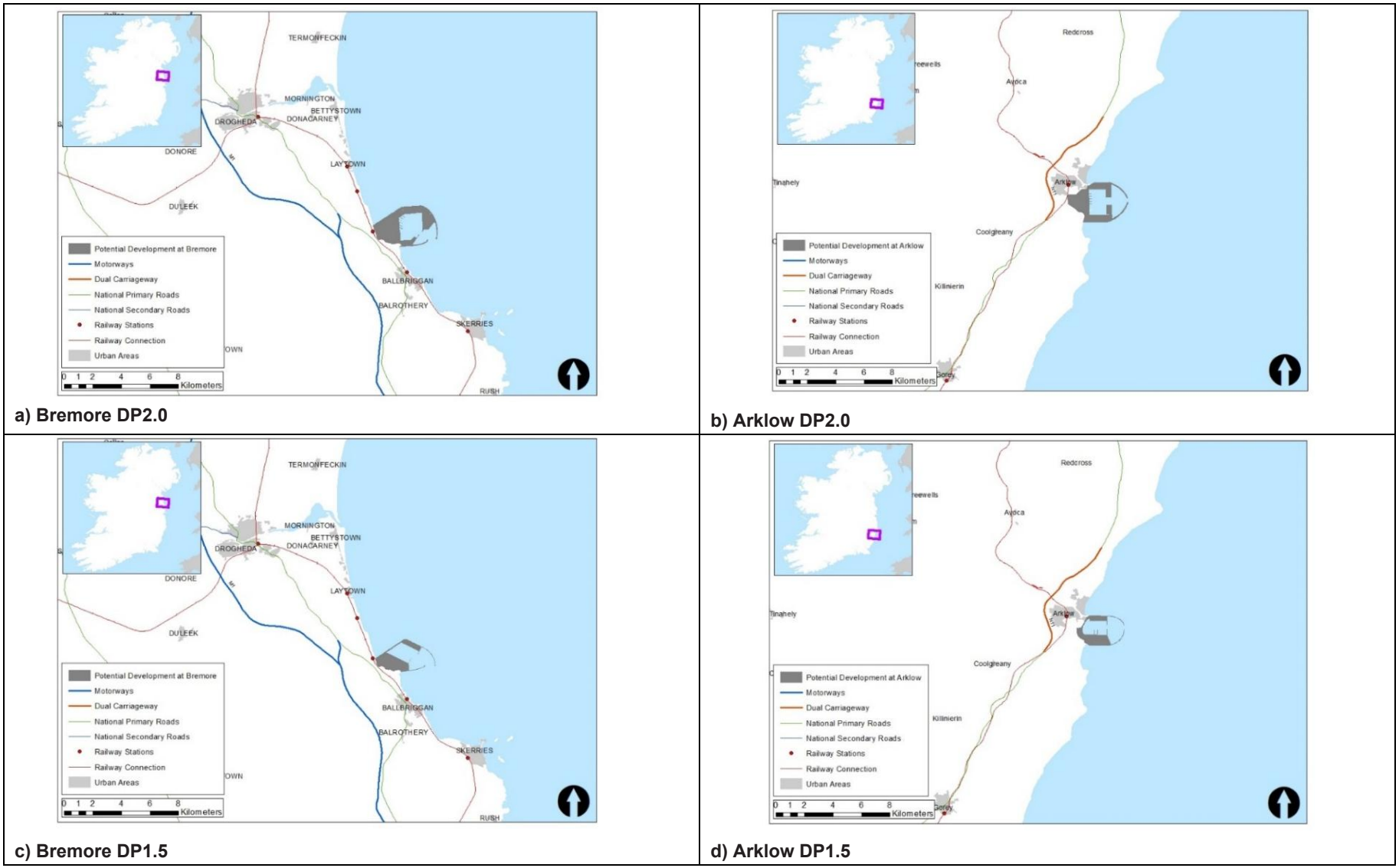


Figure 4-3: Consideration of New Site Alternatives (a-d)

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)

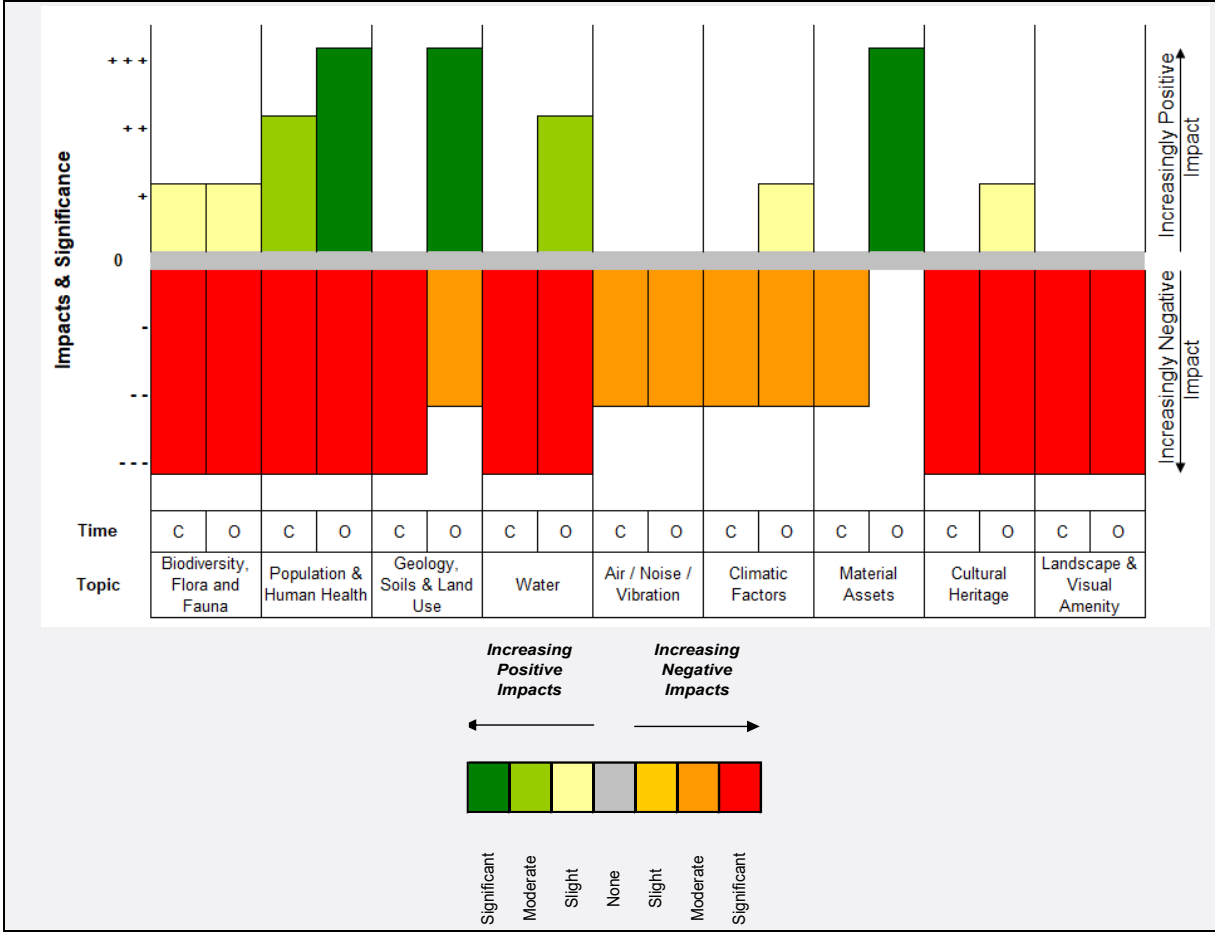


Figure 4-4: Environmental Assessment of New Site Alternatives

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).

Any large infrastructure project must of necessity have regard to impact of the project on the environment. 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 (now An Coimisiún Pleanála) for planning permission for an IROPI port project. The Commission granted permission in a landmark decision dated the 9th of April 2026 (PA0033).

Consequently, these new "greenfield" sites are not considered to represent reasonably practicable site alternatives to the "brownfield" redevelopment of the existing Dublin Port estate. 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 construction cost inflation from 2020 prices has been significant.

Similarly, DP1.5 would be very costly to build, having been estimated at €3.9 billion (at 2020 prices) at Arklow and €4.2 billion at Bremore, again with concern regarding timescale and post-2020 construction cost inflation linked to these estimates.

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

DPC concluded, in its 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 the identified 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 maximum 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: the ABR, MP2 and 3FM Projects.

DPC recognised the uncertainties in projections and planning timescales for this level of project. It has concluded that completion of the three capital development projects within the existing (brownfield) Port Estate is necessary in order to achieve the Port's maximum throughput capacity by 2040. These projects 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 location alternatives identified that the proposed site of the ABR2 Project 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 site location option, having duly considered the detailed alternative strategic locations set out in this Chapter, is therefore to progress the ABR2 Project within the exiting Dublin Port estate.

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

The Dublin Port Masterplan 2040 is a long-term strategic vision and framework prepared by DPC to guide future development, infrastructure investment and land use for Dublin Port. First published in 2012, following a period of extensive public consultation, the Masterplan was reviewed in 2018 to reflect changes in trade, policy and economic conditions. The Masterplan is a roadmap for how Dublin Port should grow and evolve sustainably to 2040.

The Masterplan do-nothing strategic level option, again, would have been a business-as-usual scenario, which would not deliver the growth objectives. **This represents the do-nothing scenario for the purposes of this ABR2 Project strategic assessment of alternative site layout.**

DPC considered the redevelopment of the existing Dublin Port estate, north and south of the Liffey, as part of this original plan level assessment process. Alternative development options for the Port were considered with regard to their layout (including the size and scale of port facilities), feasibility and reasonableness. A viable strategic option was presented in the original Masterplan 2012 layout which **represents a baseline layout scenario for the purposes of this ABR2 Project strategic assessment of alternative site layout**.

During the review of the Masterplan, further 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 were undertaken and presented for public consultation, in order to establish the updated strategic needs for the redevelopment of the existing Dublin Port estate, thus identifying the SID Projects, and other projects, to be taken forward to this more detailed planning phase. These alternative layouts identified a viable layout that could work, in conjunction with an Inland Port facility, to provide the required capacity avoiding the infill area proposed in the Masterplan 2012. **This viable, Masterplan 2018 layout option, therefore represents an alternative site layout for the purposes this ABR2 Project strategic assessment of alternative site layout.**

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

Completion of the ABR Project, through this ABR2 Project, is an essential step to implement the reviewed Masterplan's fundamental objective of providing the port's maximum throughput capacity by 2040. This would be achieved by maximising the utilisation of Dublin Port's existing "brownfield" lands and infrastructure, which, in the context of the ABR2 Project, includes a final phase of dredging within Alexandra Basin West, treatment of the contaminated dredge sediment, infilling of the Terminal 5 Ro-Ro basin (basin of Berths 52/53) (using this treated material) and raising associated yard levels to facilitate the development of the future Unified Ferry Terminal (already permitted under the MP2 Project).

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 ABR2 Project. A number of potential scenarios were assessed yielding a full range of potential options as follows:

- No Port Expansion:
    - No port expansion. (This represents a non-viable, strategic **do-nothing scenario Option 0**).
- 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 the 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 maximum throughput capacity by 2040. 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 (Masterplan 2012), which comprised rationalising existing facilities, increasing berthage in the North Port Estate and South Port Estate, 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 analysis to provide a reference point against which other options could be assessed. The development projects within the short and medium timescales are illustrated in **Figure 4-5 (a & b)**. Port operations would be ongoing in tandem with the proposed developments throughout the period of the Masterplan.

Option 2: This option (Masterplan 2018), comprised rationalising facilities, increasing berthage in the North Port Estate and South Port Estate, 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 ABR2 Project forms a significant element of this option. 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 **Figure 4-5 (c & d).** Again, port operations would be ongoing in tandem with proposed developments throughout the period of the Masterplan.

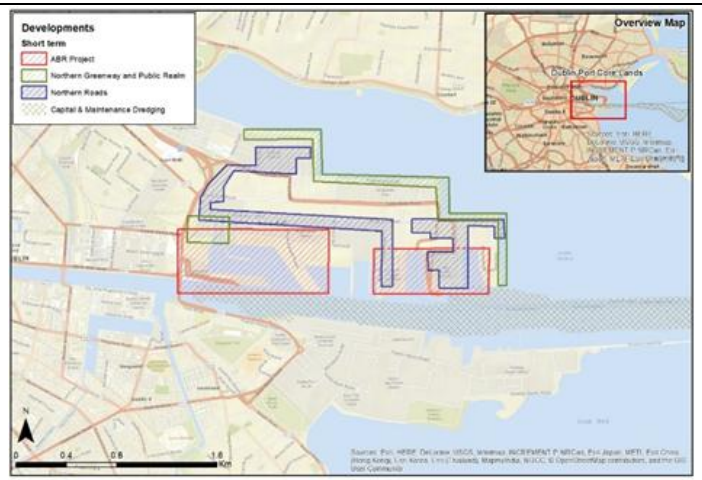
The potential option of rationalising facilities, increasing berthage in North Port and South Port lands, improving road infrastructure and developing an additional coastal port facility external to Dublin Port was addressed in the Masterplan review. This was not considered to be achievable within the 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).

Table 4-1: Details of How the Options were identified in Technical Assessment

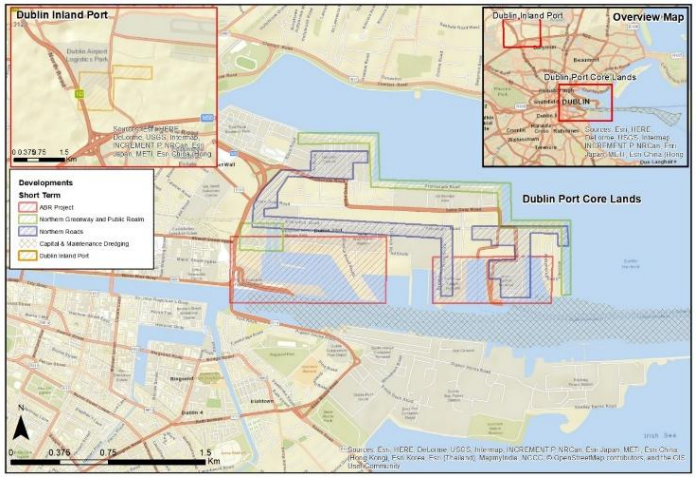
Long List of Options	Achieves Throughput of 73.8m Tonnes Technical Screening	Short list of Options	Short Description
No Port Expansion			
No port expansion	**Fail** Does not provide adequate expansion	Do-Nothing **OPTION 0**	No further port expansion once projects through the planning process are completed. The existing port lands continue the present day/*status quo* operations and facility use, at Masterplan review stage, the ABR Project 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.

Long List of Options	Achieves Throughput of 73.8m Tonnes Technical Screening	Short list of Options	Short Description
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 Estate (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 Estate (MP2 Project) and development of new quays within the South Port Estate, 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.

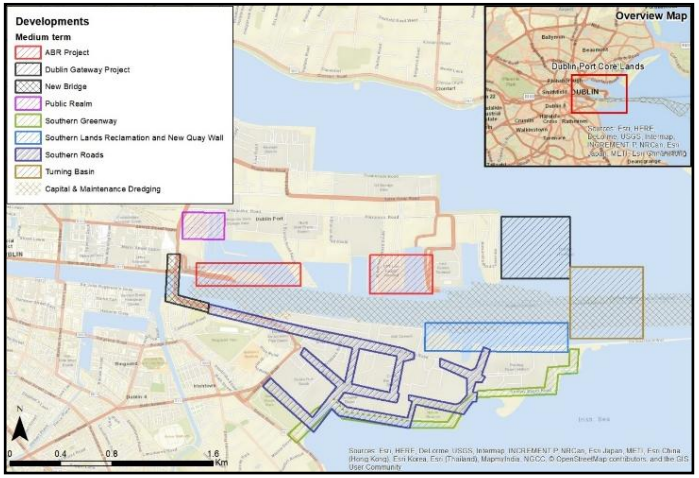
Long List of Options	Achieves Throughput of 73.8m Tonnes Technical Screening	Short list of Options	Short Description
Rationalise facilities, increase berthage in North and South Port lands, improve road infrastructure and develop additional Coastal Port Facility external to Dublin Port.	**Fail** Provides 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.



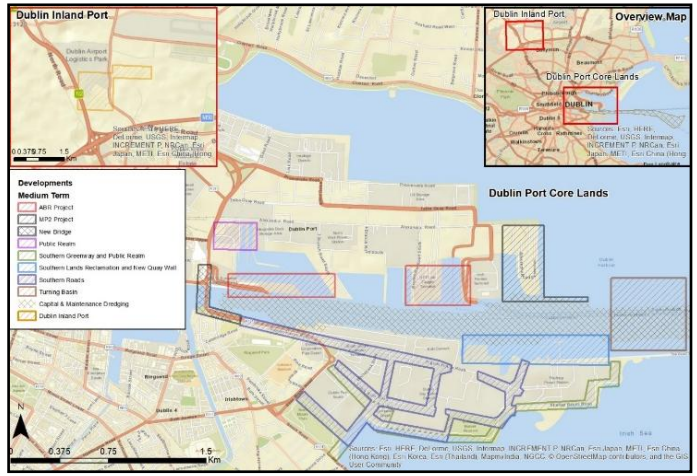
a) Strategic Option 1 Short Term (2017-2021)



c) Strategic Option 2 Short Term (2023-2026)



b) Strategic Option 1 Medium Term (2021-2031)



d) Strategic Option 2 Medium Term (2026-2036)

Figure 4-5: Strategic Layout Alternatives (a-d)

The development options arising from the Masterplan 2040, reviewed in 2018, allow for the port's maximum throughput capacity by 2040 (73.8m tonnes of cargo throughput annually), in comparison to the 60m tonnes resulting from the development projects outlined in the original Dublin Port Masterplan 2012. In order to achieve this increased throughput, 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 North Port Estate.

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 South Port Estate will arise pursuant to the Masterplan 2040, reviewed in 2018, in order to deliver this increased projected annual throughput. The ABR2 Project will see the deepening of Alexandra Basin West and the infilling of Berths 52/53 to create the Unified Ferry Terminal. In the absence of the ABR2 Project this vital component of the MP2 Project cannot be developed.

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 ABR2 Project is an integral part of) are summarised in the following sections, considering their potential short, medium, and long-term impacts.

A strategic level assessment was conducted in accordance with relevant SEA policy and guidance in respect of the Masterplan 2040. The main differences in potential environmental impacts between the two options were summarised as follows in the SEA, having taken 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 three capital development projects.
- 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.

Both Options 1 and 2 identified that deepening of the existing Alexandra Basin West was required to accommodate vessels with increased draught (as this efficiently utilises existing port infrastructure and avoids the requirement for further infill to create deeper berths elsewhere within the Masterplan layout).

However, Option 2 is preferred as it identified the beneficial reuse of this contaminated and treated dredged material to infill the Terminal 5 Ro-Ro basin (basin of Berths 52/53) and create additional lands needs to allow for the development of the Unified Ferry Terminal. This location also provides a well confined site for the placing of the treated dredge spoil. In contrast Option 1 would potentially have used this material to assist in creation of the general 21-hectare infill within the Tolka SPA which was considered an avoidable impact. Consequently, the alternative layout, identified within Option 2, of deepening Alexandra Basin West and infilling Terminal 5 Ro-Ro basin, and associated works, is the preferred layout for the remaining elements of the ABR2 Project.

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 also 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. In particular, the location of the infill at the Terminal 5 Ro-Ro basin and the associated raising of adjacent ground levels is a benefit of the proposed ABR2 Project layout.

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 South Port Estate.

The selected strategic alternative (Option 2), incorporates an ABR2 Project site layout which implements the reviewed Masterplan's fundamental approach of providing capacity in Dublin Port for the port's maximum throughput capacity by 2040, by maximising the utilisation of Dublin Port's "brownfield" lands and infrastructure and new additional inland Port facilities (rather than seeking to expand eastwards into Dublin Bay).

The Masterplan assessment process identified that Option 2 is the most feasible and sustainable approach available to the Port within the project's timescale. Within this preferred alternative, the ABR2 Project layout optimises the usage of existing infrastructure, enhancing the berthage at Alexandra Basin West to accommodate vessels with increased draught, and also providing increased lands for the development of the Unified Ferry Terminal facilities, with the associated raised ground level supporting flood protection and resilience in this location.

This preferred layout alternative is consistent with the strategic objectives which underpin the Dublin Port Masterplan 2040 and include:

- Preparing Dublin Port for future growth
- Optimising Land Use
- Integrating the Port with Dublin City and local communities
- Facilitating sustainable development
- Providing improved infrastructure and connectivity

Option 2 therefore represents the most suitable land-use for this portion of Dublin Port and is the preferred layout alternative.

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

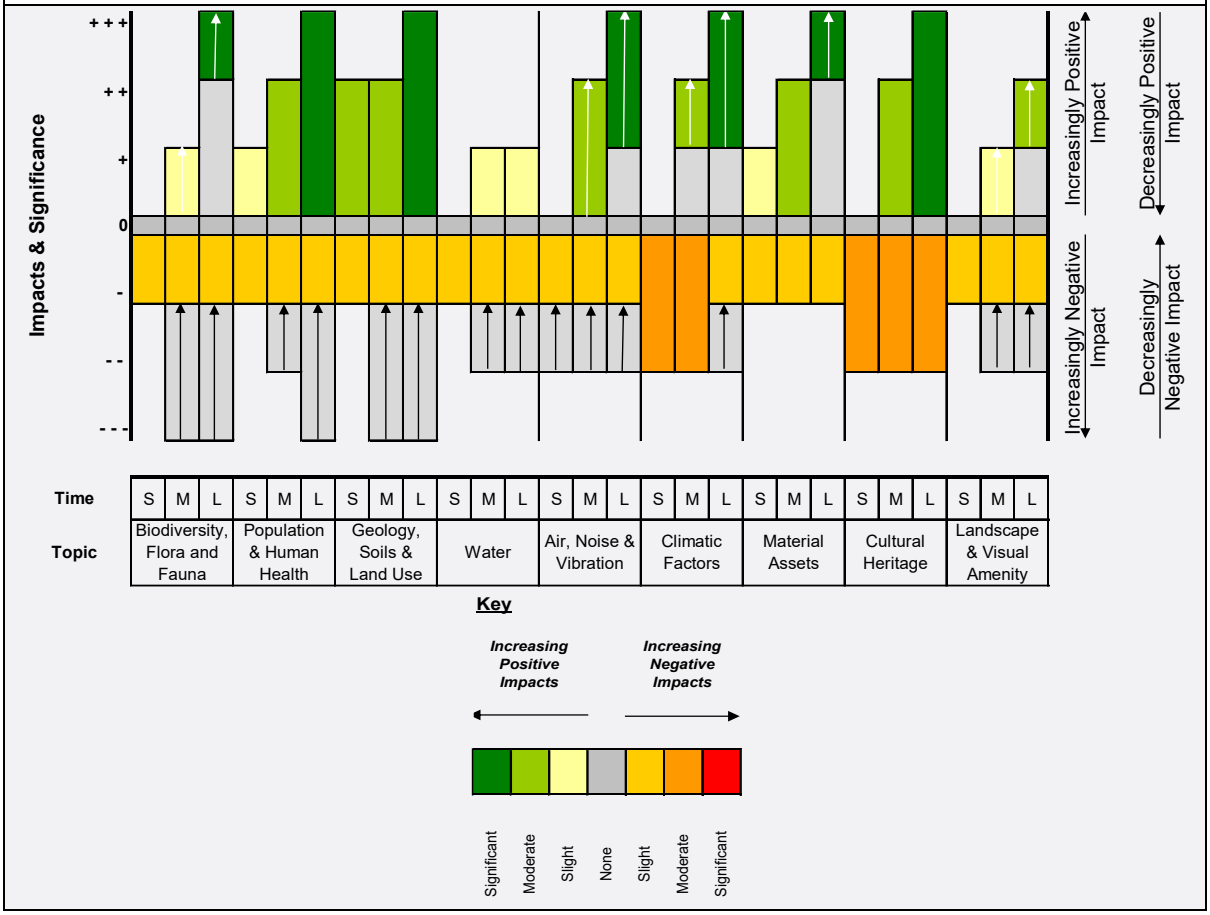


Figure 4-6: Environmental Assessment of Layout Alternatives

The assessment process, in support of the Masterplan review, identified that the alternative site layout (Option 2: Masterplan 2018) was the most feasible and reasonable layout, and therefore the most sustainable approach. The primary reason for the decision to select this as the proposed layout rather than the layout assessed in the original Masterplan 2012, was to avoid the direct adverse significant environmental impact on the designated SPA within the Tolka Estuary which the assessed alternatives would entail.

This preferred layout for the ABR2 Project will:

- Complete the deepening of berths to -10m Chart Datum;
- Resolve legacy contaminated sediment issues;
- Optimise existing port lands and infrastructure;
- Support long-term operational efficiency; and
- Enable delivery of the Unified Ferry Terminal.

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 phase alternatives considered for the ABR2 Project. 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 ABR2 Project's key activities interact, for example the rate of dredge, rate of treatment, and rate of infilling all interact with the need for material storage. This also enables consideration of the cumulative environmental impacts of these activities at ABR2 Project level.

The ABR2 Project outline design evolution was progressed, on behalf of DPC, by Tetra Tech's integrated team of engineers, environmental scientists and planners.

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

- Compliance with project brief;
- Location of element;

- Scale and size;
- Form of construction and construction methodology;
- Project phasing;
- Environmental impacts; and
- Operational impacts (land & marine).

4.4.1 Description of Project Design and Process Design Alternative Scenarios

Evolution of alternatives within this EIAR for project design and process design examined project-level progression relative to a do-nothing scenario. The do-nothing scenario describes existing port activity, incorporating previously consented development, within the North Port Estate, in particular the ABR Project and ongoing MP2 Project.

The do-nothing scenario in respect of the ABR2 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, 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 ABR2 Project, completes the overall ABR Project, which integrates with the MP2 and 3FM Projects to provide additional capacity required to cater for the Port's maximum throughput capacity by 2040. This is specifically achieved by the ABR2 Project providing the necessary additional draught for larger vessels within Alexandra Basin West and providing additional and associated raised lands for the Unified Ferry Terminal.
- 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 - 4.4.3.**
- These assessments also take account of previously consented projects, in particular the ABR Project and the MP2 Project, in the environs of each infrastructure element.
- However, the do-nothing scenario would fail to deliver on the Port's strategic objectives without completing the originally permitted redevelopment of the North Port Estate to unlock its fully optimised potential. **The do-nothing scenario (Option 0) is therefore not considered to be a practicable alternative and is presented to provide a baseline for analysis to compare to a suite of do-something alternatives which can deliver the project's required capacity and objectives.**

The 2040 Masterplan, reviewed in 2018, describes the site location and the existing layout of the relevant areas of the Port (described in detail in **Chapter 5 Project Description**). Those details are summarised in **Figure 4-7** which shows the location of Alexandra Basin West and the Unified Ferry Terminal which is to be constructed on foot of the permitted MP2 Project. Figure 4-7 also shows the proposed amendment to North Wall Quay, which was ultimately omitted from the overall ABR Project pursuant to the amendment to that permission granted by the Commission in July 2025, following a review of the Port's cruise passenger business and approach.

The 2040 Masterplan proposals on Areas A and C were described (in the context of the 2018 review) as follows:

- **Area A** This area is the redeveloped and expanded Terminal 4, constructed as part of the ABR Project, which will provide capacity primarily for unaccompanied Ro-Ro freight on services between Dublin and Liverpool.
- **Area C** It is proposed to create a Unified Ferry Terminal which would incorporate the existing Terminals 1, 2 and 5. In doing this:
    - Existing internal roadways would be eliminated, and existing buildings would be removed to create an additional three hectares of usable terminal area.
    - A new single set of in-gates would be provided north of the existing terminal areas accessed from the new Promenade Road Extension to be built as part of the project to redevelop the Port's internal road network.
    - A new jetty would be built at the eastern end of the Port to provide a fifth Ro-Ro berth
    - A new ferry terminal building would be provided to the north overlooking the Tolka Estuary.
    - In developing the new Unified Ferry Terminal, necessary State facilities would be provided for border controls by a range of State agencies.

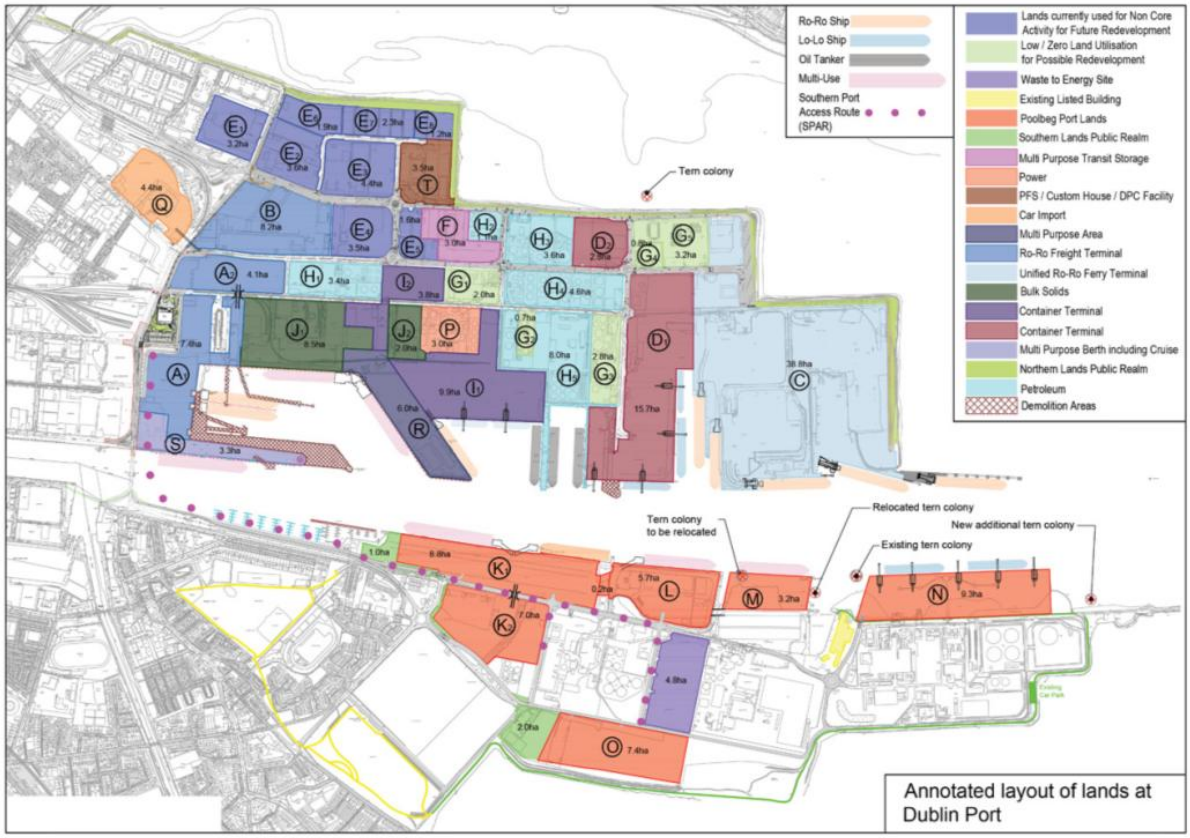


Figure 4-7: Strategic Layout (Masterplan, Reviewed 2018 Figure 4)

The ABR2 Project would constitute the completion of the ABR Project which included the partially completed dredging works in Alexandra Basin West (the first phase of dredging achieved a CD level of -8m, removing the more heavily contaminated surface materials from the basin) and enabled treatment and infilling works to commence (by infilling of Graving Dock No. 2).

Fundamental to the ABR Project (and therefore the ABR2 Project) is the synergy between the dredging requirements in Alexandra Basin West and the infill needs to allow for the development Unified Ferry Terminal permitted under the MP2 Project. To resolve both these requirements, a series of site investigations, laboratory analyses and waste management studies were conducted. These included assessment of the dredge material management in accordance with the Waste Framework Directive (Directive 2008/98/EC) in which the waste hierarchy ranks waste management options in terms of sustainability and environmental impact.

Prevention (at the ‘top’ of the hierarchy) is given top priority as it aims to stabilise and reduce waste generation whilst disposal to landfill is the lowest priority. This approach introduces 'preparing for re-use' as an additional activity in the waste hierarchy. This is consistent with European and national policy objectives to reduce the amount of waste disposed to landfill. **Figure 4-8** presents this hierarchy in a dredge material management context.

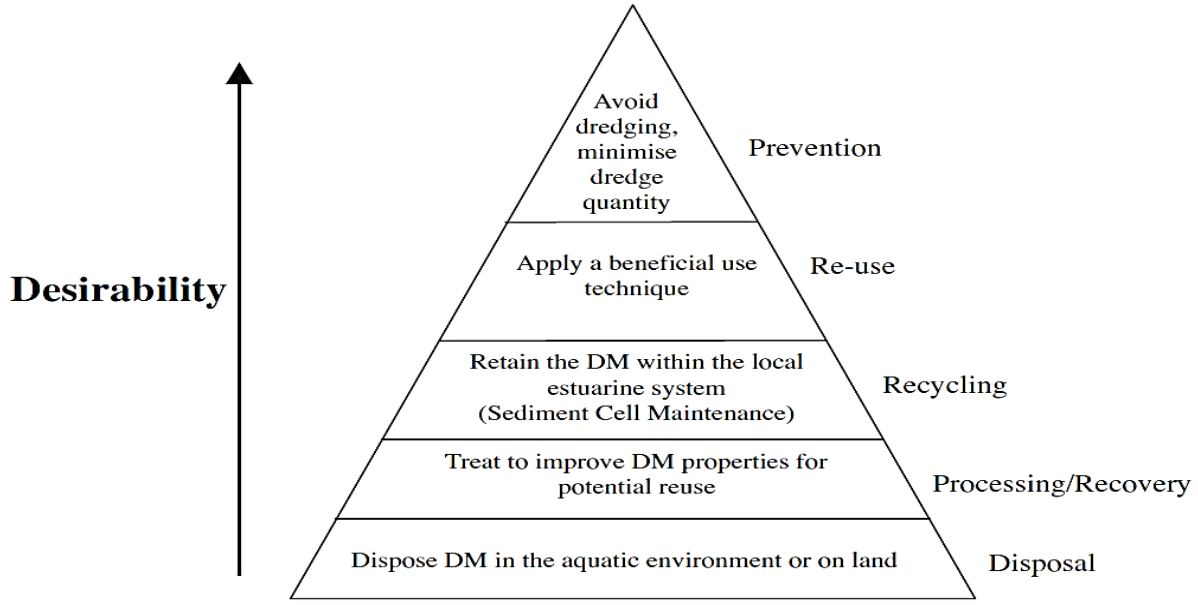


Figure 4-8: Hierarchy for prioritising dredge material management (adapted from Waste Framework Directive, 2008)[1]

As Alexandra Basin West must be dredged to safely increase port capacity, by accommodating larger vessels attending the Port, a number of waste management options were considered (with regard to legal, regulatory, technical feasibility e.g. disposal/treatment site availability, dredged sediment volume, socio-economic and environmental issues and also project specific issues).

Figure 4-9 shows the possible decision-making framework for the management of the Alexandra Basin West contaminated dredged material on the sea and land. As dredged materials are unsuitable for sea disposal then the materials must be managed on land. The alternatives for land treatment can be either of a beneficial re-use (for example a civil engineering application such as infilling) or a disposal type option (for example landfill).

Decisions on how to handle the dredged material are based on whether the material can be treated which is influenced by the material properties and to the contaminants present.

Extensive sampling and environmental testing demonstrated that the contaminated Alexandra Basin West dredge material can be treated, making it suitable for beneficial re-use within the Port Estate which is the optimum approach for this material under the waste hierarchy.

As the volume to be dredged and treated from Alexandra Basin West balances the infill requirements for the Unified Ferry Terminal this also minimises import requirements of virgin construction materials adding to the sustainability of this solution.

[1] Harrington J.,Smith G. (2013) *Guidance on the Beneficial Use of Dredge Material in Ireland,* School of Building & Civil Engineering Cork Institute of Technology Report commissioned by Environmental Protection Agency (Strive Small Scale Study) October 2013

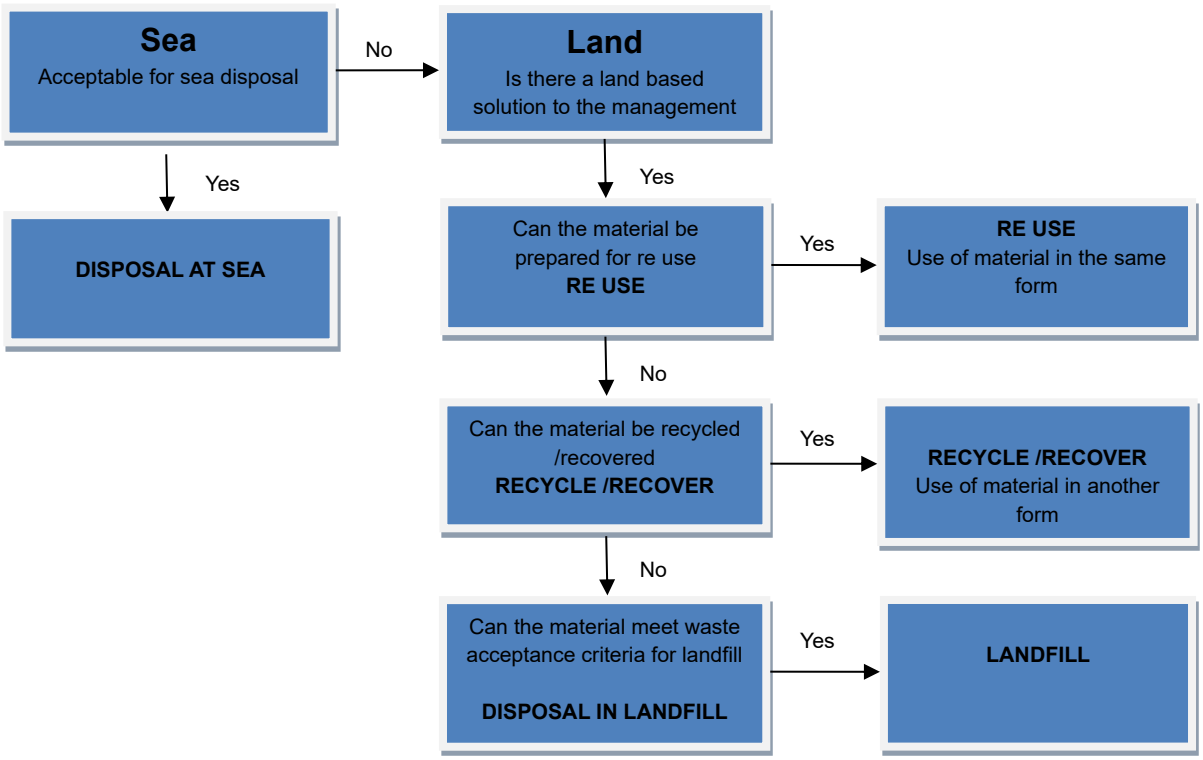


Figure 4-9: Decision making framework for the management of contaminated dredged material on the land and sea for Alexandra Basin West

The works conducted pursuant to the ABR Project (before the planning permission expired) have demonstrated that this treatment and re-use approach is a feasible and sustainable option for providing the Alexandra Basin West with additional draught, dealing with the legacy of contaminated sediments that had deposited there from previous industrial activities and, additionally, providing lands to allow for the development of the Unified Ferry Terminal. This critical component of the SID permission granted in respect of the MP2 Project cannot be delivered in the absence of the works proposed under the ABR2 Project.

In order to assess the ABR2 Project alternatives which evolved at project level, the project design and process do-something alternatives were compared to a do-nothing scenario, considering each of these four key activities:

1. Dredging of Alexandra Basin West;
2. Transportation of materials (dredged sediments and potentially construction materials);
3. Treatment and storage of dredged materials; and
4. Infilling of Terminal 5 Ro-Ro Basin (basin of Berths 52/53) and the associated raising of ground levels for the development of the Unified Ferry Terminal.

The do-something alternatives developed for the ABR2 Project's key activities during the feasibility study and outline design considered the following rationale:

- Maximising the potential of the existing port property in the context of the Dublin Port Masterplan 2040, reviewed in 2018;

- Providing sufficient water depth at Alexandra Basin West for the proposed design vessels;
- Creating beneficial re-use of the treatment dredge materials by infill at the Terminal 5 Ro-Ro basin;
- Upgrading facilities to allow for development of the Unified Ferry Terminal; and
- Taking full cognisance of environmental constraints and where feasible provide mitigation through engineering design.

Project design and process design aspects are considered by the assessment of construction and operational environmental impact for each option and were consulted on with stakeholders and members of the public as detailed in **Chapter 3 Consultation and Scoping**.

The following section details the progression and evolution of project level alternatives across the ABR2 Project (considering its four key activities) and provides an assessment of the environmental impacts associated with the design evolution.

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 North Port Estate general arrangement and the consented ABR (as completed before planning expired in 2025) and MP2 Projects.

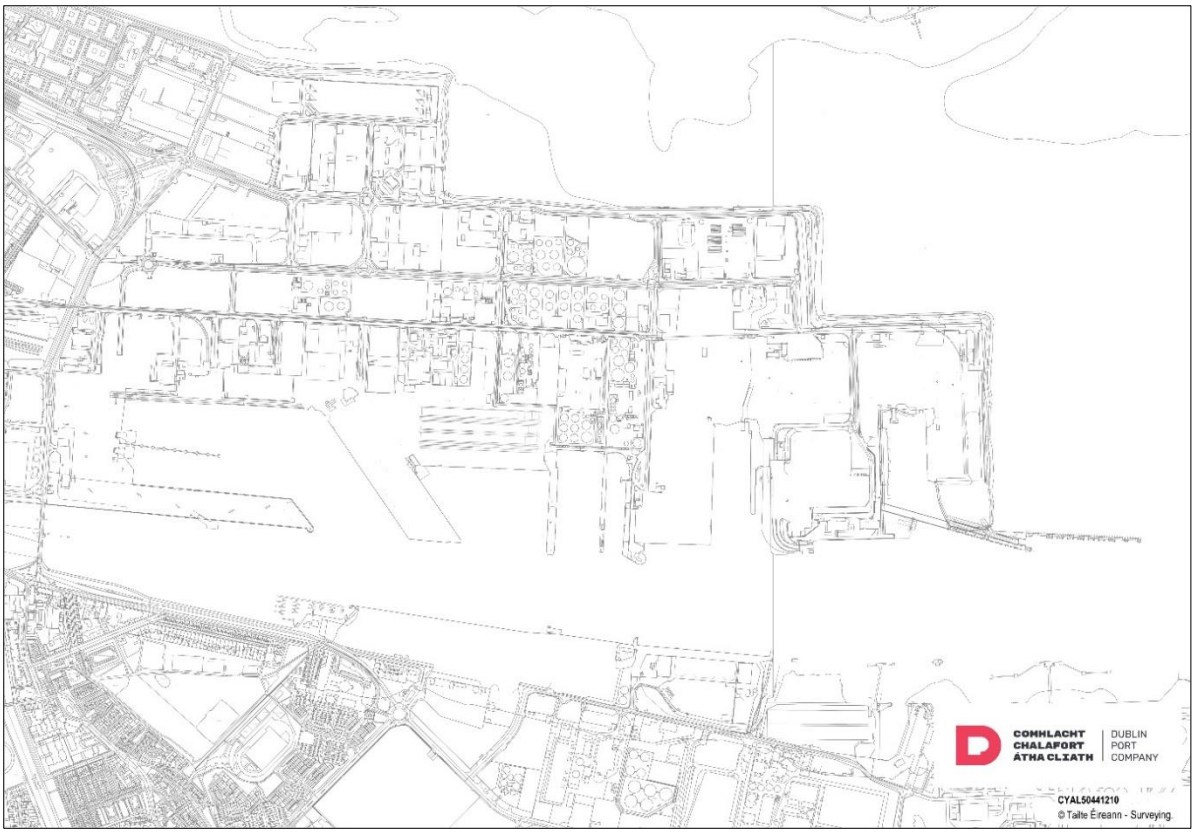


Figure 4-10: Do-Nothing General Arrangement Option 0

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 larger Ro-Ro vessels within Alexandra Basin West would be limited, and the development Unified Ferry Terminal would be rendered impossible.

Table 4-2 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 activities similar to those 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 ABR2 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. 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 North Port Estate's "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.

Key for all Summary Impacts Table:

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

Table 4-2: 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 / -	Potential for minor negative impacts from continued presence of legacy contaminants within Alexandra Basin West, which are not addressed by dredging and remediation of dredged materials impacting on water quality and aquatic species functioning.
Ornithology	0	No impacts anticipated.	0	No impacts anticipated.
Land, Soils, Geology and Hydrogeology				
Land, Soils, Geology and Hydrogeology	0	No impacts anticipated.	0 / -	Potential for minor negative impacts from continued presence of legacy contaminants within Alexandra Basin West, which are not addressed by dredging and remediation of dredged materials
Water Quality and Flood Risk Assessment				
Water Quality	0	No impacts anticipated.	0 / -	Potential for minor negative impacts from continued presence of legacy contaminants within Alexandra Basin West, which are not addressed by dredging and remediation of dredged materials.
Flood Risk Assessment	0	No impacts anticipated.	0 / -	Potential for minor negative impacts from increased flood risk

Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
				under a changing climate with no changes to existing flood defences/drainage systems in place to reflect this.
Air Quality				
Air Quality	0	No impacts anticipated.	0 / -	Potential for negative impacts due to increased berth contention from vessel traffic as Dublin Port experiences increased demand from incoming vessels for accessing port berths of low efficiency.
Climate				
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.	0 / -	Potential for negative impacts due to increased berth contention from vessel traffic as Dublin Port experiences increased demand from incoming vessels for accessing port berths of low efficiency. This may lead to vessels queuing for anchorage.
Vibration	0	No impacts anticipated.	0	No impacts anticipated.
Material Assets				
Coastal Processes	0	No impacts anticipated.	0	No impacts anticipated.
Roads / Traffic	0	No impacts anticipated.	0 / -	Potential for negative impacts due to low efficiency of berths for incoming vessel traffic, this may slow port operations and increase congestion for vehicular traffic movements on existing road networks.
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

Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
				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 which are unlikely to be adequate for addressing increased runoff volumes associated with increased rainfall rates and volumes under a changing climate.
Cultural Heritage				
Cultural Heritage	0	No impacts anticipated.	0	No impacts anticipated.
Landscape & Visual				
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 continued presence of legacy contamination within Alexandra Basin West which may potentially be re-released into the water column and/or aquatic foodweb during storms or other activities which may pose risks to human health.
Waste				
Waste	0	No impacts anticipated.	0	No impacts anticipated.

4.4.2.2 Do-Something Scenario – Dredging of Alexandra Basin West

The location, layout (size and scale) and the design of dredging are strategic considerations, dictated by the existing infrastructure of Alexandra Basin West and the required draught of the larger vessels that will use the full extent of the basin to increase port capacity. The relevant, project level, technology alternatives, considered under the project design and process design assessment, relate to the method

of dredging and the dredging regime (rate and duration) and the associated mitigations. The design progression included the following stages.

- Do-nothing Scenario (No deepening of the basin)
- Design Progression One
- Design Progression Two (Final design).

The ABR2 Project requires capital dredging over the full basin to achieve the required design depths (-10m CD) to safely berth and turn vessels within Alexandra Basin West. The total volume of marine sediment remaining to be dredged under the ABR2 Project is 334,000m^3.

These dredging activities are focussed on the construction phase of the ABR2 Project, during the operational phase there would be occasional maintenance dredging to deal with ongoing sediment deposition (as is currently the case in the operational Port, regardless of the design depth, which therefore represents no change to the current operational regime).

Do-Nothing Scenario – No deepening of the basin

The **do-nothing** scenario would not increase the draught sufficiently for the usage of larger vessels, and, in addition, would not complete the removal of the contaminated sediments within Alexandra Basin West to ensure the long-term legacy of these sediments is addressed as envisaged by the ABR Project. As this is not considered a viable option, the design was therefore progressed to develop a **do-something** alternative.

Design Progression One

In terms of method of dredging, 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, influenced by the site context and materials to be dredged:

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.

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 ABR2 Project site and accurate dredging of embankment slopes adjacent to the basin's quay walls. The backhoe dredger is also more mobile to allow the dredger to provide a safe distance from vessels operating at the port.

A plough dredger would not be suitable at the ABR2 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.

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 for treatment and its ultimate destination.

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 hydraulic dredging options: Of the alternative hydraulic dredging options, a TSHD would not be feasible to operate within the confines of the Alexandra Basin West location. Similarly, a pipeline dredge is not practical due to the distance between the loading area and the final destination at this site. Injection dredging also would not be suitable at the ABR2 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.

In terms of dredging regime, the ABR2 Project dredging is located within Alexandra Basin West which is connected to the inner Liffey channel at the basin's mouth. This location contains aquatic receptors, in particular, the Lower Liffey is a migratory route for salmonids. The daily rate of dredging and working hours within the basin were considered with regard to these receptors and, in particular, the potential for suspended solids from the dredging activity to disperse to the inner Liffey channel and for noise disturbance to receptors.

Water quality modelling was used to assess the potential impact of this dredging activity (as expanded in **Chapter 9 Water Quality and Flood Risk Assessment** and **Chapter 14 Coastal Processes**). The assessment that was supported by the data available from the extensive water quality monitoring undertaken during the first phase of dredging in Alexandra Basin West under the ABR Project.

Investigations of any high levels recorded within the initial monitoring programme consistently identified that these originated in the upper Liffey catchment, upstream of the Tom Clarke bridge.

The hydrodynamic regime within the basin varies in quadrat areas, due to the protection that the North Wall Quay Extension provides. The southeastern zone, adjacent to the mouth of the basin, experiences the greatest flow velocities and therefore would have the greatest potential for sediment dispersal, whereas, in contrast, the lowest velocities and dispersion characteristics occur in the opposing northwestern zone. These variations in hydrodynamic regime have also influenced the historic sediment dispersal and deposition regime and therefore the characteristics of the seabed sediments within these zones.

The construction programme of the ABR2 Project is constrained by simultaneous construction of the MP2 Project and the activities of an increasingly busy Dublin Port and to achieve the construction programme within the 10-year planning permission period being applied for the use of dredgers in more than one quadrat was assessed in terms of potential water quality and noise key environmental impacts.

The hydrodynamic and sediment characteristics where therefore used to consider appropriate dredge rates within the four quadrats that cover the basin simulating activities in one, or sometimes more than one, of the zones.

As good industry practice / primary dredging mitigation to protect water quality and aquatic species, no over-spill will be permitted whilst loading within Alexandra Basin West and spill plates are to be utilised to prevent spillage. In addition, the use of an environmental bucket to reduce losses of sediment during the dredging operations was also considered as a primary dredging mitigation.

The quantity of dredged material entering the water column as a sediment plume is therefore expected to be very low, and to support this, monitoring undertaken during the ABR Project has shown that loading operations within Alexandra Basin West have had no significant impact on water quality during the ABR Project construction works (see **Chapter 9 Water Quality and Flood Risk Assessment** and **Chapter 14 Coastal Processes**).

Water quality modelling established appropriate dredging rate in each quadrat, such that dredging activities would not cause breaches of water quality standards. The identified dredging rates, as summarised in **Figure 4-11** and **Table 4-3**, are analogous to the peak rate achieved during dredging in the ABR Project particularly given the lower concentrations of sediment contaminants) and would mean no significant impact of water quality standards.

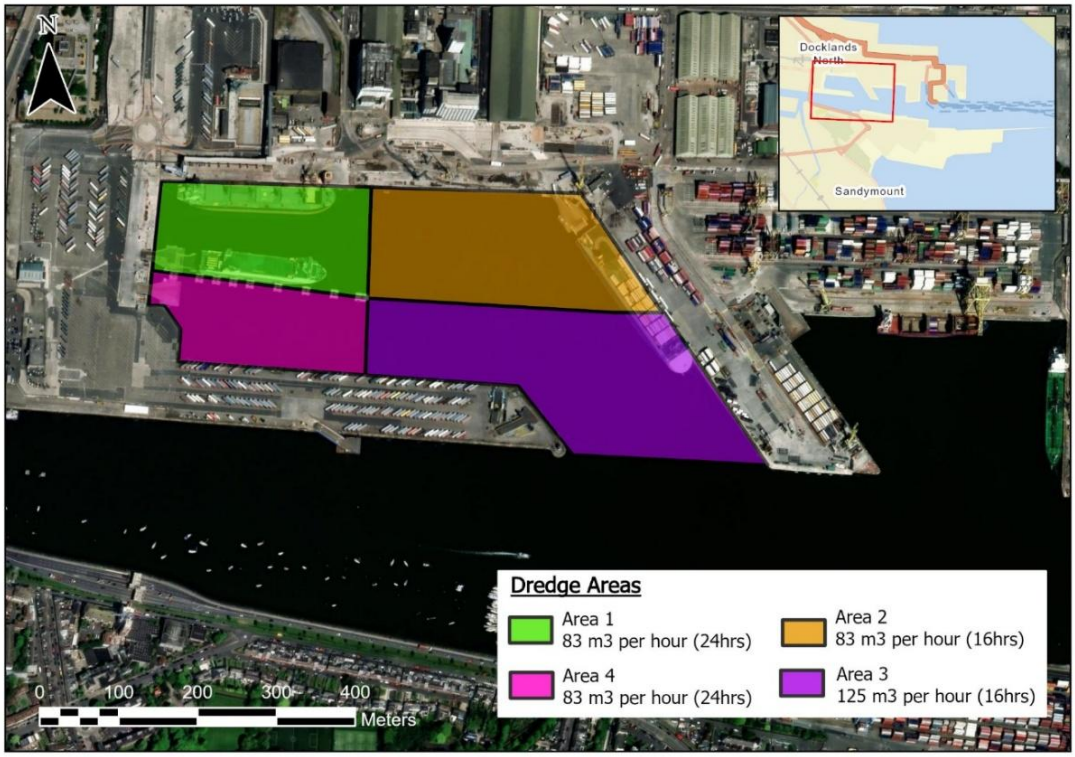


Figure 4-11: ABR2 Project Dredging Areas within Alexandra Basin West, with proposed dredge rates and operating hours

Table 4-3: Summary of dredge operation limitations for Areas 1-4 for the ABR2 Project

Area	Operating hours	Maximum dredge rate	Operational constraint / note
1	24 hours per day 7 days per week	83m³/hour	Can be dredged on a continuous basis
2	07:00–23:00 7 days per week	83m³/hour	Dredging limited to a 16-hour operational window to comply with noise assessment
3	07:00–23:00 7 days per week	125m³/hour	Higher dredge rate due to the nature of bed materials at the entrance to the basin Cannot be dredged concurrently with any other area due to dispersive conditions at the entrance to Alexandra Basin West.
4	24 hours per day 7 days per week	83m³/hour	Can be dredged on a continuous basis

Whilst the rate at which dredging occurs is the key feature in terms of assessing water quality, potential impacts on human receptors are related to the duration of the activity (in terms of working hours, and specifically nighttime working) and also the dredging technology used (in terms of type of dredging equipment and number of vessels).

Noise assessments were undertaken as detailed in **Chapter 12 Terrestrial Noise and Vibration** to assess potential impacts. It was determined that limiting the working hours, and the number of dredging vessels to up to two spreads within Alexandra Basin West, as summarised in **Figure 4-11** and **Table 4-3** would mean no significant impact in the context of the Port's background activities.

Alongside the restricted work hours standard noise mitigation measures will also be implemented on dredging activities and equipment.

Design progression one therefore identified a viable option which comprised mechanical dredging using a backhoe technique at the assessed rates, durations and with up to two vessels working and applying standard dredging (no overspill and environmental bucket) and noise mitigations (restricted working hours and equipment noise mitigations).

Design Progression Two (Final design)

Design progression one was further progressed by consideration of additional mitigation for the dredging works to further minimize sediment loss. This entailed the deployment a silt curtain around the equipment, the emergency use of an air/bubble curtain across the mouth of the Alexandra Basin West and a dredge management protocol.

The silt curtain mitigation measure and the use of a contingency air/bubble curtain installed across the entrance to Alexandra Basin West was included in the CEMP of the ABR Project, following planning submission and through a process of engagement with An Bord Pleanála (now An Coimisiún Pleanála). The air/bubble curtain would be utilised in the event of a breach of the silt curtain around the dredger. These additional mitigations are subsequently proposed as mitigations for this ARB2 Project application, in addition to the primary no overspill and environmental bucket mitigations, to further improve the protection of water quality and aquatic species.

To minimise disruption to dredging operations, due to other vessel movements within the basin, which could potentially impinge on the effectiveness of the silt curtain around the spread, an enhanced mitigation method, a dredging management protocol will therefore be agreed, with the Harbourmaster at Dublin Port, and implemented under the CEMP. The protocol will minimise disruption of dredge activities, particularly in area 3 (southeastern quadrat) where the sediment dispersal characteristics is the highest. This will enhance the effectiveness of the proposed mitigation measures.

The dredging simulations including these enhanced mitigations are presented in **Chapter 14 Coastal Processes.** The simulations show that the lower potential sediment concentrations associated with these mitigated dredging activities will be constrained to within, and adjacent to, the entrance of Alexandra Basin West enabling compliance with water quality standards.

The quantity of dredged material entering the water column as a sediment plume is therefore expected to be very low and noise impact is not expected to be significant. Monitoring undertaken during the ABR Project has shown that dredging operations within Alexandra Basin West had no significant impact during the ABR Project and the additional mitigations identified therefore give confidence that the ABR2 Project will similarly not cause environmental impact.

Further to the assessment of mechanical dredge options, the final design comprises the use of up to two backhoe dredgers with supporting ancillary vessels within a determined working period and subject to a series of mitigation measures (including no overspill condition, environmental bucket, silt curtain and bubble curtain) and a dredge management protocol.

This design progression therefore represents the preferred alternative for dredging activities and is taken forward for cumulative environmental assessment against the do-nothing scenario, reported in **Sections 4.4.3** and **4.5**.

4.4.2.3 Do-Something Scenario – Transportation of Materials

This activity relates primarily to dredged material which needs to be transported from Alexandra Basin West to proposed screening / treatment facilities (or in some cases treated and then transported) and ultimately to the Terminal 5 Ro-Ro basin which is the infill location.

Again, as the location, layout (size and scale) and the design of transportation activities have been addressed through strategic consideration, this means that the relevant project level, technology options, considered under the project design and process design assessment, relate to the means of transportation, the route and the associated mitigations.

The materials originate in Alexandra Basin West. Three temporary construction sites have been identified which provide sufficient space and facilities for the screening / treatment (these are located at North Wall Quay Extension, Berth 49 and/or Berth 52 West). All three of these sites are included within the project description and assessment as a “worst-case” design envelope which gives flexibility in achieving the treatment rates alongside other port operational / logistical constraints but is conservative, as the three sites will not all be used simultaneously).

In addition, there is allowance for import / export of a modest volume of materials for construction or re use respectively (c.54,500m^3 of import and c.60,085m^3 of export). This allowance accommodates the natural variability of the materials that will be encountered during the dredging process, so that, if appropriate, inert material can be exported for re-use in another location, or, conversely, construction materials can be imported to create the infill area bund or for capping / ground raising in the vicinity of the already permitted Unified Ferry Terminal.

The design progression included the following stages.

- Do-nothing Scenario (No dredged material transport or material import / export)
- Design Progression One (Final design)

These transportation activities are focussed on the construction phase of the ABR2 Project, during the operational phase there would be no further transportation activities and therefore no operational impacts.

Do-nothing Scenario (No transportation)

The **do-nothing** scenario would not enable the ABR2 Project's basin deepening and the infilling necessary as a prerequisite for the development of the Unified Ferry Terminal and therefore would not support the Project's objectives. As this is not considered a viable option, the design was therefore progressed to develop a **do-something** alternative.

Design Progression One (Final design)

Consideration of the means of transport assessed a range of sea and land alternative vessels and is influenced by the scale and nature of the materials being considered.

Assessment of barge transportation options: It was established that the dredged material is best transported by barge as it is placed into the barge as part of the dredge operation, the materials contain water and there is a constant and significant volume of materials to transfer. No overtopping of barges is permitted and spill plates are to be utilised to prevent spillage during transport and loading.

Assessment of HGV transportation options: The water content would rule out land based, conventional transfer of these dredge sediments by HGV transfer due to the avoidance of double handling as the barge directly attends the backhoe dredger and the better containment within the barge minimising the risk of materials, in this case leaking onto roads.

Assessment of tanker transportation options: The further land-based option of transfer by tanker similarly was not considered feasible given the undesirable double handling of materials, the scale of the operation and the variability of the dredge material in terms of particle size.

Barge movement was considered to be the most efficient, practical and environmental option and is therefore preferred as the final design option.

The route taken by barge between the dredging activity and treatment locations is selected as the shortest direct route considering the Port's navigation requirements which is logistically and environmentally efficient and therefore no further alternatives were assessed.

The modest volume of import / export materials is, however, considered most effectively achieved by a conventional, HGV means of transport, given the likely locations of the sources and destinations of these movements and the routes these journeys would take, the management of the traffic impacts would be conventionally addressed, and any impacts mitigated, under the ABR2 Project's traffic management plan, to deal with any potential environmental impact associated with this import / export activity should it arise.

Transportation of the dredged materials by barge, directly routed to treatment facilities, represents the preferred option, whilst import / export of materials would be undertaken by HGV and routed in accordance with the traffic management plan. This design progression therefore represents the

preferred alternative for transportation of materials activities and is taken forward for cumulative environmental assessment against the do-nothing scenario, reported in **Sections 4.4.3** and **4.5**.

4.4.2.4 Do-Something Scenario – Treatment and Storage

This activity relates to treatment of the dredged material and associated storage (or stockpiling) which is required until the materials can be placed within the Terminal 5 Ro-Ro basin. The stockpiling temporarily buffers any differences in rate achieved between dredging / treatment / infilling. Due to the usage demands on lands within the Port, this requirement will be minimised, with the activities managed and programmed in a sequential construction process targeting the same construction rate. Workflow balancing / synchronisation to minimise the storage requirements is in Dublin Port's best interests as there are high utilisation demands on lands throughout their full Port Estate. Similarly, the modest volumes of import / export materials required by the ABR2 Project will also be programmed to minimise on site storage demands.

The layout (size and scale) of treatment and storage activities have been largely addressed through strategic consideration. At project level, options considered under project design and process design assessment level, relate to the design/technology to be used in the treatment process and location, and the associated mitigations.

The design progression included the following stages.

- Do-nothing Scenario (No material treatment)
- Design Progression One (Final design)

The ABR2 Project requires capital dredging over the full basin to achieve the required design depths (-10m CD) to safely berth and turn vessels within Alexandra Basin West. The total volume of marine sediment remaining to be dredged under the ABR2 Project is 334,000m^3.

The Marine Institute considered this material to potentially contain widespread levels of Class 2 material making it unsuitable for disposal at sea. A full description of the sediment chemistry sampling and analysis plan which led to this classification is described in **Chapter 8 Land, Soils, Geology and Hydrogeology**.

These treatment/storage activities relate to the construction phase of the ABR2 Project, during the operational phase there would be no further treatment/storage activities and therefore no operational impacts.

Do-nothing Scenario (No treatment)

The **do-nothing** scenario would not enable the ABR2 Project's basin deepening and, as a consequence, would frustrate the development of the Unified Ferry Terminal and therefore would not support the Project's objectives. As this is not considered a viable option, the design was therefore progressed to develop a **do-something** alternative.

Design Progression One (Final design)

Consideration of the treatment process and location were assessed jointly as the process determines the facility size and requirements. The treatment process selection was dictated by the dredge material properties and the contamination levels influenced by the scale and nature of the materials being considered and was developed and proven under the ABR Project which was the subject of the EPA's IE licence currently in place for these activities (**Appendix 4-1**).

Best practice industry techniques (utilising Best Available Technology (BAT)) will be used to treat the contaminated material yielded from the dredging of Alexandra Basin West.

- It is proposed that selected sources of sediments arising from Alexandra Basin West will be subjected to soil washing techniques as appropriate to the source concentrations of contaminants. The treatment of soil and sediment washing, by the intensive washing of the soil to be treated, removes the pollutants, transferring them to the finest particles (silts and clays), from the solid phase to the liquid phase and allows the recovery of the inert fraction with coarser particle size (sands and gravels) for re-use on site.
- Stabilisation / Solidification remediation technology will be used to reduce the mobility of contaminants. Immobilisation is achieved by reaction of contaminants with reagents to promote sorption, precipitation or incorporation into crystal lattices, and/or by physically encapsulating the contaminants. The method produces a high strength monolith-like product that physically reduces the mobility and chemically binds contaminants to the produced matrix. The resulting treated mass will be recovered as infill material. Stabilisation / Solidification treatment will be applied to the remaining sediment to be dredged from Alexandra Basin West following soil washing.

The treatment and recovery of the dredge material on site will take place in accordance with the conditions of the IE Licence P1002-02 or as may otherwise be agreed with the EPA during a licence review. The works under the ABR Project (before the planning permission expired) have demonstrated that this treatment and re-use approach is a feasible and sustainable option for providing the Alexandra Basin West additional draught, dealing with the legacy of contaminated sediments that had deposited there from previous industry activities and additional providing lands for the Unified Ferry Terminal.

Three temporary construction sites have been identified which provide sufficient space and facilities for the screening / treatment (these are located at the North Wall Quay Extension, Berth 49 or Berth 52 West). All three of these sites are included within the project description and assessment as a "worst-case" design envelop which gives flexibility in achieving the treatment rates alongside other port operational/logistical constraints but is conservative, as the three sites will not all be used simultaneously). The EIAR process has therefore included mitigations specific to each of these locations and they are all included in the preferred design progression.

Treatment of the materials by screening (washing) / stabilisation / solidification treatment, at any of the three sites identified for treatment facilities, represents the preferred option. This design progression

therefore represents the preferred alternative for treatment / storage activities and is taken forward for cumulative environmental assessment against the do-nothing scenario, reported in **Sections 4.4.3** and **4.5**.

4.4.2.5 Do-Something Scenario – Infilling and Raising of Ground Levels

This activity relates to infilling of the Terminal 5 Ro-Ro basin (basin of Berths 52/53) and associated raising of ground levels to create the lands needed for the Unified Ferry Terminal, which is to be constructed as an integral part of the permitted MP2 Project. There are ancillary civil engineering works required, such as minor demolition works to clear the basin for infill, surfacing, lighting and drainage all of which are of a conventional nature and will be management by conventional site management practices included in the CEMP.

The Ro-Ro basin will be closed off from the navigation channel by works in progress to achieve the re-orientation of the new Riverside Berth pursuant to the grant of permission for the MP2 Project. This new Riverside Berth will effectively form the barrier to allow infilling and raising of Terminal 5 surface levels under the ABR2 Project.

The location and layout (size and scale) of the infill and ancillary activities have been largely addressed through strategic consideration. At project level, options considered under project design and process design assessment level, relate to the design of the infilling process, and the associated mitigations.

The design progression included the following stages.

- Do-nothing Scenario (No infill)
- Design Progression One (Final design)

These infill activities relate to the construction phase of the ABR2 Project, during the operational phase there would be minimal maintenance activities on the surfacing, drainage and lighting and therefore no operational impacts.

Do-nothing Scenario (No infill)

The **do-nothing** scenario would not enable the ABR2 Project's basin deepening and would frustrate the development of the Unified Ferry Terminal and therefore would not support the Project's objectives. As this is not considered a viable option, the design was therefore progressed to develop a **do-something** alternative.

Design Progression One (Final design)

Consideration of the infilling activity assessed conventional infill methods to ensure that these would form a stable material are influenced by the scale and nature of the materials being considered.

The treated sediment will be off loaded (dry dig) by excavators into a reception area and subsequently transferred through the relevant screening / treatment processes by excavators and conveyor systems. The materials will be placed and compacted in layers using mechanical excavators. These are

conventional construction methods using to create infill areas, however mitigations have been identified to address any potential impacts associated with this infilling activity taking place in water.

When infilling into water, process stabilisation will minimise contaminant release from material infill as the stabilised mixture is made before it is deposited into the Berth 52/53 basin fill area, with contaminant release reducing as the mixture cures in-situ. Water quality will be measured during the filling operation to ensure that measured parameters are within agreed limits. A controlled outlet from the infill area will be constructed to control water level/flow. A written record of the types and quantities of material recovered at the infill sites will be maintained. Ongoing monitoring of the S/S process during the construction project will consist of the following:

- Geotechnical tests e.g. the permeability (hydraulic conductivity) and the compression strength of the stabilised materials after different strength development periods;
- Environmental testing e.g. batch leaching tests and diffusion testing to measure the leaching of contaminants from the treated dredge material;
- An ongoing monitoring programme will be undertaken prior to, during, and post the recovery operation (surface water quality in harbour, monitoring of pore water in the construction, sediment samples from the harbour, water levels and groundwater quality); and
- A Quality Assurance/Quality Control (QA/QC) programme will be established.

These mitigations are considered comprehensive for the infilling works under the ABR2 Project, with construction management under the CEMP including additional monitoring and mitigations measures to account for the infilling taking place in water this represents the preferred option.

This design progression therefore represents the preferred alternative for treatment / storage activities and is taken forward for cumulative environmental assessment against the do-nothing scenario, reported in **Sections 4.4.3** and **4.5**.

4.4.3 Comparison of Project Design and Process Design Alternatives

The preferred do-something option for each activity was combined to provide an overall scheme (Option 1) for comparison to the do-nothing option (Option 0).

Option 1, the preferred do something option, is shown in **Figure 4-12** and comprises:

- Mechanical dredging, using up to two backhoe dredgers with supporting ancillary vessels, at controlled rates / within a determined working period and subject to a series of enhanced mitigation measures (including no overspill condition, an environmental bucket, a slit curtain and an air/bubble curtain and a dredge management protocol),
- Transportation of the dredged materials by barge, directly routed to treatment facilities, with import / export of materials undertaken by HGV and managed and routed in accordance with the traffic management plan,

- Treatment by screening (washing) / stabilisation / solidification, at any of the three sites identified for treatment facilities and subject to an IE licence, and
- Infilling works with construction management under the CEMP including additional monitoring and mitigations measures to account for the infilling taking place in water.

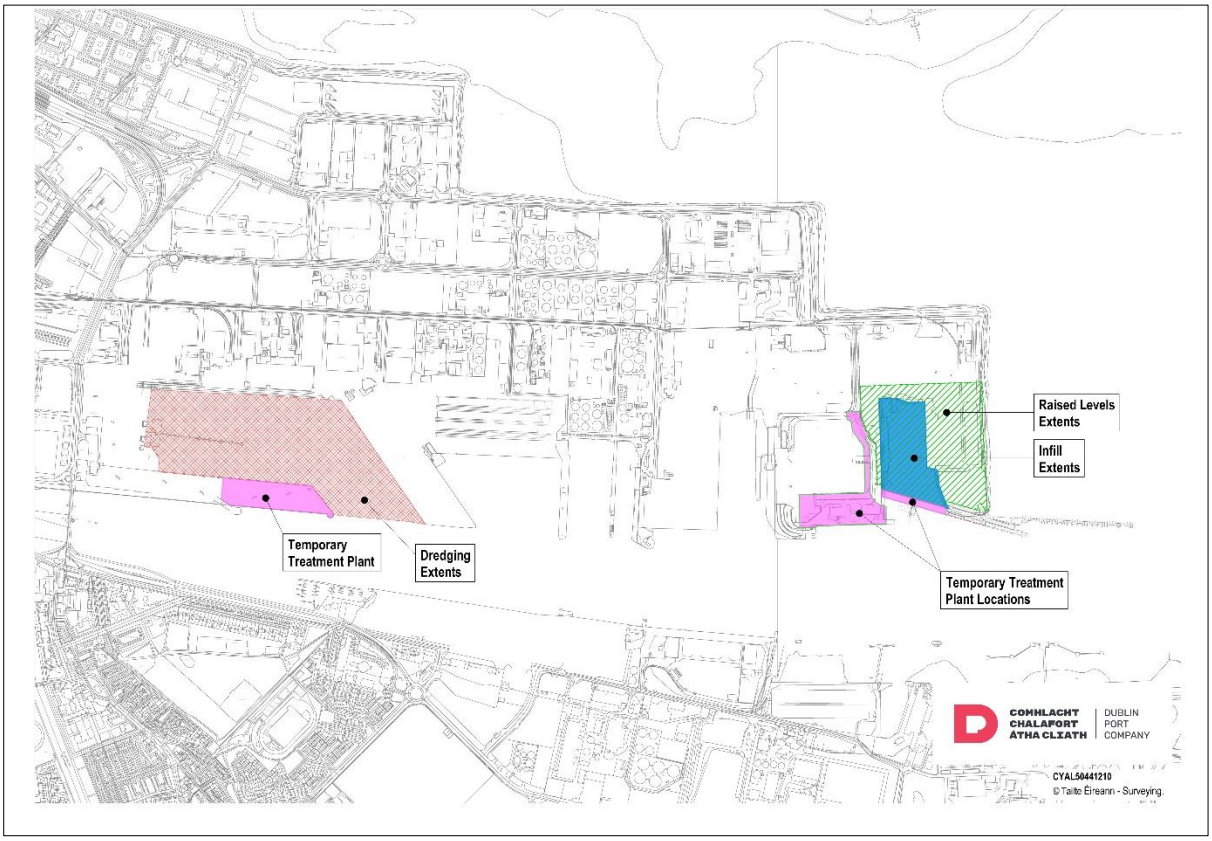


Figure 4-12: Do-Something General Arrangement – Preferred Option, Option 1

As part of this combined option, the assessment considered the sequencing, works and mitigation of all activities within the full scheme were consistent and coherent. This was supported by engagement across the Tetra Tech engineering, environmental and planning teams with the DPC project sponsors. A key aspect of this was ensuring the capacity of the dredge/ transport / treatment / infilling activities were all co-ordinated and capable of handling similar volumes of materials on a daily basis.

A summary of the predicted effects of the do-something project design and process design option is provided in **Table 4-4**. This shows potential negative and positive impacts for each environmental topic during the short-term construction phase and the operational phase for Option 1.

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.***

Table 4-4: Summary of Predicted Impacts of Do-Something General Arrangement – Preferred Option, Option 1

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.	0	No impacts anticipated.
Aquatic	0 / -	Potential for minor negative impacts associated with the loss of marine habitats due to capital dredging, however aquatic benthic habitats and species have been surveyed and indicate this to be of low-quality.	0 / +	Potential for positive impacts associated with the removal of legacy contaminants within Alexandra Basin West with improved water quality benefitting aquatic species. Whilst habitat loss will occur within the area of the Ro-Ro berth infill, aquatic benthic habitats and species have been surveyed and indicate this to be of low-quality.
Ornithology	0	No impacts anticipated.	0	No impacts anticipated.
Land, Soils, Geology and Hydrogeology				
Land, Soils, Geology and Hydrogeology	0	No impacts anticipated.	+	Potential for positive impacts associated with the removal of legacy contaminants within Alexandra Basin West with improved water quality and hydrogeology.
Water Quality and Flood Risk Assessment				
Water Quality	0	No impacts anticipated from capital dredging activities with use of mitigation measures.	+	Potential for positive impacts associated with the removal of legacy contaminants within Alexandra Basin West with improved water quality
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				
Air Quality	0 / -	Potential for negative impacts to air quality associated with	0 / +	Potential for minor positive impacts by improved port

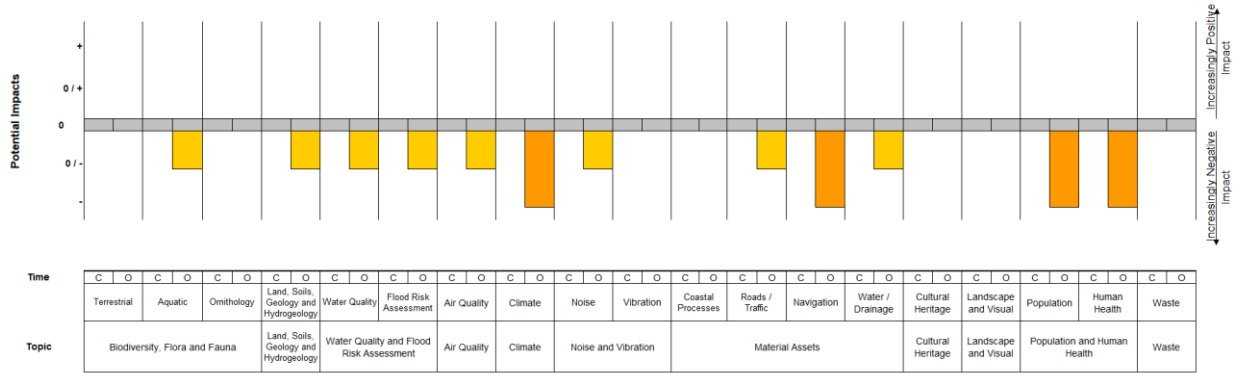
Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
		increased marine and terrestrial traffic during construction works.		operations for incoming vessels through increased port efficiency minimising vessel waiting times and associated emissions with positive impacts to local air emissions. Furthermore, the ABR2 Project facilitates the MP2 Project which allows the use of Shore to Ship Power provision at the Unified Ferry Terminal.
Climate				
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 dredging, treatment process and construction traffic.	0	No impacts anticipated.
Vibration	0	No impacts anticipated.	0	No impacts anticipated.
Material Assets				
Coastal Processes	0	No impacts anticipated.	0	No impacts anticipated.
Roads / Traffic	0 / -	Minor negative impacts to traffic due to disturbances during construction works from import and export of materials, mitigated by traffic management planning. Material dredged at Alexandra Basin West is transported via barge for treatment and infilling activities, avoiding use of the road network.	+	Potential for positive impacts through improved port berth capacity for incoming vessel traffic with greater efficiencies in processing of throughput of cargo with improved cargo consolidation.

Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
Navigation	0	No impacts anticipated.	+	Potential positive impact associated with the increased draught for vessels within Alexandra Basin West
Water / Drainage	0	No impacts anticipated.	0 / +	Potential for minor positive impacts to flood risk associated with the design of future development for flood risk and climate change.
Cultural Heritage				
Cultural Heritage	0	No impacts anticipated.	0	No impacts anticipated. The ABR Project included the demolition of the North Wall Quay, this has now been omitted with the structure remaining as a heritage gain.
Landscape & Visual				
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 overall creation of employment directly associated with expansion of Dublin Port. Positive impacts have also been delivered under the ABR Project from the transfer of lands to Bull Island to Dublin City Council, funding for a feasibility and masterplanning studies on Bull Island and provision of €1 million contribution towards facilities arising from these studies.
Human Health	0	No impacts anticipated.	+	Potential for positive impacts from removal of contaminated sediments from Alexandra Basin West reducing occurrence of accidental contaminant release to water column or aquatic foodweb.

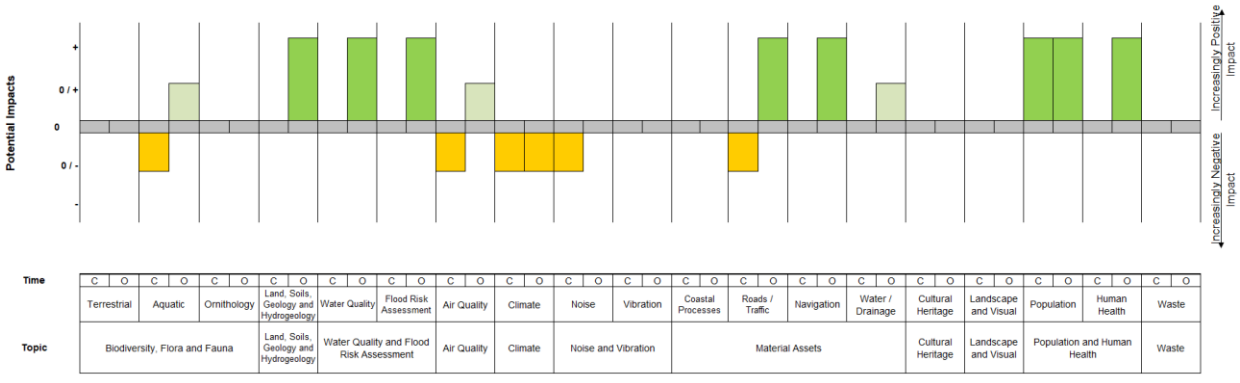
Topic	Potential Impacts			
	Construction Phase		Operation Phase	
	Score	Description	Score	Description
				Potential for positive impacts from improved port efficiency with delivery of Unified Ferry Terminal offering improved transport options to local population.
Waste				
Waste	0	No impacts anticipated.	0	No impacts anticipated.

Assessment of the do-something 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 option.

Figure 4-13 summarises the operational and construction phase potential impacts associated with Option 0 (do-nothing) and Option 1 (preferred do something).



a) Option 0 (Do-Nothing)



b) Option 1 (Do-Something)

Figure 4-13: Project Design and Process Design Evolution Environmental Assessment (a-b)

The **do-nothing scenario** describes existing port activity or activity that incorporates previously consented development, in particular the ABR and MP2 projects. **Figure 4-13 (a)** illustrates the potential negative impacts associated with the operational phase under the do-nothing scenario.

This do-nothing scenario in respect of the ABR2 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 and land elements within the ABR2 Project integrate with other SID Projects to provide the additional capacity required to achieve the port's maximum throughput capacity by 2040. This is specifically achieved by the ABR2 Project elements providing the necessary additional draught in Alexandra Basin West and the lands supporting the Unified Ferry Terminal operation.

In the do-nothing scenario, the existing usage of these brownfield areas continues and the capacity of Dublin Port to accommodate larger vessels and increased cargo and ferry passengers would be limited. The do-nothing scenario is largely representative of existing activities already taking place within the North Port Estate, therefore this scenario will not impact upon the environmental factors at the site during the construction phase. However, the absence of the ABR2 Project 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, 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. 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, such as increased noise through vessels queueing for access to berths, increased emissions from vessels idling.

This do-nothing scenario fails to deliver on the port's strategic objectives without redevelopment of the north port estate's "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 (Option 1) which can deliver the project's required capacity and objectives.

By comparison, **Figure 4-13 (b)** illustrates the potential impacts associated with the construction and operational phase under the do-something scenario. This **do-something option** 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 ABR2 Project affords in terms of land, soils, geology and hydrogeology, material assets, population & human health, air quality, water quality and improved flood risk management.

Option 1 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 1 are associated with biodiversity, flora & fauna, air quality, climate, noise and material assets. 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 and human health.

Potential minor negative operational phase impacts were identified in relation to Option 0 for biodiversity, flora & fauna, land, soils, geology and hydrogeology, water quality, flood risk, air, climate, noise, material assets and population and human health associated with the failure to provide for the increased growth in the Port. The potential minor negative operational phase impacts identified in relation to Option 1 relate to Climate due to increased marine and terrestrial traffic associated with the increased operational capacity of the Port.

Again, notably operation phase impacts associated with congestion issues in the vicinity of the port in terms of noise, climate, and air quality are reduced in comparison to the do-nothing option, as Option 1 whilst increasing vessel capacity at the Port, through the improvements in berthing and operational efficiency associated with the deepening of Alexandra Basin West and the Unified Ferry Terminal, will facilitate improved turnover rates, reducing vessel idling and by association noise and air emissions. Operationally, Option 1 achieves the port's maximum throughput capacity by 2040 and addresses the legacy of the contaminated materials deposited within Alexandra Basin West, offering the associated positive impacts that this affords, in particular the inclusion of mitigation measures improve operational phase impacts for biodiversity, flora & fauna, land, soils, geology & hydrogeology, water quality and flood risk, air quality, material assets, and population and human health.

There are no construction phase, or operation phase, impacts anticipated on cultural heritage, landscape and visual, or waste.

The comparative summary of the predicted effects of Option 0 and Option 1 shows the changes in potential impacts through the do-something project design and process design evolution. This comparative assessment is summarised in **Figure 4-14**.

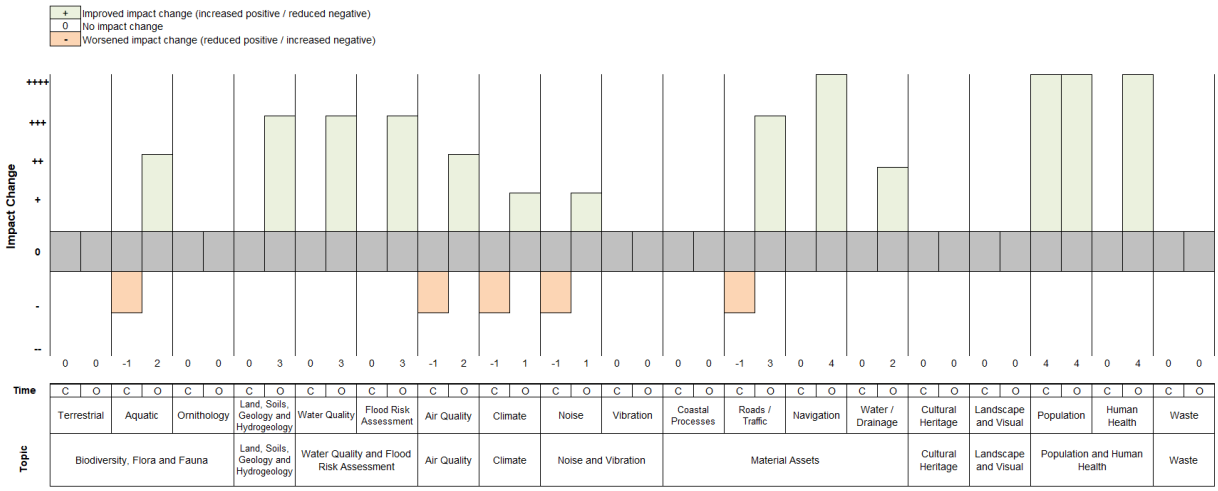


Figure 4-14: Comparison of Option 0 and Option 1

The key differences are:

Biodiversity, flora & fauna

- Increased long term benefit to aquatic ecology in the operational phase, via the removal of legacy contaminants within Alexandra Basin West with improved water quality benefitting aquatic species, resulting from a short-term potential minor impact during the dredging works.

Land, Soils, Geology and Hydrogeology

- Increased long term benefit via the removal of legacy contaminants within Alexandra Basin West which reduces potential for interface with hydrogeological components e.g. groundwater contaminant via sediment-water interactions or tide-driven porewater exchange and also reduces potential for future remobilisation of contaminants with improved water quality.

Water Quality and Flood Risk Assessment

- Increased long-term benefit via the removal of legacy contaminants within Alexandra Basin West which reduces potential for future remobilisation of contaminants with improved water quality.
- Increased long-term benefit with improved flood risk design which considers future flood risk under a changing climate and improves and modernises previous drainage schemes.

Air Quality & Climate

- Minor negative impacts due to increased emissions during construction phase offset by reduced operational emissions facilitated by the accommodation of greater accessibility to deeper draughted vessels and increased vessel activity within the Unified Ferry Terminal and Alexandra Basin West.

Noise

- Minor negative impacts due to increased noise during the construction phase offset by reduction of vessel congestion with more efficient activity within the Unified Ferry Terminal and deepened Alexandra Basin West facilities.

Material Assets – Roads and Traffic/Navigation

- Minor potential impact dur to construction traffic offset by positive operation phase impact associated with the improvement in port capacity for incoming vessel traffic and greater efficiencies regarding the processing of the throughput of cargo and improved cargo consolidation leading to potentially reduced HGV movements within the wider road network.
- Positive long term navigation impacts during the operational phase with increased draught available within Alexandra Basin West to facilitate larger ships and improve the Port's operational efficiencies within its berths.

Population & Human Health

- Positive construction and operation phase impacts associated with the creation of employment associated with the expansion of Dublin Port.
- Positive impacts delivered under the ABR Project for Community Gain from the transfer of lands to Bull Island to Dublin City Council, funding for a feasibility and master planning studies on Bull Island and provision of €1 million contribution towards facilities arising from these studies.
- Positive operation phase impacts from removal of contaminated sediments from Alexandra Basin West reducing occurrence of accidental contaminant release to water column or aquatic foodweb.
- Positive operation phase impacts from improved port efficiency with delivery of Unified Ferry Terminal offering improved transport options to local population.

No significant changes were identified relevant to cultural heritage, landscape and visual or waste topics during either the construction or operation phases.

Option 1 represents the optimum project design and process design in terms of assessment of alternatives by providing potential positive benefit and minimum negative impact. This preferred option was developed following consultation, outline design, planning and environmental assessment to finalise the ABR2 Project which is the basis of this EIAR. This preferred alternative (Option 1) offers the preferred project having thoroughly considered all environmental aspects and reasonable alternatives.

4.5 Summary of Consideration of Alternative Options

The ABR2 Project is concluded to be an essential step in achieving Dublin Port's throughput objective. This optimises the usage of existing infrastructure, enhancing the berthage at Alexandra Basin West to accommodate vessels with increased draught, and also providing increased lands for the development

of the Unified Ferry Terminal facilities, with the associated raised ground level supporting flood protection and resilience in this location. In addition, the ABR2 Project deals with the legacy of contaminated sediments that had deposited in Alexandra Basin West from previous industry activities by treating these and making them suitable to be beneficially re-used to enhance lands around the permitted Unified Ferry Terminal.

At strategic level, the Dublin Port Post-2040 Dialogue papers and the Masterplan identified the ABR2 Project as a key element to implement, and underpin, the Masterplan's fundamental approach of providing the port's maximum throughput capacity by 2040, by maximising the utilisation of Dublin Port's "brownfield" lands and infrastructure. The assessment process in support of the Port's dialogue papers and the Masterplan identified that the development at this site and this location within the Port is the most sustainable location and layout and therefore the desired approach from a strategic point of view.

At project level, the evolution of the projects four key activities (dredging, transportation, treatment and infilling), was considered to achieve the ABR2 Project's objectives. The ABR2 Project design evolution was carried out by Tetra Tech, with an integrated approach alongside the Tetra Tech planning and environmental teams.

The design team's approach to developing and progressing the scheme design was based on avoiding or minimising any adverse environmental impacts whilst enhancing the positive benefits of the project brief (providing draught, capacity and addressing a legacy of contaminated sediments). 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 activities of the ABR2 Project which required that the in combination/cumulative construction workflow was examined considering a wide range of environmental matters along with navigational safety within the port. Design took place in parallel to the environmental assessments, in order to also determine the needs of the dredging, transportation, treatment and infill.

Option 1 - The design (based on the 2040 Masterplan, reviewed in 2018) was developed via an iterative process using mitigation by design to eliminate or reduce potential impacts and to identify mitigation measures. 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 requirement for maintenance dredging activities on marine mammals (however Dublin Port routinely undertakes maintenance dredging activities to ensure operational viability), and increased greenhouse gas emissions and noise from increased marine and terrestrial traffic associated with the expansion in port capacity. Any potential minor negative impacts in the operation phase were associated with

increased operations. However, notably operation phase impacts associated with biodiversity, flora & fauna are reduced in comparison to the do-nothing option due to the addressing of legacy contamination issues within Alexandra Basin West and those associated with noise and climate through improvements in the Port's operational efficiencies. 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, providing noteworthy societal, economic & human health benefits, with associated operation phase environmental benefits.

During the design evolution environmental assessment resulted in the inclusion of mitigation measures developed by the environmental impact assessment process. These changes and mitigations also enhanced potential positive environmental benefits for alternatives, noting that the most noteworthy of these are linked to the positive impacts that the ABR2 Project affords in terms of water quality, the aquatic environment, material assets, population & human health, air quality and improved flood risk management.

Option 1 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 significant potential impacts with this alternative.

Potential construction phase impacts for Option 1 are associated with biodiversity, flora & fauna, air quality, climate, noise and material assets. 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 and human health.

Potential minor negative operational phase impacts were identified in relation to Option 0 for biodiversity, flora & fauna, land, soils, geology and hydrogeology, water quality, flood risk, air, climate, noise, material assets and population and human health associated with the failure to provide for the increased growth in the Port. The potential minor negative operational phase impacts identified in relation to Option 1 relate to Climate due to increased marine and terrestrial traffic associated with the increased operational capacity of the Port.

Again, notably operation phase impacts associated with congestion issues in the vicinity of the port in terms of noise, climate, and air quality are reduced in comparison to the do-nothing option, as Option 1 whilst increasing vessel capacity at the Port, through the improvements in berthing and operational efficiency associated with the deepening of Alexandra Basin West and the already permitted Unified Ferry Terminal, will facilitate improved turnover rates, reducing vessel idling and by association noise and air emissions. Operationally, Option 1 achieves the port's maximum throughput capacity by 2040 and addresses the legacy of the contaminated materials deposited within Alexandra Basin West, offering the associated positive impacts that this affords, in particular the inclusion of mitigation measures improve operational phase impacts for biodiversity, flora & fauna, land, soils, geology &

hydrogeology, water quality and flood risk, air quality, material assets, and population and human health.

The key environmental differences delivered by the design evolution are:

Biodiversity, flora & fauna

- Increased long term benefit to aquatic ecology in the operational phase, via the removal of legacy contaminants within Alexandra Basin West with improved water quality benefitting aquatic species, resulting from a short-term potential minor impact during the dredging works.

Land, Soils, Geology and Hydrogeology

- Increased long term benefit via the removal of legacy contaminants within Alexandra Basin West which reduces potential for interface with hydrogeological components e.g. groundwater contaminant via sediment-water interactions or tide-driven porewater exchange and also reduces potential for future remobilisation of contaminants with improved water quality.

Water Quality and Flood Risk Assessment

- Increased long-term benefit via the removal of legacy contaminants within Alexandra Basin West which reduces potential for future remobilisation of contaminants with improved water quality.
- Increased long-term benefit with improved flood risk design which considers future flood risk under a changing climate and improves and modernises previous drainage schemes.

Air Quality & Climate

- Minor negative impacts due to increased emissions during construction phase offset by reduced operational emissions facilitated by the accommodation of greater accessibility to deeper draughted vessels and increased vessel activity within the Unified Ferry Terminal and Alexandra Basin West.

Noise

- Minor negative impacts due to increased noise during the construction phase offset by reduction of vessel congestion with more efficient activity within the permitted Unified Ferry Terminal and deepened Alexandra Basin West facilities.

Material Assets – Roads and Traffic/Navigation

- Minor potential impact dur to construction traffic offset by positive operation phase impact associated with the improvement in port capacity for incoming vessel traffic and greater efficiencies regarding the processing of the throughput of cargo and improved cargo consolidation leading to potentially reduced HGV movements within the wider road network.

- Positive long term navigation impacts during the operational phase with increased draught available within Alexandra Basin West to facilitate larger ships and improve the Port's operational efficiencies within its berths.

Population & Human Health

- Positive construction and operation phase impacts associated with the creation of employment associated with the expansion of Dublin Port.
- Positive impacts delivered under the ABR Project for Community Gain from the transfer of lands to Bull Island to Dublin City Council, funding for a feasibility and master planning studies on Bull Island and provision of €1 million contribution towards facilities arising from these studies.
- Positive operation phase impacts from removal of contaminated sediments from Alexandra Basin West reducing occurrence of accidental contaminant release to water column or aquatic foodweb.
- Positive operation phase impacts from improved port efficiency with delivery of the permitted Unified Ferry Terminal offering improved transport options to local population.

No significant changes were identified relevant to cultural heritage, landscape and visual or waste topics during either the construction or operation phases.

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.

Option 1 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 ABR2 Project EIAR assesses.