# Environmental Impact Assessment Report (EIAR)

Ringaskiddy Port Re-development – Vol IVa Appendices

Report No. M1099-AYE-ENV-R-001

28 January 2025

Revision 03

Port of Cork Company

# Document Control

**Project**

Ringaskiddy Port Re-Development

**Client**

Port of Cork Company

**Document**

Environmental Impact Assessment Report (EIAR)

**Report Number:**

M1099-AYE-ENV-R-001

**Document Checking:**

| Date | Rev | Details of Issue | Prepared by | Checked by | Approved by |
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| 6 June 2024 | 00 | Draft Issue | LMorrissey ABrogan | B Sheridan | BSheridan |
| 22 November 2024 | 01 | Draft Issue | LMorrissey ABrogan | B Sheridan | BSheridan |
| 10 January 2025 | 02 | Draft Issue | LMorrissey ABrogan | B Sheridan | BSheridan |
| 28 January 2025 | 03 | Draft Issue | LMorrissey ABrogan | B Sheridan | BSheridan |
| | | | | | |

**Disclaimer: Please note that this report is based on specific information, instructions, and information from our Client and should not be relied upon by third parties.**

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# APPENDIX 1.1 STAKEHOLDER ENGAGEMENT LETTER

Wednesday 16 October 2024

Ref: M1099/ENV /Lt/001

Ref:M1099 -AYE-LT-ENV-001

By email:

**Re: Port of Cork Company–Application to facilitate Final Completion of Ringaskiddy Port Redevelopment – Section 287 SID Pre-Planning Consultation**

Dear Sir/Madam,

Ayesa is writing on behalf of Port of Cork Company to notify you of the Port's intention to apply to An Bórd Pleanála for renewed planning permission, to facilitate the final completion of the Ringaskiddy Port Redevelopment Project.

The proposed development is the same as that previously permitted under ABP Reference PA0035. A layout drawing of the proposed scheme, showing stages of the Ringaskiddy Port Redevelopment already constructed and those yet to be constructed is attached to this email.

At this stage of the project, Ayesa is seeking your preliminary views on the proposed scheme, as well as environmental items/issues you wish to be considered at this stage of the project. In addition, if you hold any information or environmental data regarding the project area or its surrounds, we would be grateful to receive a copy.

Please pass on your comments or any information to our Project Manager for the Project, Lynn Morrissey, by emailing Environment-Eng@ayesa.com or write to the address provided below. We request that all responses are provided on or before Wednesday 29th November 2024.

Should you require any further information or clarification on the project or process, please do not hesitate to contact us using the contact details provided above.

Byrne Looby Partners (Irl) Ltd. Registered in Ireland, No. 551605.

Building 2100, Unit K, Ground Floor, Cork Airport Business Park, Kinsale Road, Cork, T12 KV8R, Ireland

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Yours sincerely
For Ayesa,

Lynn Morrissey

Lynn Morrissey BSc MSc
Principal Consultant

Attachment A – Development Layout

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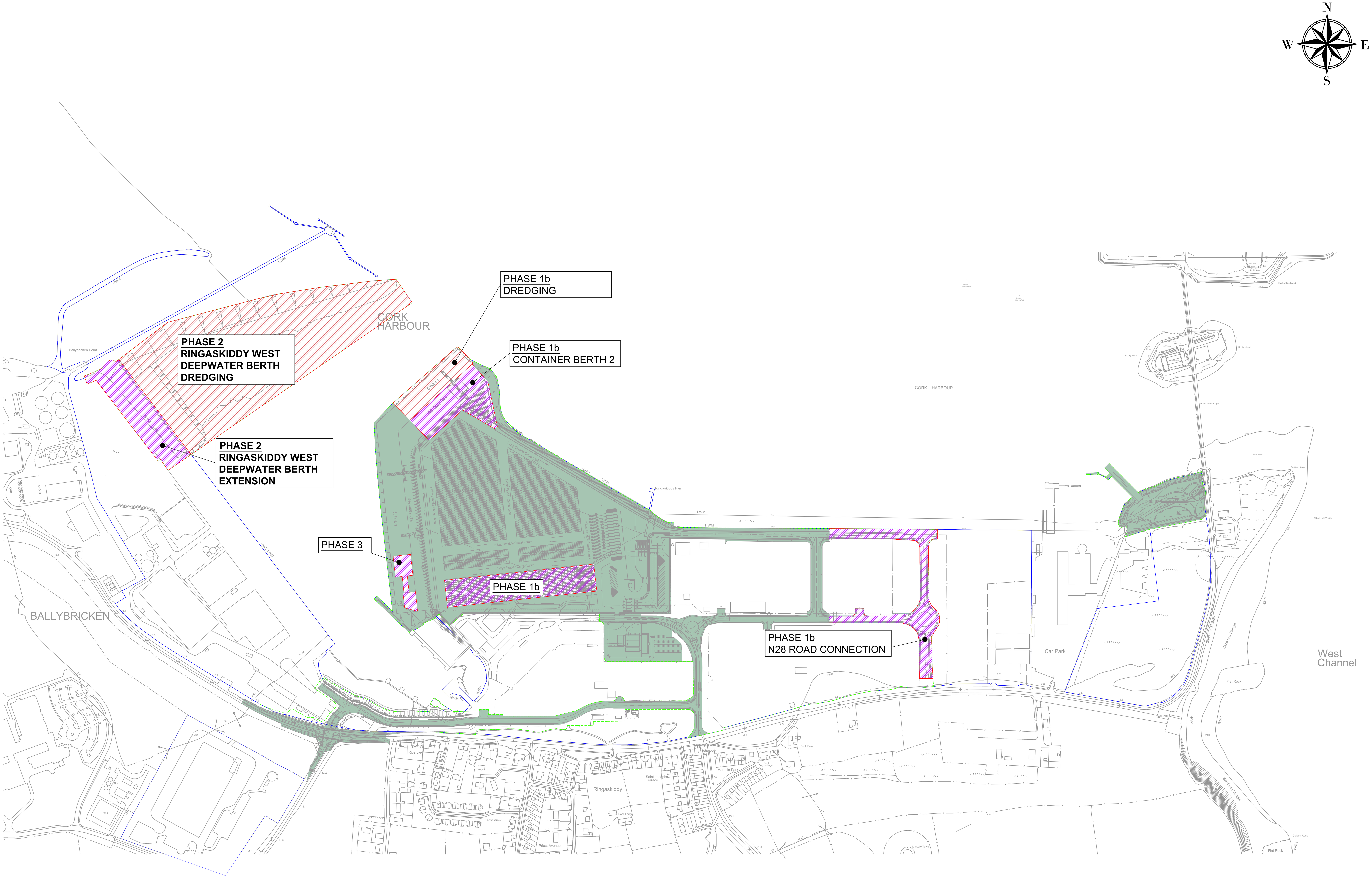
A1




GENERAL NOTES

1. Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.

2. Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.

3. Issue of Drawings.
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

4. DATUM: Ordnance Datum Poolbeg

5. PORT OF CORK COMPANY
ORDNANCE SURVEY IRELAND
LICENCE No. EN 0040614
c ORDNANCE SURVEY IRELAND/
GOVERNMENT OF IRELAND

6. MAP TILE RE MAP TILE REF: 6472-20, 6472-19, 6472-C and 6472-D

LEGEND:

= OWNERSHIP BOUNDARY

= RED LINE BOUNDARY OF CURRENT APPLICATION

= PREVIOUS SID PA0035 APPLICATION BOUNDARY, AS MODIFIED BY PM001.

= PHASES INCLUDED IN CURRENT APPLICATION (PHASE 1b, 2 & 3)

= DREDGING PROPOSED IN CURRENT APPLICATION

= PHASES CONSTRUCTED

| Rev | Date | Description | By | Chk | App |
|---|---|---|---|---|---|
| P01 | 15/10/24 | ISSUED FOR PLANNING | MON | LM | LM |

CLIENT

PORT of CORK
DEEPWATER MULTI-MODAL PORT

PROJECT
Ringaskiddy Port Redevelopment
Section 146C

DRAWING TITLE
SITE LAYOUT PLAN.
PROPOSED RINGASKIDDY PORT
REDEVELOPMENT

STATUS
FOR PLANNING

SUITABILITY
–

Date: 15/10/24 | Scale: 1:4000 | Drawn: MON | Chk: LM | App: LM

Project No: M1099
Drg. No: M1099–1002
Rev: P01

# APPENDIX 1.2 INSPECTOR’S REPORT

# Inspector's Report
# ABP-320733-24

| | |
|---|---|
| **Development** | Proposed Redevelopment of Port Facilities |
| **Location** | Ringaskiddy, Co. Cork |
| **Prospective Applicant** | Port of Cork Company. |
| **Type of Application** | Pre-Application Consultation under S287, of the Planning and Development Act 2000, as amended. |
| **Planning Authority** | Cork County Council |
| **Date of Consultation Meeting** | 1st October 2024, |
| **Date of Site Inspection:** | 23rd September 2024 |
| **Inspector:** | Jimmy Green |

## 1.0 Introduction.

1.1. This report relates to a request from the prospective applicant, the Port of Cork Company (POCC), to enter into pre-planning consultations with An Bord Pleanála under Section 287 of the Planning and Development Act 2000, as amended, ('the Act') in respect of the proposed redevelopment of port facilities at Ringaskiddy, Co. Cork. The pre-application consultation request was received by the Board on the 3rd of September 2024 under the provisions of Section 287(4)(a) (Chapter III – "Other Development in Maritime Area") of the Act, under which a Maritime Area Consent (MAC) is not a pre-requisite to engage in pre-application consultations where the subject port development will facilitate the deployment, maintenance or operation of offshore renewable energy infrastructure.

1.2. This report describes the location and nature of the proposed development, the applicant's submission, the consultations held and the legal provisions which are relevant to the proposed development.

1.3. The Board's representatives met with the prospective applicant on one occasion, the 1st of October 2024. The presentation provided by the prospective applicant and written record of this meeting are on file. This report should be read in conjunction with the written record of the pre-application consultation meeting with the prospective applicant. It is not proposed to repeat the contents of this record in detail here. The written record of the meeting was circulated to the Prospective Applicant on the 21st October, who subsequently provided additional details and clarifications including a fully annotated layout plan in a submission dated 2nd December 2024.

## 2.0 Site Location and Description.

2.1. The subject site is at the Port of Cork facility at Ringaskiddy, which is adjacent to the village of Ringaskiddy within the lower reaches of Cork Harbour approximately 5km east of Carrigaline, 13km south east of Cork City Centre. The site is to the south west of Haulbowline Island, west of Spike Island and south of Cobh which is located on the opposite shore. The existing port facility occupies the shoreline to the north of Ringaskiddy village main street. Ringaskiddy village main street (the start/end of the N28 road to Cork City) runs east-west along the southern side of the port lands with a number of smaller roads/streets running south (onto higher ground) from it.

2.2. The surrounding area is dominated by large industry and port facilities, the National Maritime College of Ireland is located to the east, with the Naval base at Haulbowline being located further to the northeast. There are significant pharmaceutical industrial sites to the west of the port.

2.3. Access to the site from landward is via a signal-controlled junction with the N28 (which proceeds onto the east to form the Main Street of Ringaskiddy and provides connectivity to the N40 (Cork southern ring road) to the North West). This junction also connects with the R613 which runs southwest towards Carrigaline. There is an alternative vehicular access to the port for the car ferry onto the main street of Ringaskiddy, however, this is gate controlled and only opens for the times that the ferry service runs, to encourage tourist traffic through the village. A condition of a previous consent precludes the use of this entrance for HGV traffic.

2.4. The existing Ringaskiddy port has a deep-water berth (DWB) in its western portion, this predominantly handles bulk cargo, although containers can be accommodated as there are refrigerated unit stacks present. The landward side of the DWB at Ringaskiddy West is occupied by a number of warehouse/bulk storage buildings which are operated by individual tenants and there is an existing liquid bulk delivery jetty (referred to as the ADM[1] jetty in application documents) located to the north west of the existing DWB with a breakwater located further to the north west.

2.5. Ringaskiddy East accommodates a ferry service and terminal currently in seasonal use for the Cork to Roscoff route (with two sailings weekly scheduled for next year April to November 1st). Ringaskiddy East also accommodates the Cork Container Terminal (CCT1) and trade car deliveries/storage. Ringaskiddy East has been recently upgraded and extended through the partial implementation of the PA0035 Strategic Infrastructure Development (SID) consent issued by the Board (and its associated alterations, discussed further below). The port lands to the east of CCT1 are used for storage of trade cars, and associated port services.

2.6. The Ringaskiddy port facility operates as part of the overall Port of Cork Company Operations which runs several facilities at various locations throughout the Cork harbour area. These other facilities include Cork City docks (predominantly dry bulk

[1] ADM – Archer Daniels Midland, a US agribusiness which formerly used this jetty facility.

goods), Tivoli Docks (predominantly containers, liquid bulk, and trade cars), Cobh (predominantly cruises), and Marino Point (predominantly dry bulk goods).

2.7. There are designated conservation sites in the vicinity of the Proposed Development including:

- Cork Harbour SPA [Site Code 004030], the closest part of which is centred on Monkstown Creek immediately north of the breakwater adjacent to the ADM Jetty.
- Great Island Channel SAC, [001058], approximately 5km north of the subject works.

## 3.0 Relevant Planning and other Consent History.

### 3.1. Planning History

3.1.1. The following is a list of planning history in the vicinity which are relevant in relation to the Proposed Development.

- **PL04.PA0035**: Permission granted by the Board in 2015 under Section 37E of the Act (Strategic Infrastructure Development [SID] application supported by an Environmental Impact Statement and a Natura Impact Statement) for the redevelopment of existing port facilities at Ringaskiddy, Co. Cork. This application was preceded by pre-application consultations under PL04.PC0131 confirming the SID status of the project. This consented development (and its permitted alterations – further discussed below) has been partially implemented/completed, and the works subject to the current pre-application query are stated to be those required to complete the outstanding elements of the previously permitted infrastructure. The works granted permission under PA0035 incorporate the following:
    - o Ringaskiddy East, container and multi-purpose berths, (berths 314m and 200m in length respectively),
    - o Ringaskiddy West – 182m deepwater berth extension,
    - o Paddy's Point amenity area – new public pier, slipway, planting and landscaping and provision of public amenity area,

- Road improvements and external road works, and
- All associated development works, including dredging.

Permission was granted by the Board on 28th May 2015 subject to 18 no. conditions subsequent to an oral hearing and a further information request. The Board, in granting permission did not accept the recommendation of the inspector to refuse permission due to a lack of rail connection to the site, because of, inter-alia, the multi-location nature of the Port of Cork operations in the harbour and the existing rail infrastructure in the harbour area. Conditions attached to this grant of permission include:

- A ten – year consent,
- Phase 3 of the proposed development (link-span bridge and berth to accommodate roll-on/roll-off freight traffic) shall not become operational until such time as the N28 and Dunkettle road upgrade schemes are completed.
- Agreement and implementation of the Ringaskiddy mobility management plan.
- Prior to commencement of development, the final design of the New Port entrance at the junction between the R613 and the N28 to agreed.
- The existing port entrance adjacent to the junction of the L2545 and the Loughbeg Road shall not be used by port related HGV's.
- Use of the berth and associated mooring dolphins where a colony of breeding Terns had been recorded shall not occur between April and August (inclusive).
- Appropriate interim capacity for the treatment of domestic wastewater arising shall be provided on the site if the proposed development is operational before wastewater treatment capacity is available in the Cork Lower Harbour Main Drainage Scheme.

This permission was subsequently altered four times as follows –

- **PM0010** - Lengthening the main berth, extending the dredge pocket, alterations to mooring dolphins, amending the method of landside container handling by using straddle carriers, lowering of container stack heights which consequently needed to be spread over a larger area with the carriers also requiring provision of a new two-storey maintenance and office building, expansion of the red line application boundary, and changing the previously proposed maintenance building to customs inspection. Alteration was permitted in June 2017, following Environmental Impact Assessment (EIA) and Appropriate Assessment (AA). Certain amended conditions were applied which included; that pending the completion of the N28 and Dunkettle Road schemes (a) throughput at the permitted Ringaskiddy port facility will be limited to 322,846 TEU (Twenty-foot Equivalent Units), (b) Phase 3 (provision of link span bridge and use of the berth to accommodate roll on / roll off freight traffic) shall not become operational and (c) the container/multipurpose berth 1 shall be modified for use for containers and general cargo as shown in submitted drawings (16th December 2016). A further condition required that the proposed maintenance building does not exceed 22.5 metres in height.

- **304437-19** – Alterations to the customs inspection building, including a doubling in size from the permitted 324 square metres to 648 square metres, it's slight footprint relocation as well as other internal alterations including in relation to floor levels and inspection base. Determination by the Board was that the alterations were not considered to be material, and the decision was altered in July 2019.
- **310847-21** – Alterations to part of the departure lounge of the constructed ferry terminal to change use to office accommodation for maintenance and office staff, minor elevational changes to the terminal building, the provision of 4 no. modular units, 3 no. to accommodate drying area, toilets and showers for use by drivers of the container moving equipment and the fourth as a ship planner's office, realignment of a section of the existing noise reflective barrier, relocation of 44 no. car parking spaces. Determination by the Board was that the alterations were not considered to be material, and the decision was altered in October 2021.
- **PA-0035M –** Application documentation states that this is a modification to condition 5 of original permission, relating to reducing the timeline for agreeing

the Ringaskiddy mobility management plan from six months prior to one month prior to commencement.

- **PL04.PA0003:** Permission refused by the Board to the Port of Cork for the redevelopment of Ringaskiddy Port, including the construction of a container terminal and a multipurpose ro-ro berth comprising approximately 480m of new berths and a ro-ro birth of 182m, along with 18 hectares of reclamation, and replacement of the public pier slip away to the east of the site. This 2008 application had a design capacity of 400,000 TEU per annum for 2026. The decision noted the proposed relocation of commercial freight activities away from Tivoli, a location which is served by a railway line with reasonably direct access to the national road network, to Ringaskiddy which lacks a rail connection and is totally reliant on road-based transport. The Board considered that the proposed development would:

  (a) adversely impact on the carrying capacity of the strategic road network in and around Cork City and in particular the carrying capacity of the strategic interchanges at Bloomfield, Dunkettle, and Kinsale Road and the Jack Lynch tunnel and would exacerbate serious traffic congestion at these strategic interchanges, and

  (b) be unable to make use of rail freight carrying facilities in the future and would therefore represent a retrograde step in terms of sustainable transport planning (noting references to the potential for rail freight in the regional planning guidelines for the South West region and in the Cork Area Strategic Plan 2001 to 2020)

3.1.2. There are a number of other applications and permissions in the wider area relating to a range of industrial and storage uses within the vicinity of the port facility, including applications and consents in relation to the National Maritime College of Ireland and the MaREI centre to the east, general urban development associated with Ringaskiddy village to the south, Pfizer to the west, Jansen Sciences/Biologics to the south west and Cobh to the north.

## 3.2. Other Relevant Consents

3.2.1. A Maritime Area Consent (MAC) application in respect of the subject proposed dredging works at the Ringaskiddy East and West berths has been lodged with the Marine Area Regulatory Authority (MAC20230004 refers). The pre-application documentation states that this was lodged in June 2024. The MARA website notes that this application has been lodged, however, no further details are available.

3.3. A dumping at sea licence has also been applied for (Ref. no. S0021-03) and is currently under the consideration of the Environmental Protection Agency (EPA). That application is accompanied by Appropriate Assessment Screening and a Natura Impact Statement. At time of writing, the latest available correspondence/details in relation to this licence application are the responses from the applicant to queries raised by the EPA, (dated December 2024).

3.4. The following foreshore licences are of relevance in relation to the proposed development:

- **FS006441**: Foreshore licence granted to facilitate site investigation works at Ringaskiddy, in Cork Harbour, to aid the design of Phase I of the Ringaskiddy Port development for which permission was granted by An Bord Pleanála, in 2015. The site investigation works constituted a total of 33 no. 200 mm diameter boreholes.
- **FS006408**: This Departmental reference relates to three consents, namely, a foreshore lease for a term of 35 years, a foreshore Licence for a term of 3 years, and a Ministerial consent under Section 10 of the Foreshore Act 1933, all of which were granted in December 2017. The foreshore lease and Section 10 Ministerial approval refers to the works consented by An Bord Pleanála under PL04.PA0035 including (a) the construction of the new extension to the existing deepwater berth at Ringaskiddy West, (b) the construction of the remaining section of the new container and multi-purpose berths at Ringaskiddy East, (as well as a sub-lease in relation to the provision of a public amenity area at Paddy's Point) and all associated works. The foreshore lease was subject to a condition that required all relevant works to be completed 'within 10 years of 28$^{th}$ of May 2025', however, subsequent to the pre-application consultation meeting, the prospective applicant has

provided details of a deed of variation to the lease made (September 2024) by the Maritime Area Regulatory Authority (MARA) extending this timeframe to the 31st May 2030. The foreshore lease excludes the proposed dredging areas, which were formally subject to the 3-year foreshore licence (referenced under FS006408), and are now subject to the MAC application (MAC20230004) currently under the consideration of MARA referenced previously above.

For clarity the Board should therefore note that the prospective applicant is a lessee under a lease made under section 2 of the Act of 1933[2] in relation to the proposed works, with the exception of the dredging for which a MAC is currently under the active consideration of MARA.

## 4.0 Description of the Proposed Development.

### 4.1. Context:

4.1.1. This pre-application consultation is taking place in relation to the redevelopment of the Ringaskiddy port facility, the works subject to this pre-application consultation are those which have been previously consented under PA0035, as amended, but which have not yet been completed under the provisions of that permission. The prospective applicant has confirmed that the works remaining to be completed from that consent require Appropriate Assessment (AA) as well as Environmental Impact Assessment (EIA), and accordingly an extension of the appropriate period of the issued consent is precluded under Section 42(8) of the Act.

### 4.2. Overview:

4.2.1. The pre-application consultation documentation states that the following works from the originally consented development have been completed:

- The new 361m Container berth/multipurpose berth CCT1, surfacing of existing port lands, demolition of existing link span, provision of terminal

[2] The Planning and Development Act, 2000 refers to the Foreshore Act, 1933 as the 'Act of 1933'.

transport equipment, maintenance building, administrative buildings, and entrance kiosks at Ringaskiddy East.

- Improvements to the external road entrance/access into the Ringaskiddy Port facility.
- Improvements to the internal link road between Ringaskiddy East and West.
- Public amenities including new pier, slipway, planting, landscaping, boat storage, lighting and fencing at Paddy's Point.

4.2.2. The initial submission layout drawings did not specifically clarify/delineate the elements which were subject to the current pre-application consultation process, however, these were clearly set out by the prospective applicant at the meeting, and further clarified in the correspondence and additional details received by the Board dated 2nd December, 2024, which included an updated site layout plan (Drawing no. M1099-1002, dated 13th October 2024). The updated layout clearly delineates the extent of the works that have been completed (as outlined above) and also sets out the extent of the works subject to the current pre-application consultation as set out below.

## 4.3. Main Project Components.

4.3.1. The Proposed Development is comprised of the following elements:

- Ringaskiddy East (Container Berth 2)
    - Construction of an additional 200m container berth,
    - Dredging of the seabed to a level of -13.0m chart datum (CD),
    - Installation of linkspan comprising a floating pontoon and access bridge,
    - Installation of container handling cranes, and
    - lighting and fencing,
- Ringaskiddy West (Deepwater Berth Extension)
    - A new 180m extension to the existing deepwater berth (DWB) which will comprise a filled quay structure (c. 231m) extending no further seaward than the edge of the existing DWB.

- Dredging works to varying levels to facilitate navigational access to the new facilities.
- Lighting.

- Road improvements:
  - Improvements to internal road network at Ringaskiddy East to facilitate future access to the N28.
  - Lighting and fencing.

## 5.0 Policy Context.

5.1. The following policy documents and legislation are of relevance in relation to the proposed development but, it should be noted, do not comprise an exhaustive list:

- National Marine Planning Framework,
- Marine Planning Policy Statement 2019,
- Project Ireland 2040 - National Planning Framework 2040 and the National Development Plan 2018-2027;
- Climate Action Plan, 2024;
- National Ports Policy, 2013;
- Regional Spatial Economic Strategy for the Southern Region, and
- Cork County Development Plan 2022 – 2028 (under which the land-based area of the port subject to the proposed works have been zoned as "Industry"),

## 6.0 Meeting Held.

6.1. One meeting was held with the prospective applicant's representatives on the 1st of October, 2024.

6.2. A presentation was provided by the Prospective Applicant, which is included on the file, together with other information provided to the Board in respect of same. The record of the meeting is also contained on the file. Issues raised at the meeting are identified and discussed in Section 8 below.

## 7.0 **Relevant Legislative Provisions.**

7.1. Section 285(1)(c) of the Planning and Development Act, 2000 (as amended) ('the Act'), notes that Chapter III (Other Development in the Maritime Area) of Part XXI (Maritime Development) applies to development of a class specified in the Eighth Schedule situated partly on land and partly in the nearshore area of a coastal planning authority[3]. The Eighth Schedule of the Act includes all developments listed in the Seventh Schedule and a wide range of marine and harbour/port infrastructure, underwater communications, pipelines and cables, land reclamation, extraction of aggregates, dredging, drilling, large marinas, as well as various energy generation and storage developments. Specifically, the Eighth Schedule includes the following class of development:

- *'Class 21: A harbour or port installation, including –*

  *(a) Loading or unloading areas,*

  *(b) Vehicle queuing and parking areas,*

  *(c) Ship repair areas,*

  *(d) Areas for berthing or dry docking of ships, and*

  *(e) Areas for the weighing, handling or transport of goods or the movement or transport of passengers (including customs or passport control facilities), and any associated offices or other similar facilities that would –*

    *(i) Result in the enclosed area of water in the harbour or port installation being not less than 20 hectares,*

    *(ii) Involve the reclamation of an area of land of not less than t hectares.*

    *(iii) Involve the construction of a quay greater than 100m in length, or*

    *(iv) Be capable of admitting a vessel of more than 1,350 tonnes.*

[3] Section 285(1)(c)(ii)(I) of the Act refers.

7.2. 'Nearshore Area' for the purposes of the Act has the meaning assigned to it in the Maritime Area Planning Act 2021, and essentially relates to the marine area below the line of the high water mark (including tidal rivers and tidal estuaries) extending out to sea by three nautical miles (or any other such distance as may be prescribed by regulation).

7.3. Section 286(3) of the Act states that a person shall not be eligible to apply for permission under the provisions of Part XXI, Chapter III, unless that person is either:

(a) the holder of either a Marine Area Consent (MAC)[4], or of a licence granted under section 3 of the Foreshore Act of 1933[5] ("the Foreshore Act") authorising the licensee to do any act or acts referred to in that section for the purposes of the development on, or in relation to the maritime site in which the development is proposed,

(b) the owner of the land in the maritime area where the development will be carried out,

(c) the lessee under a lease made under section 2 of the Foreshore Act that includes the maritime site of the proposed development and that contains a covenant, condition or agreement that requires the lessee to carry out on that site the proposed development concerned[6], or

(d) makes the application with the consent of the owner of the land in the maritime area[7].

7.4. Section 287(1) of the Act, states that a person who is eligible to apply for permission under Section 291 shall, before making the application, consult with the Board. Section 287(2) of the Act states that the Board may provide an opinion in relation to a range of matters, including inter alia,

*(a) 'the procedures to be followed by the prospective applicant when making the application and by the Board when considering the application,*

*(b) the documents required to accompany the application,*

[4] Section 286(3)(a)(i) of the Act refers.
[5] Section 286(3)(a)(ii) of the Act refers.
[6] Section 286(3)(c)(i) & (ii) of the Act refers.
[7] Section 286(3)(d) of the Act refers.

*(c) the need for the prospective applicant to create an internet website for the purpose of publishing the application and all documentation accompanying the application,*

*(d) the publication of notices in accordance with this Act, the furnishing of documentation to persons referred to in subsection (3) of section 291 and the making of submissions and observations in relation to an application under that section,*

*(e) such persons as may be prescribed for the purposes of this Chapter,*

*(f) some or all of the matters that the Board is likely to take into consideration relating to—*

*(i) the National Marine Planning Framework,*

*(ii) objectives of maritime spatial planning,*

*(iii) principles of proper planning and sustainable development, and*

*(iv) the environment or any European site,*

*when making a decision under section 293 in relation to the application,*

*(g) the fees payable to the Board in relation to the making of the application, and*

*(h) compliance by the prospective applicant with any direction of the Board under subsection (3) of section 291.'*

Of note, under Section 287(3) of the Act, the Board may at any time conclude a consultation under this section where it considers it appropriate to do so.

7.5. Section 287(4) of the Act states that *"a prospective applicant for permission to carry out development consisting of port infrastructure to facilitate the deployment, maintenance or operation of offshore renewable energy infrastructure may consult with the Board in accordance with subsection (1) notwithstanding that the prospective applicant is not the holder of a maritime area consent granted for the occupation of a maritime site for the purposes of such proposed development"*.

## 8.0 Matters Arising.

### 8.1. Proper Planning and Sustainable Development:

8.1.1. Over the course of the pre-application consultation there were a range of issues discussed with, and raised by, the Prospective Applicant through the meeting held and within the documentation submitted in support of the pre-application process. In this regard the Board is referred to the record of the meeting and other documentation attached to the file. I have summarised the broad matters arising below which include inter alia:

- A need for clarity in relation to the nature of the works previously completed, under the previous application and those which were subject to the current pre-application consultation. In this regard additional detail was provided by the prospective applicant at the meeting, and an updated and more fully annotated layout plan provided in correspondence dated 2nd December 2024. These additional details have informed the project description set out above and the Board are referred to the updated layout plan provided which sets out the previously consented works, the works that have been constructed under the previous consent, as well as the areas of dredging and works which will be subject to the future application at both Ringaskiddy East and West.
- In discussions the prospective applicant stated their intent to continue to build out parts of the previously consented works at the location of Container Berth 2 (CB2) under the auspices of the previous consent. These works are stated to have commenced in October 2024 with the intent for them to be completed prior to the expiration of the current consent, which the prospective applicant has stated to be in October 2025. Accordingly, it is likely that such works could be ongoing when any future application is lodged. In order to ensure that comprehensive and appropriate application documentation is lodged, the prospective applicant is intending to provide for the completion any part of CB2 not finished by the expiry date of the previous consent within the upcoming application. In this regard, the application and submitted documentation (including EIAR and NIS) will provide for assessment of this work. Closer to application stage the prospective applicant will identify which

works may necessitate consideration in this regard and the applicant has provided drawing no. CCT2-MWP-ZZ-ZZ-DR-S-1204, which outlines the identifiable phases/main elements required to provide the CB2 infrastructure. The application documentation will assess these phases and their potential for impact and provide up to date information in relation to the construction programme at the future lodgement date. I consider that this approach will allow for comprehensive consideration of the proposed development in the context of there potentially being ongoing and consented works taking place during the assessment of any future application, provided up to date and accurate information is provided throughout. For clarity, the Board should note that I do not consider this approach to represent design flexibility requiring an opinion from the Board. In this regard I note that the final design of the infrastructure is known and that the approach set out merely presents a viable means of informing a comprehensive assessment of any future application in the context of ongoing consented works taking place.

- The previous grant of permission (PA0035) that is currently in place for the subject infrastructure was noted, as were the previous supporting documents (Environmental Impact Statement and Natura Impact Statement). The applicant was advised that any future application must stand on its own merits and be informed by up-to-date assessments, information and surveys. Furthermore, the applicant was advised to provide comprehensive details of any 'prior to commencement' agreements reached with the Planning Authority under the current consent and to provide a schedule of condition compliance in order to fully inform the Boards consideration of any future application. The applicant undertook to include all relevant details within the future application.
- The policy context surrounding the proposal ranging from strategic, regional, and local issues set out in national legislation, the National Planning Framework, Regional Spatial and Economic Strategy, and local County Development Plan were noted as an important consideration. It will also be important for any future application to consider the requirements of the Climate Action and Low Carbon Act, as well as the Climate Action Plan and the established sectoral carbon budgets.

- Since the previous consent issued (May 2015) the National Marine Planning Framework (NMPF) has been adopted. The applicant was strongly advised to ensure that any future application considers all relevant policy objectives within the NMPF and that any supporting documentation clearly sets out how the proposed development complies with its provisions. While compliance with all NMPF planning policies will be required (and should be demonstrated), policies in relation to ports, harbours and shipping as well as interactions with other maritime users (such as fishers, and naval operations) are of particular importance. Furthermore, the NMPF policies relating to ocean health, biodiversity, water quality, seafloor and water column integrity, and underwater noise are also of note. The applicant was also advised that any proposed works must include sufficient and best practice up-to-date mitigation measures to ensure adequate protection of marine species and water quality.
- The prospective applicant was advised of, and noted, the provisions of the Cork County Development Plan 2022-2028 (CDP), which has issued since the previous grant of permission. In discussions in this regard the prospective applicant noted the provisions of the CDP (which zones the Ringaskiddy port facility as 'Industry') and advised that they continue to liaise with the Planning Authority in relation to the proposed development. Although not located within the functional area of the Cork City Planning Authority, the provisions of the Cork City Development plan are also a consideration within any future application, due to the proximity of the City, the multi-location nature of the Port of Cork facilities and the support within the City Development plan for the relocation of port facilities from the City and Tivoli docks.
- The applicant is fully aware of the range of issues raised and considered throughout the previous application process and was advised that these issues will remain significant considerations in any future application. These issues include, the principle of the proposed development, traffic and transportation, strategic location and alternatives (including consideration of rail links), noise, dust, air quality, climate, visual impacts, coastal processes, ecology (particularly marine ecology – and underwater noise mitigation/assessment), construction phase impacts and management, leisure and amenity as well as cultural heritage and protecting the amenities of

residents who could be affected during construction and/or operational phases. In discussions, the prospective applicant advised that all these issues would be discussed and detailed in full within any future application and that all necessary and relevant surveys, studies, and assessments were underway.

- The applicant was advised to pay particular attention to the traffic and transport provisions having regard to the nature of the conditions attached to the previous consent and the ongoing nature of the road design improvements in the area in the context of the N28 and Dunkettle road upgrade scheme. Liaison with the relevant roads design offices and Transport Infrastructure Ireland (TII) was also encouraged in this regard.
- During consultations the applicant has confirmed that a dumping at sea licence application (in relation to the proposed dredging material) has been lodged with the EPA and that this remains under their consideration.
- The prospective applicant is aware of the importance of continued liaison with stakeholders and relevant prescribed bodies throughout the planning processes for the currently proposed and previously granted infrastructure. The prospective applicant was advised to review all submissions made by relevant bodies and parties to the previous application on this site and to continue to liaise insofar as practicable.
- The coastal planning authority within whose functional area (including nearshore area) the proposed development would be situated or one whose functional area (including near shore) adjoins that part of the maritime area in which the proposed development would be situated may provide a dedicated report including their members views during any future application process. In this instance Cork County Council is the relevant coastal planning authority under the provisions of Section 291(3)(b)(V) from which a report (including members consideration) would be appropriate as part of any future application process.
- Potential impacts on cultural heritage and biodiversity were discussed in broad terms and it was stated that these would be dealt with in the relevant sections of the EIAR that would accompany any future application. The

Prospective Applicant was advised that submissions made by relevant parties and stakeholders in the previous application should be used to inform assessments, and any additional surveys carried out should be used to further inform the baseline.

- In relation to impact on fisheries the prospective applicant has stated that the area is not a busy location in this regard, however, community, and sectoral engagement is ongoing.
- Construction methods of the various elements of the proposed development were discussed. Any future application will be accompanied by a detailed construction and environmental management plan, and it is proposed that the application documentation will include details of how construction of the various shoreline and seabed elements will be carried out while minimising the potential for impacts to arise.
- The application documentation including EIAR will consider all potential operational impacts arising from the proposed development.

## 8.2. Environmental Impact Assessment

8.2.1. An Environmental Impact Assessment Report (EIAR) will be provided in relation to the proposed development. The initial submission from the Prospective Applicant, provides the standard headings for review within an EIAR and also lists the key environmental considerations in relation to the proposed development as well as a schedule of studies proposed inform the EIAR. The key environmental considerations listed include marine ecology, waste management, terrestrial ecology, ornithology, impacts on water quality and noise impacts.

8.2.2. The applicant has been advised to ensure that all assessments and relevant surveys are updated to ensure that robust findings can be made. Furthermore, the Prospective Applicant was advised that any EIAR should contain a robust alternatives discussion informed by environmental considerations as well as ensuring that a comprehensive cumulative impact assessment is carried out.

8.2.3. While the Board should refer to the record of meetings held that are on file, and the discussion details set out in the previous sections, the following include some of the key matters which were outlined in relation to the EIAR during the course of the consultation meetings.

- Formal EIA scoping was not undertaken by the prospective applicant; however, they have submitted a wide range of informal scoping requests and consultations to a range of bodies.
- Due to the planning history of the site, the importance of ensuring up to date survey data and the importance of incorporating validity exercises on data and surveys used to inform assessments was discussed.
- The marine mammal population as well as all sensitive and protected species will be taken into consideration, and appropriate mitigation applied as necessary.
- Consideration of major accidents and disasters will be included within the EIAR, however, the prospective applicant has stated that the proposed development will not result in the provision of any COMAH[8] facilities at Ringaskiddy Port.
- The ecological sensitivity of the site must be fully considered for both the terrestrial and marine species and habitats. It was acknowledged that the previously submitted details would be updated and reviewed and any future EIAR will need to address such issues and impacts in full.
- It is intended that all anticipated construction and operational phase impacts will be set out in full within the EIAR with all relevant mitigation measures included.
- The overall format of the EIAR was broadly discussed in terms of the nature of the proposed development and the various elements and topics which are intended to be covered.
- The potential for cumulative impacts to arise was discussed and the importance of considering all relevant projects including those permitted and proposed in the immediate area and which could be constructed/operational along the same timeframe as the subject proposed development.

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[8] Control of Major Accident Hazards Regulations

- As discussed previously the assessment of the permitted construction activity at CT2 was discussed. While the intention is to have these works completed before the expiry of the current consent this may be delayed, however, the up to date status of the works, and the potential impacts to arise from any further phases of construction, within the timeframe of the existing consent, or beyond that date, as part of any completion works which will be subject to the future application (if necessary) will be assessed within any future EIAR. In order to ensure a comprehensive EIAR is submitted it is intended to consider the impacts of the various identifiable construction phases of CT2, as set out on the drawing 'Main quay area, phased construction of main elements' dated November 2024, and received by the Board in December.

### 8.3. Appropriate Assessment

8.3.1. It is proposed to submit a Natura Impact Statement with any subsequent section 291 application, to inform the Board's Appropriate Assessment of any future application. The following include matters which were discussed during the consultation meetings.

- Consultation with the National Parks and Wildlife Service (NPWS) was encouraged.
- In preparing the NIS the Prospective Applicant has considered the likely Zone of Impact of all elements of the proposal, and to ensure that any conclusions arrived at are informed by up-to-date surveys, and assessments. In this regard any monitoring data or surveys carried out in compliance with previously applied conditions should be included in considerations.
- The range of Natura 2000 sites considered should not be based on proximity but arrived at following review of the relevant species and habitats of concern and consideration of the likely zones of impact that will arise from the proposed development. Consideration should include migratory, roosting and feeding interactions, as well as territorial patterns.
- Consideration of the efficacy of any mitigatory measures that were applied during the previously approved construction.

- The applicant was advised of the importance of the provision of a detailed and comprehensive Natura Impact Statement to show the impacts that could arise, and mitigation measures proposed to ensure the integrity of designated sites. The NIS is to contain all the required details in this regard and in terms of in-combination effects consider all relevant plans and projects.

### 8.4. Procedures and Process

8.4.1. From review of the submitted documentation and having regard to the meeting discussions and site visit completed, I am satisfied that the proposed development constitutes a Class 21, Eighth Schedule form of development that is located partly on land and partly in the nearshore area of Cork. In this regard the Board should note that the proposed development involves the construction of a quay greater than 100m in length, will be capable of admitting vessels of more than 1,350 tonnes and will constitute the provisions of roadways and areas within the port installation for the handling, transport and weighing of goods. Furthermore, the proposed development will provide further loading/unloading areas as well as additional berthing facilities albeit I note that some of these may be provided in the short term under the auspices of the extant permission that is in place.

8.4.2. The Proposed Development is located partly in the nearshore of Cork County Council (the Coastal Authority) where dredging, berths (both the additional container berth CB2 at Ringaskiddy East and DWB extension at Ringaskiddy West), and link span (floating pontoon and access bridge) are proposed, with the remainder of the subject works (including roads, lighting and fencing, and other servicing works) being provided on land as shown in the layout plans submitted.

8.4.3. As the Proposed Development is a class of development specified in the Eighth Schedule of the Act (Class 21) and is located partly on land and partly in the nearshore area of a coastal planning authority I am satisfied that the relevant criteria set out in Section 285(1)(c)(ii)(I) of the Act have been met.

8.4.4. I note that the initial submission from the prospective applicant stated that the proposed development consists of port infrastructure which *"may facilitate the deployment, maintenance or operation of offshore renewable energy infrastructure"*, and goes on to quote Section 287(4) of the Act (set out previously above in section

7.5 of this report), as being applicable to this pre-application request. Following queries on this matter at the pre-application consultation meeting, the applicant has further clarified in their submission of the 2nd December, 2024, that both the Ringaskiddy East and West quay extensions have been designed with sufficient loading capacity to support the import, assembly and deployment of offshore fixed-bottom wind turbines. The design of the subject infrastructure was informed through consultation with the offshore wind industry in relation to their requirements, furthermore the prospective applicant has also confirmed that the Port of Cork has a funding arrangement in place with the Irish Strategic Investment Fund specifically to assist in the development of Ringaskiddy East berth with capacity to support offshore renewable energy. Given the multipurpose functionality of the berths and port facilities at Ringaskiddy, and their design, I am satisfied that the subject works could facilitate the deployment, maintenance or operation of offshore renewable energy, and accordingly, the provisions of section 287(4)(a) of the Act are applicable, in that the applicant can engage in consultation with the Board in the absence of a MAC being in place. I also note that a Section 291 application cannot be lodged without the prospective applicant being the holder of such a MAC (Section 287(4)(b) of the Act refers), the prospective applicant has acknowledged this fact.

8.4.5. The Prospective Applicant is the lessee under a lease made under section 2 of the Foreshore Act issued for the purpose of constructing the subject development (with the exception of the proposed dredging works), FS006408 refers. This foreshore lease has a duration of 35 years and was initially subject to a conditioned construction timeframe (i.e. that works must be carried out within 10 years of the 28th May 2015). As set out in the details provided by the prospective applicant this construction timeframe has now been extended by MARA through a deed of variation (an extract of which has been included in the prospective applicant's submission dated 2nd December 2024) to the 31st May 2030.

8.4.6. The prospective applicant has lodged a MAC application with MARA in relation to the subject dredging works required (MAC2023004 refers – Capital Dredging of berths at Ringaskiddy East and West and of approaches to Ringaskiddy West berth extension). At time of writing this MAC remains under the consideration of MARA.

8.4.7. The Board will note that the foreshore lease and MAC mapping is not scalable for direct comparison to the layout of the Proposed Development, however, comparing the extents of the mapping and layout on the basis of available background maps indicates that the relevant boundaries of the current MAC application are broadly consistent with the subject dredging works and the issued foreshore lease relates to the previously permitted development under (PA0035), furthermore in discussions the prospective applicant has confirmed that no amendments were required to the issued foreshore lease beyond the construction timeframes for which a deed of variation has since issued (September 2024) in relation to the current proposal.

8.4.8. On the basis of the above, and subject to MARA granting a MAC in relation to the dredging activities, I am satisfied that the prospective applicant will have the relevant third-party consents required to engage in a section 291 application to the Board in relation to the proposed development. The MAC (if granted) will be in place in relation to the dredging activities and the foreshore lease and associated deed of variation is in place in relation to the remainder of the relevant shoreside works.

8.4.9. The prospective applicant has confirmed their awareness that an application cannot be lodged under Section 291 of the Act until such time as the relevant MAC is in place[9]. The applicant is, therefore, aware of the legislative requirements articulated in Section 286 of the Act, which lists a number of prerequisites for applicants engaging in a section 291 application. This section requires that an applicant either has a MAC, or a foreshore licence in relation to the works, owns the land in the relevant marine area, is the lessee under a lease granted under section 2 of the foreshore act of 1933 for the proposed development, or makes the application with the consent of the maritime landowner.

8.4.10. The Prospective Applicant has confirmed in the pre-application meeting that they do not require an opinion from the Board in relation to flexibility under section 297B of the Act.

8.4.11. In relation to closing out the pre-application process the prospective applicant has confirmed that they do not require any further feedback and I am satisfied that the they are aware of all the relevant issues arising, are familiar with the processes involved, and that it is appropriate to close out the pre-application consultation process at this time. The prospective applicant's most recent correspondence notes the comprehensive feedback provided at the pre-application consultation meeting

[9] Section 287(4)(b) of the Act refers.

and concludes by confirming that they have no further questions on procedures and that they would welcome the closure of the pre-consultation phase at this stage. The administrative section of the Board will remain available to engage with the Prospective Applicant up to the lodgement of any future planning application in relation to any relevant procedures concerning the documentation and details required including the provision of the stand-alone website, timing and statutory wording of notices, relevant prescribed bodies, application fee, etc.

8.4.12. In relation to the prescribed bodies for the purposes of any future application I recommend that the Board consider that the persons listed hereunder be served with the application and accompanying documents. In forming the list hereunder, regard was had to, inter alia, the requirements under Schedule 1 of the Planning and Development (Maritime Development) Regulations 2023 and to the provisions of S.291(3)(b) and (c) of the Planning and Development Act 2000 (as amended). In this regard I recommend that the Prospective Applicant should send the following persons a copy of the application, accompanying documents (including EIAR and NIS) and a copy of the public notice:

- The Minister for Housing, Local Government and Heritage;
- The Minister for the Environment, Climate and Communications;
- The Minister of Transport;
- The Minister of Defence;
- The Minister for Agriculture, Food, and the Marine;
- The Environmental Protection Agency (EPA);
- Cork County Council;
- The Maritime Area Regulatory Authority;
- The Minister for Rural and Community Development;
- The Marine Institute;
- Inland Fisheries Ireland;
- The Health and Safety Authority (HSA);
- Commission for Regulation of Utilities (CRU);

- Failte Ireland;
- An Taisce;
- Cork City Council;
- The Southern Regional Assembly;
- National Transport Authority;
- Sustainable Energy Authority of Ireland;
- Eirgrid;
- Commissioner of Irish Lights, and
- The Irish Coastguard.

The Board may wish to review the above list and satisfy itself that it is sufficient. In this regard, I note that the above list has been compiled on the basis of information that is available from the pre-application consultations and that the applicant who has been carrying out detailed studies and surveys in preparing the EIAR and NIS may consider other bodies to be relevant. Accordingly, I recommend that any communication with the Prospective Applicant advise them that it is open to them to send copies of the application and its associated documentation to any other bodies that they consider relevant on the basis of the studies that they have carried out. Furthermore, I note that the status, capacity and development of the national roads network in the vicinity of the proposed development was a significant concern in relation to the previous application on this site, with specific conditions imposed in relation to the operational status of the various consented infrastructure pending the upgrade of road infrastructure in the vicinity, similarly a condition was imposed in relation to the status of capacity of the Cork Lower Harbour Main Drainage Scheme. Accordingly, I recommend that the prospective applicant be requested to send copies of any future Section 291 application to the following bodies, which are not included in the prescribed list above:

- Transport Infrastructure Ireland
- Uisce Eireann/Irish Water

### 8.5. Transboundary Consultation

8.5.1. Having regard to the provisions of S.291(3)(d) of the Planning and Development Act 2000 (as amended), the nature and location of the proposed development, I do not consider that the Proposed Development is likely to give rise to transboundary effects and accordingly I do not consider it necessary to engage in transboundary consultations.

## 9.0 Conclusion

9.1. Following the completion of the pre-application meeting on 1st October 2024, and the provision of additional details from the prospective applicant dated in their submission dated the 2nd of December 2024, I am of the opinion that the process should be concluded. In this regard, it is recommended that the Board notify the prospective applicant that the process is closed and include the list of bodies that the applicant is requested to send copies of the application to as set out previously above in accordance with S291(3)(b) and S291(3)(d), as well as the additional bodies identified in the interests of completeness.

9.2. I confirm that this report represents my professional planning assessment, judgement and opinion on the matter assigned to me and that no person has influenced or sought to influence, directly or indirectly, the exercise of my professional judgement in an improper or inappropriate way.

Jimmy Green
Senior Planning Inspector

16th December 2024

# APPENDIX 2.1 SOCIO-ECONOMIC IMPACT OF RINGASKIDDY PORT RE-DEVELOPMENT

# Socio-Economic Impact of Ringaskiddy Port Re-Development

## Detailed Assessment Report

Prepared on behalf of

**Port of Cork**

By

**Indecon International Economic Consultants**

Indecon
www.indecon.ie

April 2014

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# EXECUTIVE SUMMARY

## Introduction

This report has been prepared on behalf of the Port of Cork by Indecon International Economic Consultants. The report concerns a socio-economic impact assessment of the proposed Ringaskiddy Port Re-Development.

The overall objective of this assessment is to examine the socio-economic impacts that would arise if the Port of Cork achieves statutory consent to develop its facilities at Ringaskiddy and, conversely, to also assess the implications of failure to undertake these developments.

## Wider Economic Context and Linkages with Port Development

An important issue in assessing the socio-economic impacts of the Port of Cork's proposed Ringaskiddy Port Re-Development is to set this within the wider economic and port development context.

The Port of Cork plays a key strategic role in the development of both the Cork City region and the wider Irish economy. Furthermore, by facilitating the movement of goods to and from the UK and Continental Europe, the Port also plays an important role in the development of the EU's Internal Market.

Ensuring that the Port of Cork continues to meet the external connectivity needs and supports the development of the wider regional and national economy is of key importance. This is clearly enunciated in Irish government policy, including the National Spatial Strategy, the Cork Area Strategic Plan (CASP)[1] and the Government's most recent National Ports Policy statement.[2]

The Port of Cork has also been designated for inclusion (alongside Dublin Port and Shannon Foynes) as a Core Network Port under the EU Trans-European Network – Transport (TEN-T), in recognition of its strategic importance to the island of Ireland, where practically all trade is exported by sea, and due to its role in the movement of goods to and from the UK and Continental Europe.[3] Reflecting the Port's role and its TEN-T status, the Government's National Ports Policy statement also identifies Port of Cork as a 'Tier 1 Port of National Significance'.

The Port's Strategic Development Plan (SDP) Review outlines the company's intention over time to relocate its commercial trade to the lower Cork Harbour area. This has been informed by a rigorous assessment and site selection process, which identified Ringaskiddy as the optimal location to consolidate the Port's LoLo services and ensure that it can service future trade growth. The principles set out in the SDP have been endorsed by the Government, which has also noted that the continued development of the Port represents a key strategic objective of national ports policy.[4]

As a small open economy, Ireland is critically dependent on external trade to support its development. This is evidenced by the scale of external trade relative to overall economic activity, with overall merchandise (goods) trade representing 85.9% of Irish economy Gross Domestic Product (GDP). In addition, exports represent over 87% of the value of manufacturing output and almost 61% of raw material inputs used in the production of such

[1] Cork City Council, Cork Area Strategic Plan (2008). See: http://www.corkcity.ie/casp/strategicplan/.

[2] Department of Transport, Tourism and Sport, National Ports Policy statement, March 2013. See: http://www.transport.ie/upload/general/13776-NATIONAL_PORTS_POLICY_2013-1.PDF.

[3] The Port has recently been awarded TEN-T funding to support its development plans.

[4] National Ports Policy statement, Op. Cit., Page 26.

goods. The manufacturing sector in Ireland is therefore highly dependent on external trade, both in terms of its outputs/sales and in relation to its production inputs. The supply-chain activities of these exporting firms also indirectly support output and employment elsewhere in the economy.

*Role of commercial seaports in external trade*

Sea-based trade represents the single largest category of Ireland's merchandise trade. Indecon's analysis demonstrates that sea-based trade, i.e., trade taking place through the commercial seaports, represents 70% of the total volume of exports and imports of goods, and almost €58 million or 41% of the value of goods trade to/from Ireland. This underscores the critical role played by the commercial seaports in serving the trading needs of the Irish economy.

The Port of Cork's role in this context is evidenced by the fact that the port is the second largest multi-modal port by overall volume of trade handled and is the largest natural harbour in Ireland, capable of handling all principal modes of port traffic. It is also the second largest LoLo port, handling almost 23% of all LoLo trade, and it accounts for 21% of break bulk and almost 39% of liquid bulk trade in the State (see table below).

**Port of Cork in Context of Other Major Ports in Ireland – Volumes of Trade – '000 Tonnes**

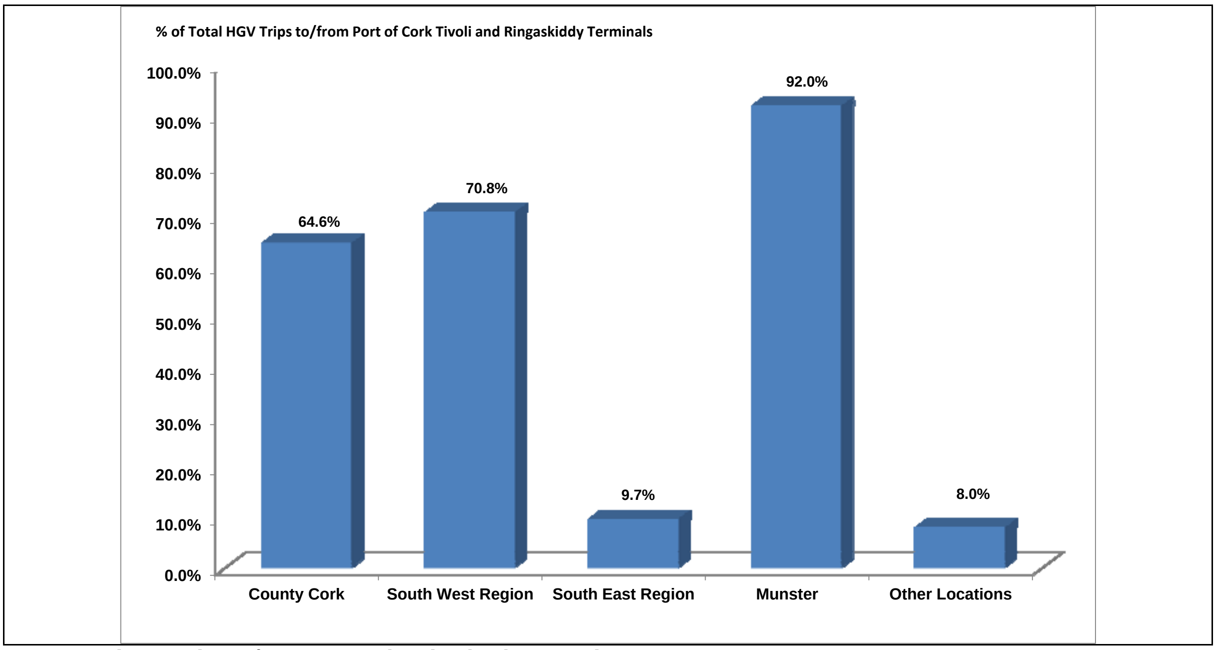
| Port | All types of cargo | Roll-on/roll-off traffic | Lift-on/lift-off traffic | Liquid bulk | Dry bulk | Break bulk and all other goods |
|---|---|---|---|---|---|---|
| Dublin | 19,898 | 9,691 | 4,892 | 3,444 | 1,813 | 59 |
| Shannon Foynes | 10,094 | .. | .. | 1,097 | 8,938 | 59 |
| Cork | 8,708 | 50 | 1,515 | 5,200 | 1,759 | 183 |
| **All Irish ports** | **47,649** | **11,605** | **6,716** | **13,417** | **15,042** | **870** |
| | | | | | | |
| *Port of Cork % Share* | *18.3%* | *0.4%* | *22.6%* | *38.8%* | *11.7%* | *21.0%* |

Source: Indecon analysis of CSO Maritime Statistics. Figures relate to 2012.

*Regional Economic Context*

The Port of Cork serves a catchment area which represents a large and strategically important part of the State's population and economic base. Almost two-thirds of the Port's customers are located in Cork while over 70% are in the South West region and 92% are in Munster. This has important implications in terms of the requirements for port capacity to serve this catchment area.

**Port of Cork Catchment - Origin and Destination of Road Haulage Traffic to/from Port***




Source: Indecon analysis of survey research undertaken by Systra during 2013.
* Analysis based on interviews with sample of road hauliers arriving into and departing from Tivoli and Ringaskiddy terminals

The economic importance of the Port of Cork's catchment can be seen from a number of perspectives. The role of the Cork and wider Munster regions, in particular, are most clearly evident when one considers the extent of manufacturing sector activity located in this part of the State. Gross output in manufacturing industry located in Cork City and County represents over one-third of output across the State as a whole, while output in Munster accounts for over 49% of national manufacturing production. A particular feature of the manufacturing sector in Cork is the location in the Ringaskiddy area of a key strategic national industry cluster in the form of a number of major international pharmaceutical manufacturing companies.

## Current Economic Impact of Port of Cork

The Port of Cork delivers a substantial economic contribution/impact, both regionally and nationally, through its existing activities/operations. The economic impacts of the Port are comprised of the following dimensions:

- Value of trade handled by the Port:
- Port of Cork Company's own operations;
- Operations of service providers to the Port, such as stevedoring, haulage and other service providers; and
- Activities of ferry and cruise companies.

Based on Indecon's modelling and the latest available full-year figures for the volume of trade, we estimate the value of trade handled by the Port of Cork at €13.9 billion. We also estimate that this trade supports almost 172,000 full-time equivalent jobs across the regional and national economies (see table overleaf).

**Estimated Value of Trade Handled by Port of Cork and Employment Supported by Trade**

| | 2012 Figures |
|---|---|
| Estimated Value of Trade at Port of Cork (Baseline Development Extension Scenario) - € Million | 13,937 |
| Estimated Employment Supported from Trade Handled by Port of Cork – Economy-wide Full-Time Equivalents (FTEs) | 171,787 |

Source: Indecon modelling based on Port of Cork trade data, CSO mode of trade data and Indecon Assessment of Economic Impact of State Commercial Seaports on the Irish Economy

In addition to the economic value and impact of the trade handled by the Port, the table below describes Indecon's estimates of the existing economic impact in terms of employment supported through the Port of Cork Company's own operations, the activities of port service providers and the operations of ferry and cruise companies. Indecon estimates that the operation of the port directly supports 866 full-time equivalent jobs and 1,267 FTEs on an economy-wide basis when multiplier effects are taken into account.

**Employment Supported by Port of Cork and Associated Activities – Current Impacts**

| Component of Impact | 2012 Figures | | |
|---|---|---|---|
| | **Direct Impact** | **Multiplier Impacts** | **Economy-wide Impacts** |
| Port of Cork Operations – FTEs | 141 | 78 | 219 |
| Port Service Providers - FTEs | 460 | 159 | 619 |
| Ferry and Cruise Passengers/Crew - FTEs | 265 | 164 | 429 |
| **Total** | **866** | **401** | **1,267** |

Source: Indecon modelling based on data from Port of Cork and Survey of Port Service Providers. Economy-wide impacts = direct impacts + multiplier impacts.

The extent to which investment in the capacity of the Port of Cork can deliver future growth in the above areas of economic impact is important in the context of the proposed Ringaskiddy Port Re-Development. This is considered below.

**Economic Impacts of Ringaskiddy Port Development**

*Key Drivers for Port Development*

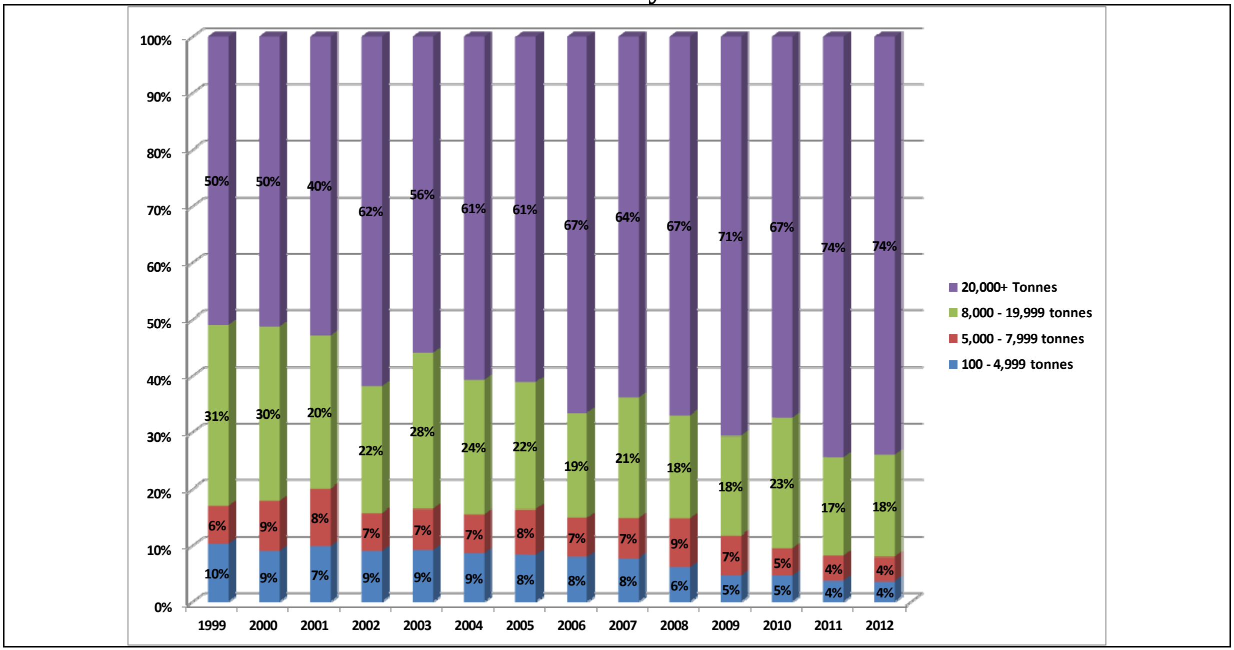
The key drivers or factors influencing the need for the proposed Ringaskiddy Port Re-Development are as follows:

- The projected growth in trade volumes handled by the Port of Cork due to the national significance of the Cork Gateway serving a large population base with many significant customers;
- The Port's anticipated contribution to the national economic recovery and long-term, sustainable development of the Irish economy, given its dependence on external trade;
- The existing physical constraints in handling larger vessels at Tivoli container terminal and the intensified operational constraints associated with projected further increase in container vessel size and cargo throughput;

- The changing nature of port activities, including the trend towards port-centred logistics, requiring a different nature of land banks adjacent to port facilities;
- National and regional spatial and economic strategy to develop Cork as a Gateway, and the role of the Port of Cork in this context; and
- The catalytic role of the port in releasing port lands at City Quays and Tivoli to facilitate the re-development of the Cork Docklands into high density, mixed use development, and therefore to supporting the future sustainable growth of the population of Cork City.

A graphical depiction of the recent historical trends in the size of vessels using Irish ports is presented in the figure below. This highlights in particular the steady growth in the proportion of overall vessel arrivals represented by ships with a capacity of 20,000 tonnes and above, and a corresponding decline in smaller sized vessels. An issue in relation to smaller vessels is that the presence of scale economies in container vessel usage is leading to a reduction in the volume of such vessels manufactured internationally, thereby removing smaller vessels from the market, which are being displaced by larger ships.

**% Breakdown of Number of Vessel Arrivals by Size across Irish Ports**

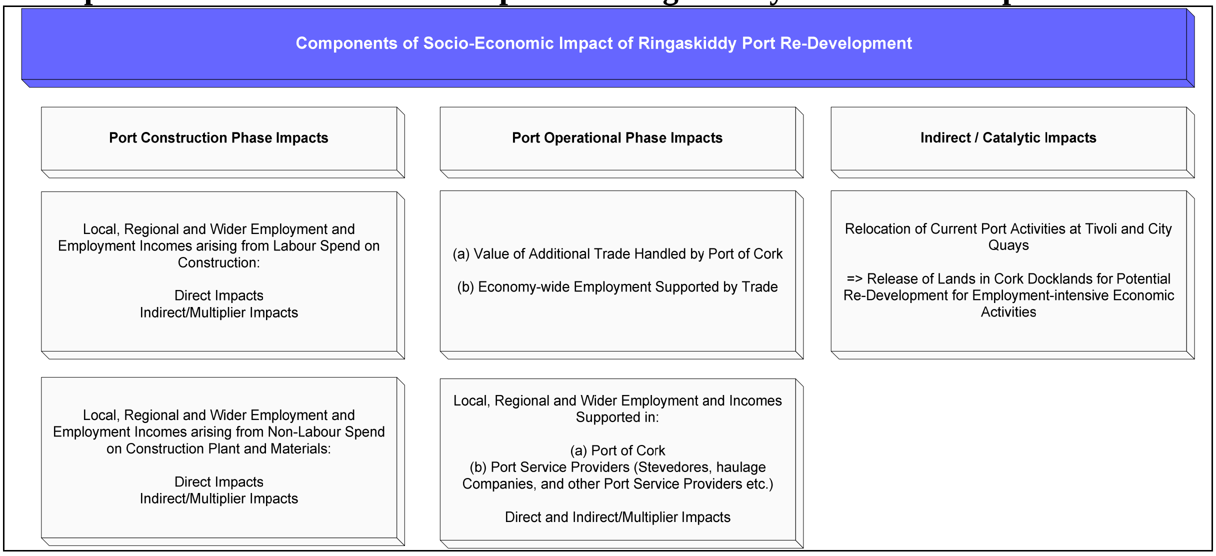



Source: Indecon analysis of CSO Maritime Data

**Assessment of Economic Impacts of Ringaskiddy Port Development**

Indecon has assessed the potential economic impacts that would unfold through the enhancement of Port of Cork's trading capacity if the proposed Ringaskiddy Port Re-Development is successfully completed. The schematic overleaf identifies the key components of the socio-economic impact of the proposed development. The potential overall impact includes impacts that would arise in the construction phase and in the operational phase of an expanded port. In addition to these impacts would be the indirect, catalytic impact that would emerge over time as the Port relocates its existing operations at Tivoli and City Quays to Ringaskiddy, thereby releasing current port lands in the Cork Docklands for potential re-development into employment-intensive economic activities.

**Components of Socio-Economic Impacts of Ringaskiddy Port Re-Development**



Source: Indecon

*Construction phase impacts*

The capital spending required to implement the above development works will give rise to economic impacts in the local, regional and national economies. These impacts will comprise:

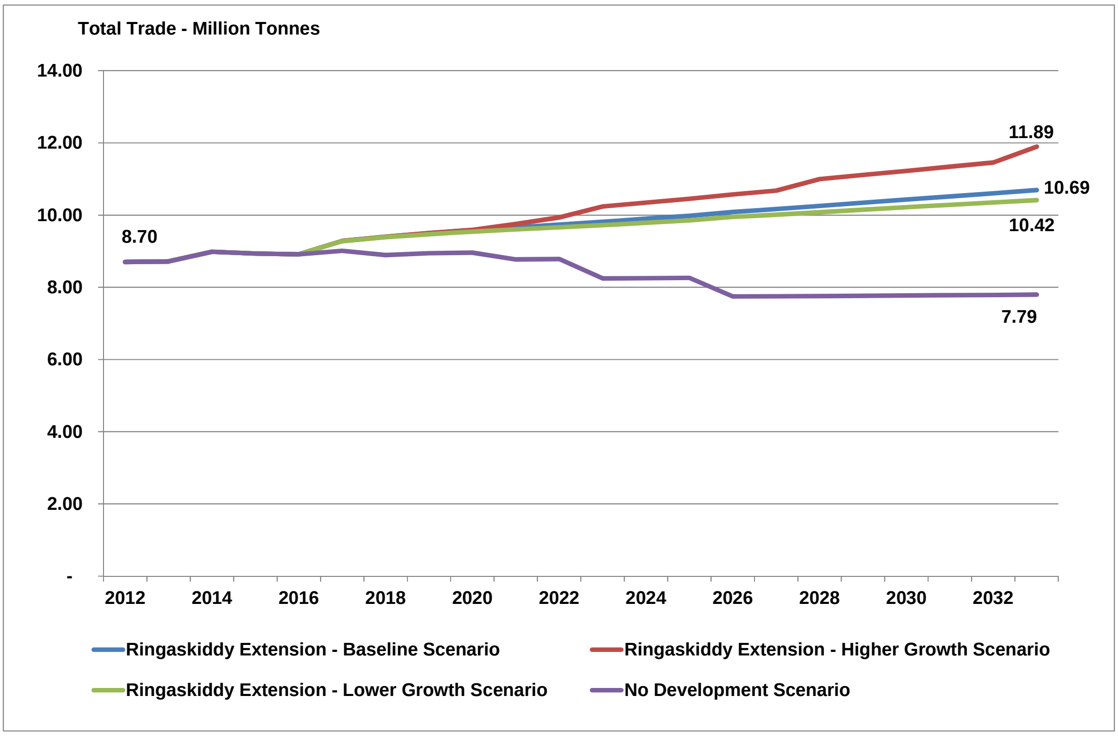
- Employment and employment incomes arising from the labour spend component; and
- Indirect output, employment and incomes arising from the non-labour spend on plant and materials.

It is estimated that the construction of the Ringaskiddy East Phase 1 to 3 developments would support approximately 739 full-time equivalent jobs (FTEs) during the build-out phase. This would translate into an estimated 1,282 FTEs on an economy-wide basis when indirect/multiplier impacts are taken into account. This would be estimated to support €51.2 million in employment incomes on an economy-wide basis. If the Ringaskiddy West Deep Water Berth (DWB) Extension is added to this, the economy-wide impacts would be expected to increase to an estimated 1,473 FTEs and €58.8 million in employment incomes. The importance of this construction-related employment should not be underestimated in the context of the wider labour market and high levels of unemployment among construction sector professionals in Ireland.

*Operational phase impacts*

Of considerably greater importance from the perspective of longer-run, sustainable socio-economic impacts would be the expected impacts that would arise through the implications for the external trade throughout of the Port of Cork. Indecon have modelled the impacts of completion of the proposed developments in terms of how this investment would enhance the Port's operational capacity and ability to handles greater volumes of trade. The figure overleaf depicts Indecon's estimates for the evolution of the volume of trade handled by Port of Cork based on comparison of the Port's development scenarios with a base case 'No Development' scenario.

**Scenarios for Trade Handled at Port of Cork (Million Tonnes) – 2012-2033**




Source: Indecon analysis based on Port of Cork Trade Projections

Under the port's baseline development scenario, which depicts the central scenario for the likely evolution of trade handled if there are no constraints on port capacity and the port's trade volumes grow in line with national trends, Port of Cork would be projected to handle a total of 10.7 million tonnes of trade by 2033, up from 8.7 million tonnes in 2012. These additional trade volumes would in turn drive increased economic impacts over time, both in terms of the value of trade and associated employment supported, and via increased port and service provider activities.

The table below presents the outputs of Indecon's modelling of the estimated impact on the future value of trade handled by the Port of Cork and the level of economy-wide employment that would be supported by this trade. Assuming the proposed Ringaskiddy developments are fully implemented, it is estimated that future expansion of the port would lead to an increase in employment supported by trade to over 254,000 FTEs by 2023 and to over 354,000 FTEs by 2033.

**Economic Impact of Proposed Ringaskiddy Port Re-Development – Estimated Employment Supported by Future Trade Growth**

| | 2012 Actual | 2023 Estimate | 2033 Estimate |
|---|---|---|---|
| Estimated Employment Supported from Trade Handled by Port of Cork (Baseline Ringaskiddy Development Extension scenario) – Economy-wide FTEs | 171,787 | 254,089 | 354,256 |

Source: Indecon modelling

In addition, further economic impacts would arise through expanded operational activity at the Port of Cork and within port service providers linked in with the port's activities. These impacts relate to the operational phase once the new facilities and associated capacity come on-stream. Indecon's modelling suggests that direct employment supported could rise to between 785 and 815 FTEs while economy-wide employment (including indirect/multiplier impacts) could increase to between 1,095 and 1,136 FTEs. The direct employment supported would include jobs in the local and wider Cork areas.
In addition to the above direct impacts, an important indirect, catalytic impact would emerge over time as the port relocates its existing operations at Tivoli and City Quays to Ringaskiddy, thereby releasing current port lands in the Cork Docklands for potential re-development into employment-intensive economic activities.

### Views of Multinational and Other Companies

Indecon also undertook extensive primary research among exporting multinationals and other companies/businesses located in Cork and in the wider South West Region. This research sought the views of firms on the following dimensions:

- The levels of importance attached to specific aspects of the role and future development of the Port of Cork;
- The extent to which the planned Ringaskiddy Port Re-Development would be likely to act as a key driver or catalyst for future economic growth and development of the Cork and Wider South West Regions; and
- The significance of potential implications arising from failure to address future capacity requirements of the Port of Cork through the development of Ringaskiddy Port.

The table overleaf summarises the findings of Indecon's research in relation to the first aspect above, namely the levels of importance attached to specific aspects of the role and future development of the Port of Cork.

**Views of Multinational and Indigenous Companies/Businesses Level of Importance Attached to the Role and Future Development of the Port of Cork**

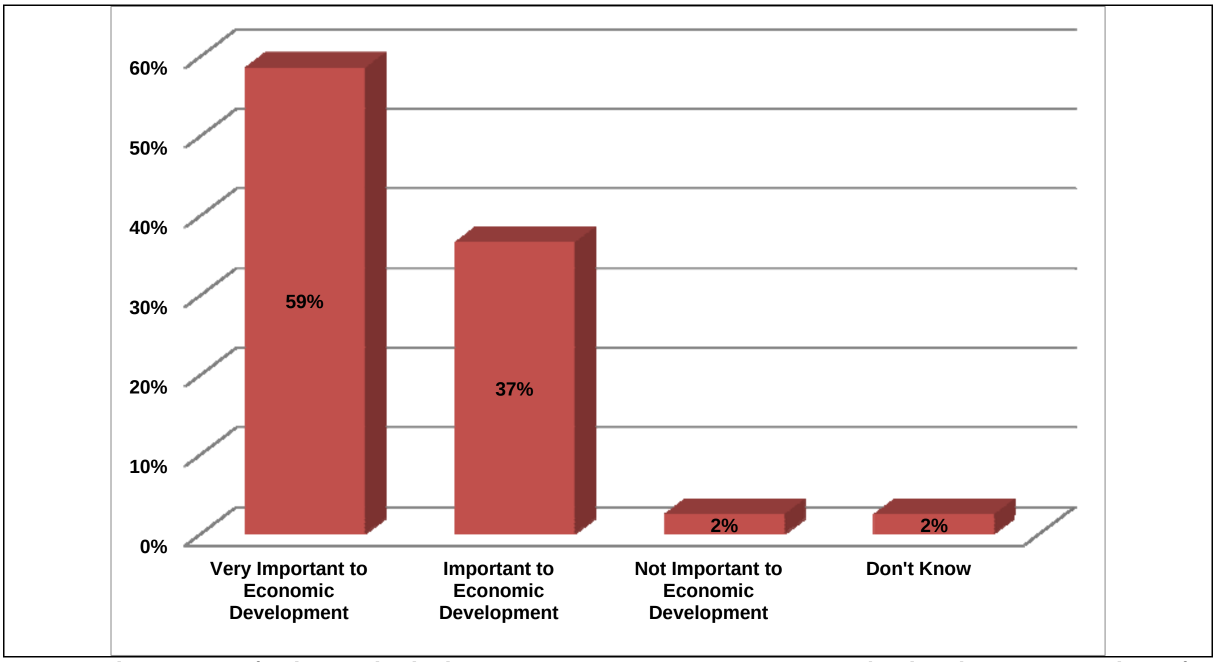
| | % of Responding Companies/Businesses | | |
|---|---|---|---|
| | **Very Important or Important** | **Neither Important Nor Unimportant** | **Not Important** |
| Contributing to National Economic Competitiveness | 98.8% | 1.2% | 0.0% |
| Ensuring the External Connectivity of Cork and the Wider South West Region | 97.5% | 2.5% | 0.0% |
| Facilitating Exporting from the Cork Region and Nationally | 97.5% | 2.5% | 0.0% |
| Boosting the Overall Economic Competitiveness of the Cork Region | 97.5% | 2.5% | 0.0% |
| Supporting the Attractiveness of the Cork and Wider South West Regions for Investment | 93.8% | 6.3% | 0.0% |
| Reducing the Environmental Impacts of Transporting Goods to/from the Cork Region | 87.7% | 12.3% | 0.0% |
| Facilitating the Development of the Ringaskiddy/Carrigaline Employment Zone | 83.8% | 16.3% | 0.0% |
| Facilitating Tourism in the Cork and South West Regions | 83.5% | 15.2% | 1.3% |

Source: Indecon Surveys of Multinational and Indigenous Exporting Companies/Businesses in Cork and South West Region, and Port of Cork Service Providers

The above research indicates that exporting multinationals and other companies in the South West Region attach very high or high levels of importance to the role and future development of Port of Cork. This is most notable in terms of (a) how this would contribute to regional as well as national competitiveness; (b) ensuring the external connectivity of Cork and the wider South West Region; (c) boosting the overall competitiveness of the Cork region; and (d) supporting the ongoing attractiveness of the region for investment. High levels of importance are also attached by companies to the role of the Port in facilitating the development of the Ringaskiddy/Carrigaline industry cluster, and to facilitating tourism in the wider region.

It is also notable that a very strong majority of firms are of the view that the planned development of Ringaskiddy Port would act as a key driver or catalyst for future economic growth and development in the region (see figure overleaf).

**Views of Multinational and Indigenous Companies/Businesses on Whether Planned Ringaskiddy Port Development would be Likely to Act as a Key Driver or Catalyst for Future Economic Growth and Development of the Cork and Wider South West Regions**




Source: Indecon Surveys of Multinational and Indigenous Exporting Companies/Businesses in Cork and South West Region and Port of Cork Service Providers

**Impact of Failure to Develop Ringaskiddy Port**

By contrast, if the Port of Cork failed to respond to the wider port sector developments and, in particular, the ongoing trend towards larger container vessels, this would place it at an operational and competitive disadvantage relative to larger ports such as Dublin. Under this scenario, the Port of Cork would start to lose some larger unitised freight customers and market share in the key LoLo segment from around 2022 onwards, and this over-capacity trade would have to be handled at other, more distant ports. This loss would increase over time.

The table below identifies the estimated overall present value of future loss in the value of trade handled by Port of Cork once capacity is reached and additional over-capacity trade must be handled at other ports. It is estimated that the overall value of this loss in trade from Port of Cork could total between €21.1 billion and €25.7 billion in present value terms over the period to 2033.

**Estimated Scenario Projections of Present Value Loss of Trade at Port of Cork**

| | **Present Value of Future Loss of Trade Relative to 'No Development' Scenario over period to 2033 - € Millions*** |
|---|---|
| No Development versus Baseline Development Scenario | -22,768 |
| No Development versus Lower Growth Development Scenario | -21,143 |

| | |
|---|---|
| No Development versus Higher Growth Development Scenario | -25,707 |

Source: Indecon Analysis

The views of multinational and other companies located in the South West Region with regard to the potential implications arising from failure to address future capacity requirements of the Port of Cork through the development of Ringaskiddy Port are summarised in the table below.

**Views of Multinational and Indigenous Companies/Businesses Significance of Potential Implications Arising From Failure to Address Future Capacity Requirements of the Port of Cork through the Development of Ringaskiddy Port**

| | % of Responding Companies/Businesses | | |
|---|---|---|---|
| | **Very Significant Impact or Significant Impact** | **Significant Nor Insignificant Impact** | **Insignificant Impact** |
| Result in Businesses having to Divert their Sea-based Trade to Alternative Ports | 92.8% | 7.2% | 0.0% |
| Result in a Loss of Economic Competitiveness in the Cork Region | 88.9% | 9.9% | 1.2% |
| Increase the Overall Costs of Transporting Goods to/from the Cork region | 87.8% | 12.2% | 0.0% |
| Undermine the Attractiveness of the Cork Region for Future Investment and Job Creation | 86.4% | 12.3% | 1.2% |
| Lead to Increased Environmental Costs associated with Transportation of Goods | 85.9% | 14.1% | 0.0% |
| Prevent Balanced Regional Development | 85.2% | 13.6% | 1.2% |
| Undermine the Potential for Re-Development of the Cork Docklands (through Re-Location of Port of Cork's Current Operations at City Quays and Tivoli) | 85.0% | 13.8% | 1.3% |
| Increase the Overall Costs of Transporting Goods to/from Ireland as a Whole | 81.7% | 15.9% | 2.4% |
| Undermine National Economic Competitiveness | 79.3% | 17.1% | 3.7% |
| Undermine Access to the Cork Region for Tourism/Ferry/Cruise Visitors | 78.0% | 20.7% | 1.2% |

Source: Indecon Surveys of Multinational and Indigenous Exporting Companies/Businesses in Cork and South West Region and Port of Cork Service Providers

According to Indecon’s research among companies in the region, a majority of businesses consider that the greatest repercussions would arise from failure to develop the port in terms of how this would result in businesses having to divert their sea-based trade to alternative ports. Large majorities also believe that failure to develop Ringaskiddy Port would result in a loss of economic competitiveness in the Cork region; would increase the overall costs of transporting goods to/from the Cork region; would undermine the attractiveness of the Cork region for future investment and job creation; would lead to increased environmental costs associated with transportation of goods; and would undermine the potential for re-development of the Cork Docklands (through re-location of port of cork's current operations at City Quays and Tivoli).

**Cost-Benefit Analysis**

Indecon also undertook a formal Cost-Benefit Appraisal of the socio-economic impacts of the proposed Ringaskiddy Port Re-Development. The objective of this appraisal was to assess whether the proposed developments would deliver a net economic return to the Irish economy. The detailed workings are presented in Section 5.

The overall approach applied to this appraisal was to quantify the benefits and the costs of proceeding with the proposed Ringaskiddy Port Re-Development relative to a 'No Development'/'Do Nothing' scenario. This was informed by projections developed by the Port of Cork for trade throughput at the port assuming (a) full implementation of the proposed capacity-enhancing measures for the Ringaskiddy Port site, and (b) no development of Ringaskiddy and 'business as usual' on basis of intensification of the port's existing facilities and capacity.

It is important to emphasise that the appraisal estimates the net economic return that would arise on the proposed level of capital investment <u>at the level of the national economy</u> (as opposed to from the perspective of the Port of Cork or the local/regional economy). The methodology and assumptions applied were consistent with the national (Department of Expenditure and Reform and Department of Transport, Tourism and Sport) and EU (European Commission) guidance in this area, which indicates that appraisals of investments in national infrastructure on this scale and involving public or EU funding should be undertaken from the perspective of the economy as a whole.

*Context and Rationale*

The context and rationale for the assessment of benefits in this appraisal relate to the wider developments in port trade nationally and internationally, and how the Port of Cork responds to these developments. In particular, the recent evolution of commercial sea freight is such that, in addition to a longer-term trend towards unitised freight, the average size and tonnage of freight vessels have experienced substantial growth, and the consensus is that this trend will continue as the industry seeks to benefit from economies of scale. This is likely to mean that the market for smaller vessels will decrease, while that for larger vessels will continue to expand. In this environment, while smaller 'feeder' vessels will continue to visit ports such as Port of Cork, cost advantages will mean that shipping companies will have a preference to migrate towards larger vessels over time. The primary implication is that if the Port of Cork fails to respond to these external port sector and economic trends through ensuring that it has the appropriate scale and configuration of capacity – particularly for unitised trades – it is likely that the port will be unable to handle vessels much beyond current sizes. Because of these technological and economic developments in shipping, the Port of Cork would face the real prospect of becoming uncompetitive for shipping companies who use the southern and eastern shipping corridors. As noted above, this would mean that additional trade beyond capacity levels would have to be handed at other, more distant ports. Given the predominance of Dublin in the key LoLo sector, the strong likelihood would be that over-capacity trade would be diverted and handled via Dublin, although smaller quantities of some trades may also be handled at Waterford and Shannon Foynes.

*Benefits*

Under a 'No Development'/'Do Nothing' scenario involving diverted over-capacity trade, additional socio-economic costs would arise across the Irish economy associated with the internal haulage costs of moving trade, the majority of which would otherwise have an origin-destination catchment that is focussed on the Cork and Munster areas. These internal freight transport/connectivity costs would include additional journey times and vehicle costs, costs associated with increased traffic congestion along national primary routes and associated environmental/emissions costs. These effectively represent costs that would be avoided if the Port of Cork was positioned to respond to market developments by ensuring it has the appropriate scale and configuration of capacity in place, as would be envisaged under the proposed Ringaskiddy Port Re-Development. Thus, a key benefit of proceeding with the project is the avoidance of internal freight transport costs that would arise if over-capacity trade has to be diverted to more distant ports. These benefits or avoided costs are summarised in the table overleaf.

**Cost-Benefit Appraisal of Ringaskiddy Port Development - Summary Description of Internal Freight Transport/Connectivity-related Benefits of Port Development**

| **Benefit Component** |
|---|
| Avoided/Reduced Journey Time and Vehicle Operating Costs associated with Diversion of Over-capacity Trade to More Distant Ports |
| Avoided/Reduced Traffic Congestion-related Costs associated with Diversion of Over-capacity Trade to More Distant Ports |
| Avoided/Reduced Environmental Emissions-related Costs associated with Transporting of Over-capacity Trade to More Distant Ports |

Source: Indecon

*Costs*

The costs of the proposed Ringaskiddy Port Re-Development that are included in the appraisal include the capital costs of constructing and operationalising the proposed developments, in addition to the journey time, vehicle operating costs and emissions associated with additional road network traffic that would result from the expanded port development. Total costs, including direct capital costs and indirect costs associated with additional network traffic resulting from an expanded port, are estimated to amount to €222.4 million in present value terms over the appraisal period.

*Results of appraisal*

The table below presents a summary of the overall findings of Indecon's Cost-Benefit Appraisal on the proposed Ringaskiddy Port Re-Development.

**Cost-Benefit Appraisal of Ringaskiddy Port Development – Summary of Results**

| **Benefit/Cost Component** | **Present Value of Annual Benefits/Costs over period 2018-2038 @ 5% Discount Rate - €** |
|---|---|
| *Benefits (relative to 'No Development' Scenario)* | |
| Trade Diversion Costs Avoided through Development of Port | €514,332,843 |
| | |
| *Costs (relative to 'No Development' Scenario)* | |

| | |
|---|---|
| Capital costs of Proposed Ringaskiddy Developments | €83,928,479 |
| Costs associated with additional HGV traffic on local network | €142,415,530 |
| Residual Value of Infrastructure | -€3,909,016 |
| Total Costs | €222,434,993 |
| **Net Present Value** | **€291,897,850** |
| **Benefit-Cost Ratio (X : 1)** | **2.31** |

Source: Indecon and Systra modelling

Taking into account the benefits in the form of avoided costs of trade diversion and setting these against the incremental capital and traffic-related costs, Indecon estimated a net present value associated with proceeding with the proposed Ringaskiddy Port Re-Development of €291.9 million. Based on the rigorous methodology applied, this implies a Benefit-Cost Ratio (BCR) of 2.31 to 1, which indicates that the proposed expansion of Ringaskiddy Port would have a positive net economic return to the Irish economy.

**Overall Conclusions**

Indecon's detailed independent analysis and assessment of the socio-economic impacts of the proposed Ringaskiddy Port Re-Development highlight the following key findings:

- The Port of Cork plays a key strategic role in the development of both the Cork City region and the wider Irish economy. The Port of Cork is the second largest multi-modal port in Ireland and the largest natural harbour in Ireland, capable of handling all principal modes of port traffic.
- Over 63% of the port's customers are located in Cork while over 70% are in the South West Region and 92% are in Munster. This has important implications in terms of the requirements for port capacity to serve this catchment area.
- The value of trade throughput at the Port is estimated at €13.9 billion, and this trade is estimated to support almost 172,000 full-time equivalent jobs across the regional and national economies.
- Key drivers of the rationale and need for the Ringaskiddy Port Re-Development include the existing physical constraints in handling larger vessels and the changing nature of port activities, including the trend towards port-centred logistics.
- Addressing these needs would allow the Port of Cork to meet and secure its future development potential, and this would translate into significant quantified economic benefits for Cork and the surrounding region, as well as for the national economy.
- It would also play a wider catalytic role in the development of Cork City through facilitating the re-configuration of the port and the release over time of lands at City Quays and Tivoli for potential re-development and employment creation.
- Failure to respond to port sector developments, however, would likely mean that the Port of Cork will lose competitiveness and market share to other ports, including Dublin. This will result in greater costs for the Irish economy.
- Indecon's Cost-Benefit Appraisal suggests that proceeding with the proposed Ringaskiddy Port Re-Development would be likely to deliver a net economic return to the Irish economy. This is evidenced by an economic Benefit-Cost Ratio of 2.31 to 1 in favour of the project.

# 1 INTRODUCTION AND BACKGROUND

## 1.1 Introduction

This report has been prepared on behalf of the Port of Cork by Indecon International Economic Consultants. The report concerns a socio-economic impact assessment of the proposed Ringaskiddy Port Re-Development.

## 1.2 Background Policy and Planning Context

The background context for this assessment is that the Port of Cork is the second largest multi-modal port in Ireland and the largest natural harbour in Ireland, capable of handling all principal modes of port traffic. It is the second largest LoLo port, handling over 20% of all LoLo trade in the State. The port plays a key strategic role in the development of both the Cork City region and the wider Irish economy. Furthermore, by facilitating the movement of goods to and from the UK and Continental Europe, the Port also plays an important role in the development of the EU's Internal Market. The Port's mission statement is:

> *To promote and develop Cork's natural harbour as a world-class port, facilitating the efficient movement of goods and people to and from the marketplace.*[5]

Ensuring that the Port of Cork continues to meet the external connectivity needs and supports the development of the wider regional and national economies is of key importance. This is clearly enunciated in Irish government policy, including the National Spatial Strategy, the Cork Area Strategic Plan (CASP)[6] and the Government's most recent National Ports Policy statement.[7] The Port of Cork has also been designated for inclusion (alongside Dublin Port and Shannon Foynes) as a Core Network port under the EU Trans-European Network – Transport (TEN-T) - in recognition of its strategic importance to the island of Ireland where practically all trade is exported by sea and its role in the movement of goods to and from the UK and Continental Europe.[8] Reflecting its TEN-T status, the Government's National Ports Policy statement also identifies Port of Cork as a 'Tier 1 Port of National Significance'.
The Port's Strategic Development Plan (SDP) Review outlines the company's intention over time to relocate its commercial trade to the lower Cork Harbour area. This has been informed by a rigorous assessment and site selection process, which identified Ringaskiddy as the optimal location to consolidate the Port's LoLo services and ensure that it can service future trade growth. The principles set out in the SDP have been endorsed by the Government, which has also noted that the continued development of the Port represents a key strategic objective of national ports policy.[9]

## 1.3 Objective and Scope of Assessment

The overall objective of this assessment is to examine the socio-economic impacts that would arise if the Port of Cork achieves statutory consent to develop its facilities at Ringaskiddy and, conversely, to also assess the implications of failure to undertake these developments. Specifically, the assessment examines the following dimensions:

(a) Assessment of the impact of the development of the Port's Ringaskiddy facilities on:
- Future employment in the region;
- The future of the regional economy;

[5] Port of Cork, Strategic Development Plan Review (2010).

[6] Cork City Council, Cork Area Strategic Plan (2008). See: http://www.corkcity.ie/casp/strategicplan/.

[7] Department of Transport, Tourism and Sport, National Ports Policy statement, March 2013. See: http://www.transport.ie/upload/general/13776-NATIONAL_PORTS_POLICY_2013-1.PDF.

[8] The Port has recently been awarded TEN-T funding to support its development plans.

[9] National Ports Policy statement, Op. Cit., Page 26.

- The future viability of the Port of Cork; and
- The economic future of Cork Gateway.

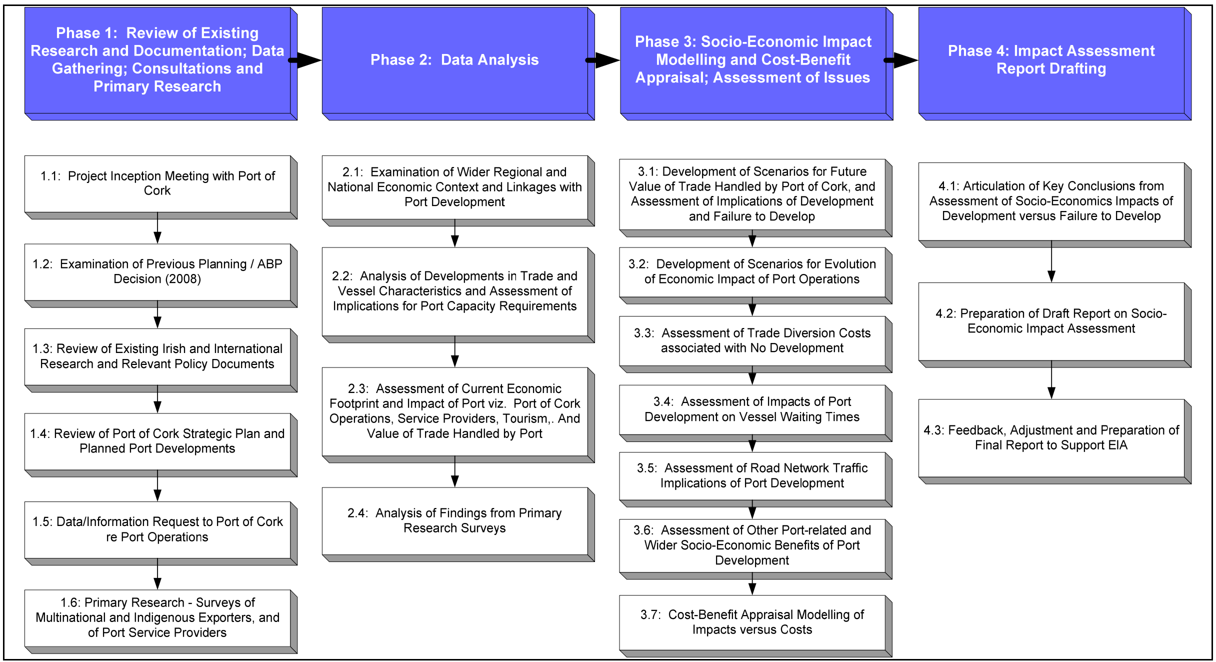
(b) Assessment of the impact of a refusal of development on the following:

- The future commercial viability of the Port;
- The economic competitiveness of the Port operations;
- The economic competitiveness of the region;
- The commercial attractiveness of the region to FDI;
- The employment potential of the region;
- The impact on potential investors in the Ringaskiddy strategic employment zone;
- The potential growth of exports from the South of Ireland and Ringaskiddy in particular;
- The impact on the costs of the movement of goods for the Region; and
- The impact on carbon emissions and sustainable logistical movement of goods through other ports remote from the Region.

## 1.4 Methodological Approach

A detailed methodology was applied to completing this assessment, which was designed to rigorously assess the above dimensions of the socio-economic impact of the proposed development and implications of failure to develop. A schematic overview of the assessment work programme and methodology applied is presented in the figure overleaf.

**Figure 1.1: Schematic Overview of Work Programme and Methodological Approach to Assessment**




Source: Indecon

### 1.4.1 Data sources

In applying the above approach, a wide range of data/information sources have been utilised. These include the following:

- Detailed data provided by Port of Cork in relation to the port's own operations and trades handled, existing facilities and capabilities, and long-term projections for trade over the period to 2033 under different scenarios;
- CSO and IMDO data on trade by port in Ireland, including developments in trade volumes by mode and port, vessels and vessel characteristics;
- IMDO and United Nations/UNCTAD data on international trends in commercial, trade and port development;
- Forfás and IDA Ireland data on foreign and indigenous investment and enterprise activities in the Cork City and South West Regions, and nationally; and
- CSO data on regional socio-economic characteristics and developments, including Census of Population, external trade statistics, national and regional Gross Value Added (GVA), and Census of Industrial Production.

### 1.4.2 Primary research

In addition to the above data sources, the assessment has been informed by extensive new primary research. This included the following streams of research:

- Survey of Exporters in Cork and South West Region – seeking the inputs and views of multinational and indigenous companies/businesses in relation to their exports and usage of Port of Cork for trade, and on the levels of importance they attach to the role and future development of the port and the implications of failure to develop the port; and
- Survey of Port of Cork Service providers – seeking information on their operations and economic impacts and their views on the levels of importance they attach to the

role and future development of the port and the implications of failure to develop the port.

A high level of response was achieved on both survey streams – 44% in respect of the survey of exporters and 47% in the case of the service provider survey – which inputted to the assessment in relation to economic impact and the implications of future development of the port.

### 1.4.3 Cost-Benefit Appraisal

In addition to a socio-economic impact assessment, this report includes a formal cost-benefit appraisal, which quantifies and compares the economic benefits and costs associated with the proposed development of Port of Cork's Ringaskiddy terminal. This utilises detailed projections for trade handled by the port to estimate impacts in terms of trade diversion-related transport costs and environmental emissions, HGV traffic impacts, and estimated capital expenditures on the planned facilities and other aspects of infrastructure. The appraisal is carried out in line with Department of Public Expenditure and Reform guidelines and European Commission guidance and parameters on cost-benefit analysis for port developments. The methodology and results of this appraisal are presented in Section 5.

## 1.5 Report Structure

The remainder of this report is structured as follows:

- Section 2 sets the context by highlighting the key features of the wider national and regional economic context and the linkages with the development of Port of Cork. It also considers the wider policy environment for port development, and describes the current economic role and impact of the Port and implications for economic development;
- Section 3 assesses the rationale for the proposed development of the Port of Cork's Ringaskiddy terminal. This considers the developments in trading volumes and shipping, and the operational capabilities and constraints facing the port that need to be addressed;
- Section 4 assesses the socio-economic impacts that would arise from successful development of the Ringaskiddy terminal, and also considers the implications of a failure to develop and provide adequate LoLo capacity at the port;
- Section 5 presents the results of Indecon's cost-benefit appraisal of the planned development of the Port of Cork's Ringaskiddy facilities; and
- Section 6 integrates the detailed analyses undertaken in the preceding sections to develop overall conclusions from the assessment.

## 1.6 Acknowledgements and Disclaimer

Indecon would like to thank a number of individuals and organisations for their inputs and assistance during the course of completing this assessment. We would particularly like to acknowledge the valuable inputs and assistance of management and staff at the Port of Cork, including Brendan Keating, Denis Healy, Michael McCarthy, Bryan O'Keefe, Donal Crowley, Margaret McCann and Sara McKeown. In addition, we would like to thank Dermot Flanagan S.C. for his guidance throughout the process. We would also particularly like to express our gratitude to the exporting companies/businesses and port service providers who provided valuable inputs via responses to our surveys. The usual disclaimer applies, and responsibility for the analysis and findings in this independent report remain the sole responsibility of Indecon.

# 2 WIDER ECONOMIC CONTEXT AND LINKAGES WITH PORT DEVELOPMENT

## 2.1 Introduction

An important issue in assessing the socio-economic impacts of the Port of Cork's proposed Ringaskiddy development is to set this within the wider economic and port development context. This section considers the wider national and regional economic context in terms of the nature of economic development in Cork City and the surrounding South West Region, and the policy environment for port development. It then examines the role and present economic impacts of the Port of Cork, and the implications of the port for wider economic development.

## 2.2 Wider National and Regional Economic and Policy Context

### 2.2.1 National context and dependence of Irish economy on external trade

In assessing the national and regional economic context for the planned development of the Port of Cork, it is important to firstly set this in context by considering the key features of the wider Irish economy and, in particular, the role of external trade. As a small open economy, Ireland is critically dependent on external trade to support its development. This is evidenced by the scale of external trade relative to overall economic activity. As highlighted by the official statistics summarised in the table below, the available CSO full-year figures for 2012 indicate that overall merchandise trade (including goods imports as well as exports, which are relevant to the component of trade handled by the commercial seaports) amounted to €140.8 billion, representing 85.9% of Irish economy's Gross Domestic Product (GDP).

**Table 2.1: Indicators of Importance of External Trade to the Irish Economy – Value of Merchandise Trade**

| ***Overall Economy*** | **2012 Figures** |
|---|---|
| Total Goods Imports - € Million | €49,151 |
| Total Goods Exports - € Million | €91,688 |
| Total Merchandise Trade (Goods Exports and Imports) - € Million | €140,839 |
| *% of Gross Domestic Product (GDP)* | *85.9%* |
| **Source: Indecon analysis of CSO, External Trade and Census of Industrial Production statistics** | |

As well as facilitating domestic demand and private consumption via imported consumer goods, external trade also plays a central role in supporting the manufacturing sector of the Irish economy, as indicated by the figures in the table overleaf, which show that exports represent over 87% of the value of output and almost 61% of raw material inputs used in the production of manufactured goods. The manufacturing sector in Ireland is therefore highly dependent on external trade both in terms of its outputs/sales and in relation to its production inputs.

**Table 2.2: Indicators of Importance of External Trade to the Irish Economy – Role of Trade in the Manufacturing Sector**

| **Manufacturing Sector** | **2011 Figures** |
|---|---|
| Gross Output Exported - € Million | €76,116 |
| *% of Total Gross Output in Manufacturing Sector* | *87.2%* |
| Raw Materials Imported - € Million | €18,875 |
| *% of Total Raw Materials Purchased in Manufacturing Sector* | *60.9%* |
| | |
| Employment (Persons) – All Manufacturing Enterprises (A) | 167,373 |
| Employment (Persons) – Manufacturing Enterprises Engaged in Exporting (B) | 138,296 |
| *(B) as % of (A)* | *82.6%* |
| **Source: Indecon analysis of CSO Census of Industrial Production statistics** | |

A further aspect of the importance of trade highlighted in the above table concerns the extent to which exporting activity in the manufacturing sector supports employment across the Irish economy. Based on data from the Census of Industrial Production, it is evident that persons employed directly within exporting manufacturing enterprises represent almost 83% of overall employment in manufacturing enterprises at national level. The supply-chain activities of these exporting firms will also indirectly support output and employment elsewhere in the economy.

The above figures relate to the Irish economy and the manufacturing sector as whole, and some individual sub-sectors exhibit significantly higher levels of dependence on external trade. In particular, there is a very strong linkage at the national level between external trade and the multinational sector of the economy. As shown in the table below, foreign-owned firms contribute over €28 billion in Gross Value Added (GVA) to Irish economy GDP, which is equivalent to almost 84% of overall GVA in the manufacturing sector. In addition, these firms are highly export-intensive, with the value of their exports representing over 94% of overall output from these firms. Access to export markets constitutes an important driver of foreign investment in Ireland among multinational companies, which typically use Ireland as a base for production and sale into European and other international markets.

**Table 2.3: Indicators of Importance of External Trade to the Irish Economy – Role of Trade in the Multinational Sector**

| **Multinational Sector** | **2011 Figures** |
|---|---|
| Gross Value Added in Foreign-owned Manufacturing Enterprises - € Million | 28,414 |
| *% of Total Gross Value Added in All Manufacturing Enterprises* | *83.7%* |
| Gross Output Exported by Foreign-owned Manufacturing Enterprises - € Million | 67,306 |
| *% of Total Gross Output in Foreign-owned Manufacturing Enterprises* | *94.3%* |
| **Source: Indecon analysis of CSO Census of Industrial Production statistics** | |

### 2.2.2 Role of commercial seaports in facilitating external trade

Sea-based trade represents the single largest category of Ireland's merchandise trade. Indecon's analysis demonstrates that sea-based trade, i.e., trade taking place through the commercial seaports, represents 70% of the total volume of exports and imports of goods, and 41% of the value of goods trade to/from Ireland (see below). This underscores the critical role played by the commercial seaports in serving the trading needs of the Irish economy.

**Table 2.4: Role of Commercial Seaports in External Trade – Volume and Value of Sea-based Merchandise Trade in Ireland**

| | % of Total Volume of Merchandise Trade | % of Total Value of Merchandise Trade |
|---|---|---|
| Sea-based Trade | 70.2% | 41.1% |

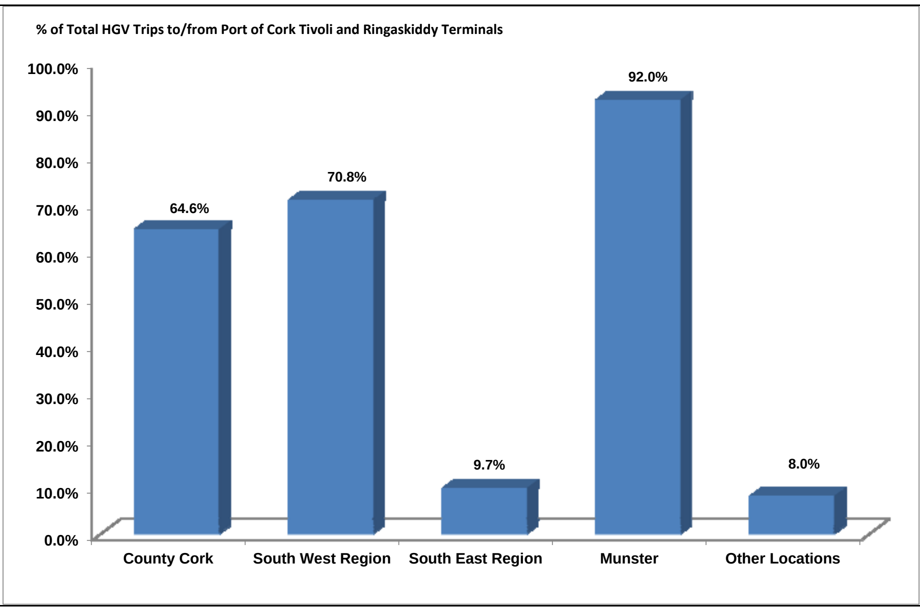
Source: Indecon analysis of CSO External Trade data

### 2.2.3 Regional economic context

*Port of Cork Catchment Area*

The Port of Cork serves a catchment area which represents a large and strategically important part of the State's population and economic base. The chart below depicts the catchment area served by the port. The analysis highlights the fact that almost 65% of the Port's customers are located in County Cork, while over 70% are in the South West Region and 92% are in Munster. This has important implications in terms of the requirements for port capacity to serve this catchment area. However, it is instructive to consider the features of the Port of Cork's catchment in terms of population and economic activity, and this is undertaken overleaf.

**Figure 2.1: Port of Cork Catchment - Analysis of Origin and Destination of Road Haulage Traffic to/from Port***




Source: Indecon analysis of research undertaken by Systra

* Analysis based on interviews with sample of road hauliers arriving into and departing from Tivoli and Ringaskiddy terminals

The Port of Cork serves a population catchment of over 664,000 persons in the South West Region and almost 1.25 million people in the Munster province (see table below), which is equivalent to over 27% of the population of the State as a whole.

**Table 2.5: Population Catchment Served by Port of Cork**

| | **Persons** |
|---|---|
| State | 4,588,252 |
| Munster | 1,246,088 |
| South West Region* | 664,534 |
| County Cork | 519,032 |
| Cork City | 119,230 |

**Source: CSO, Census of Population 2011**
* South West Region comprises Cork City, Cork County and County Kerry

*Importance of manufacturing sector in South West Region*
The importance of the Port of Cork's catchment from an economic standpoint can be seen from a number of perspectives. The role of the Cork and wider Munster regions, in particular, are most clearly evident when one considers the extent of manufacturing sector activity located in this part of the State. As demonstrated in the table overleaf, gross output in manufacturing industry located in Cork City and County represents over one-third of output across the State as a whole, while output in Munster accounts for over 49% of national manufacturing production. A particular feature of the manufacturing sector in Cork is the location in the Ringaskiddy area of a key strategic national industry cluster in the form of a number of major international pharmaceutical manufacturing companies.

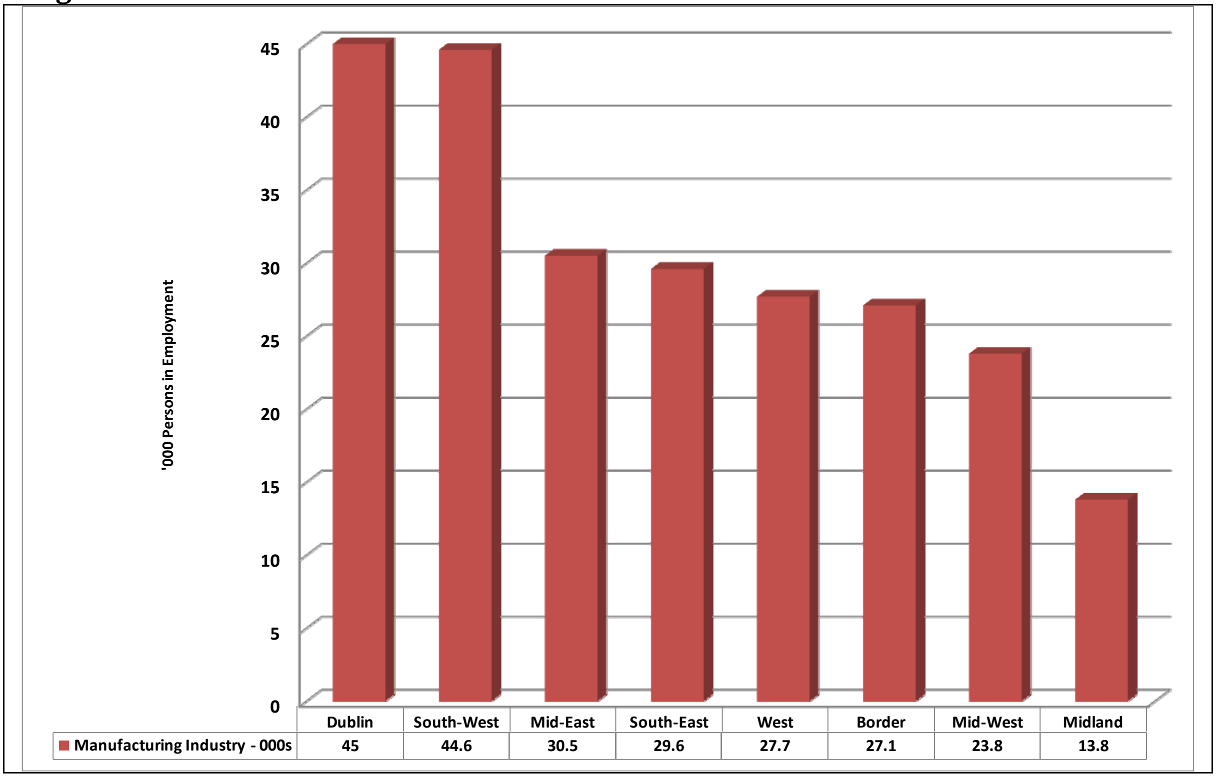
**Table 2.6: Port of Cork Catchment - Importance of Manufacturing Sector in Catchment Area – Gross Output in Manufacturing Industry in Munster Counties relative to State**

| **Location of Manufacturing Activity** | **€*** |
|---|---|
| Cork City and County | €32,654,443 |
| Limerick City and County | €4,456,770 |
| Clare | €1,506,723 |
| Kerry | €1,795,433 |
| North Tipperary | €821,251 |
| South Tipperary | €3,363,567 |
| Waterford City and County | €2,817,934 |
| **Munster Total** | **€47,416,121** |
| **State** | **€96,550,868** |
| ***Cork City and County as % of State*** | ***33.8%*** |
| ***Munster as % of State*** | ***49.1%*** |

Source: Indecon analysis of Census of Industrial Production (CoIP)
* Figures relate to latest available CoIP data for 2010.

The importance of the South West Region's manufacturing sector from a national perspective can also be seen from the graphic below, which highlights the fact that the region is almost on a par with Dublin in terms of the number of persons employed in manufacturing industries.

**Figure 2.2: Port of Cork Catchment - Importance of Manufacturing Sector in Catchment Area – Employment in Manufacturing Sector in South West relative to Other Regions**




Source: Indecon analysis of CSO, QNHS data. Figures refer to position as at Quarter 3, 2013.

*Regional contribution to national economic output*

Focussing on the South West Region (Cork and Kerry), the figures highlighted in the table overleaf indicate that the region represents 17.5% of overall Gross Value Added or GDP across the Irish economy as a whole. This places the South West as the second most important region after Dublin in terms of its contribution to Irish GDP.

**Table 2.7: Gross Value Added (GVA) at Basic Prices (%) by Region and Year**

| | **2008** | **2009** | **2010** |
|---|---|---|---|
| Dublin | 40.7% | 41.0% | 42.1% |
| ***South West*** | ***16.4%*** | ***17.2%*** | ***17.5%*** |
| Mid-East | 9.0% | 8.7% | 8.1% |
| South East | 8.3% | 7.7% | 7.4% |
| West | 7.1% | 7.1% | 7.7% |
| Mid-West | 7.0% | 7.1% | 7.2% |
| Border | 7.6% | 7.6% | 6.5% |
| Midland | 3.9% | 3.8% | 3.6% |
| State | 100% | 100% | 100% |

Source: Indecon analysis of CSO data

*Foreign Direct Investment activity*

An issue concerns the role of the Port of Cork in the South West Region as a major port of national significance in terms of how this influences the competitiveness and attractiveness of the region for foreign investment. To understand the context, we have examined the latest available evidence on the extent of economic activity supported by the foreign-owned sector in Cork and the wider South West Region. The figures in the table below indicate the level of employment within IDA Ireland-assisted firms by region in Ireland, and highlight the extent of foreign investment in the South West Region, which is the second most important region in Ireland in terms of employment supported within IDA Ireland-assisted foreign-owned multinationals. Most of the South-West Region here relates to Cork City and County. Therefore the importance of the area to the region and the Irish economy generally can be seen in this data. Most notable among the figures shown below is that the South West and South East Regions together account for over one-quarter of IDA Ireland-assisted employment in the State.

**Table 2.8: Total Employment by Region in IDA Ireland Supported Companies**

| **Area/Region** | **2012** |
|---|---|
| **Midlands and East** | 79,560 |
| | |
| **South** | 39,744 |
| *Of which:* | |
| South West | 27,860 |
| South East | 11,884 |
| | |
| West & Mid-West | 25,071 |
| Border | 8,410 |
| **All Regions** | **152,785** |

Source: IDA Ireland Annual Report and Accounts 2012

In terms of the mix of foreign investment, high value foreign firms, many of whom are in the pharmaceutical industry, support over 22,500 jobs within IDA Ireland-assisted foreign-owned firms in Cork City and County (with Cork accounting for over 80% of all IDA supported jobs in the South West Region as a whole). The table below provides a breakdown of this employment by sector. While there is a range of sectors evident, the importance of manufacturing activities in the areas of ICT, biopharma and medical technologies is noteworthy, and these are areas of activity that are strongly dependent on exporting to international markets.

**Table 2.9: Employment in IDA Assisted Firms by Sector in Cork City and County**

| Sector Category | Employment in IDA Assisted Firms - 2013 | % Share of Total |
|---|---|---|
| ICT | 8,053 | 35.7% |
| Biopharma | 4,910 | 21.8% |
| Medical Technology | 3,672 | 16.3% |
| Content Industry, Consumer and Business Services | 3,045 | 13.5% |
| Diversified Engineering & Clean Tech | 1,733 | 7.7% |
| Financial Services | 1,122 | 5.0% |
| **Total – Cork City and County** | **22,535** | **100%** |

Source: Indecon analysis of IDA Ireland data.

*Ringaskiddy/Carrigaline Pharmaceutical Cluster*

A particular feature of industry in Cork is the existence of one of the key strategic industry clusters in Ireland in the form of the co-location in the Ringaskiddy/Carrigaline area of a number of major multinational companies in the pharmaceuticals/biopharma sector. At the end of 2013, a total of 3,419 persons were employed in IDA Ireland client companies located in the Ringaskiddy/Carrigaline area of Cork.

**Table 2.10: IDA Supported Employment in the Ringaskiddy / Carrigaline Pharmaceutical Cluster**

| Category | Employment in IDA Assisted Firms – December 2013 – Estimate |
|---|---|
| IDA Supported Employment – Ringaskiddy/Carrigaline Pharmaceutical Cluster | 3,419 persons |
| **Source: IDA Ireland** | |

*Role of external trade in regional manufacturing sector*

The importance of the Port of Cork can also be seen in the extent of import and export activity associated with manufacturing firms in the region. The analysis in the table overleaf builds on the figures presented at national level in Table 2.2 above and highlights in particular the high level of dependence on external trade within the manufacturing sector in Cork and the South West Region, both from the perspective of export of output and in terms of imported inputs required to produce this output. Notable, the figures indicate that among manufacturing firms in Cork, 89% of the value of their output is exported, while 78% of production inputs are imported.

**Table 2.11: Export and Import Shares of Manufacturing Sector Output in Cork and Wider South West Region**

| | Gross Output (€'000s) | Gross Output Exported (€'000s) | *Percentage of Gross Output Exported* |
|---|---|---|---|
| ***Cork*** | ***32,688,542*** | ***28,953,277*** | ***89%*** |
| Kerry | 1,859,161 | 1,581,097 | *85%* |
| South West | 34,547,703 | 30,534,374 | *88%* |
| Ireland | 87,247,109 | 76,116,046 | *87%* |
| | | | |
| | **Inputs/Materials Purchased** | **Materials Imported** | ***Percentage of Purchased Materials Imported*** |
| ***Cork*** | ***8,522,365*** | ***6,663,190*** | ***78%*** |
| Kerry | 614,974 | 497,572 | *81%* |
| South West | 9,137,339 | 7,160,762 | *78%* |
| Ireland | 30,989,815 | 18,875,290 | *61%* |

Source: CSO Census of Industrial Production Data. Figures based on latest available data for 2011.

The analysis presented so far in this section highlights the critical importance of external trade in the national economy and particularly in the manufacturing sector in Cork and the wider South West Region. The role of the Port of Cork in this context is underlined by its location and multi-modal capacity as a port of national significance. This is further supported by the evidence gathered by Indecon through its research among major multinational and other exporting companies in the region. The findings from this research, summarised in the table below, indicate that almost 64% of companies that responded to Indecon's survey indicated that they use the Port of Cork to export or import goods.

**Table 2.12: Indecon Survey of Multinationals and Other Businesses in Cork Region re Development of Port of Cork – Utilisation of Port of Cork for Export and Import Activity**

| Does your business use the Port of Cork to export or to import goods? | % of Companies |
|---|---|
| | |
| Yes | 63.6% |
| No | 36.4% |
| | |
| **Total** | **100%** |
| | |

Source: Indecon Confidential Survey of Businesses in Cork Region re Development of Port of Cork.

The above analysis highlights the important contribution made by the Cork and wider South West and Munster economies, particularly in the manufacturing sector, and the role of external trade and the Port of Cork in this context. In the next section we consider the role of Port of Cork in more detail, including the current economic impact of the port and its associated activities.

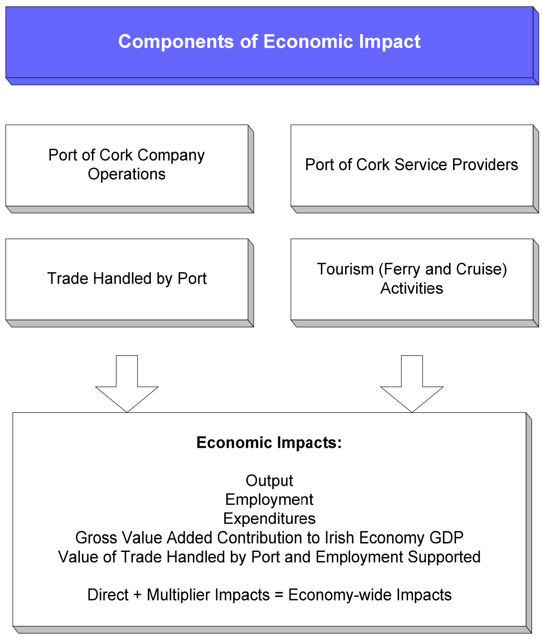
## 2.3 Role and Current Economic Impact of Port of Cork

The regional economic context detailed above indicates that Cork and its wider regions are central to the economic performance of the Irish economy as a whole. This section, going one step further, considers the role and impact of the Port of Cork within this wider context.

### 2.3.1 Economic Impacts Associated with Port of Cork

This section details the economic impacts related to the Port of Cork's present operations. The overall impact of the port is made up of a number of components. The schematic below outlines these components.

**Figure 2.3: Overview of Components of Economic Impacts Associated with Port of Cork's Present Operations**




Source: Indecon

*Economic Impact of Port of Cork Company Operations*

The first component of the overall economic impact of Port of Cork that we quantify relates to the impact of the Port of Cork Company's own operations. Based on data provided by the Port of Cork Company, Indecon has identified the direct economic impacts in terms of sales, employment, wages and salaries, non-labour expenditures on business inputs, capital expenditures and the Gross Value Added (GVA) contribution to Irish economy Gross Domestic Product (GDP). In addition to the direct impacts, we have also modelled the indirect and induced multiplier impacts of these activities throughout the economy. The quantified economic impacts of the Port of Cork Company's own operations are summarised in the table overleaf.

**Table 2.13: Economic Impacts of Port of Cork Company Operations**

| Component of Impact | 2012 Figures | | |
|---|---|---|---|
| | **Direct Impact** | **Multiplier Impacts** | **Economy-wide Impacts** |
| | | | |
| **Output – Sales Revenues** | | | |
| Sales Revenues - € Million | 21.8 | 31.2 | 53.0 |
| | | | |
| **Employment and Employment Incomes Supported** | | | |
| Employment – Full-Time Equivalent Persons (FTEs) | 141 | 78 | 219 |
| Employment Incomes - € Million | 7.1 | 5.6 | 12.7 |
| | | | |
| **Non-Labour Business Expenditures** | | | |
| Non-Labour Business Expenditures - € Million | 8.8 | 12.6 | 21.4 |
| | | | |
| **Gross Value Added / GDP Contribution** | | | |
| Estimated GVA/GDP Contribution - € Million | 14.6 | 16.1 | 30.7 |
| | | | |
| **Capital Expenditures** | | | |
| Capital Expenditures – 2012 - € Million | 6.0 | 10.0 | 16.0 |

Source: Indecon analysis based on data from Port of Cork Company.

*Economic Impact of Port of Cork Service Providers*

A second major impact related to the Port of Cork is the impact of the service providers and businesses in and around the port region. The sectors in which these companies operate include:

- Shipping;
- Logistics;
- Freight and Transport; and
- Energy-related Industry.

Indecon's research among Port of Cork's service providers found that these suppliers direct employed some 460 full-time equivalent persons while their activities also supported an additional 159 FTEs indirectly, based on 2012 figures. This employment was associated with direct wages/salaries estimated at €19.4 million and overall employment incomes, after taking into account indirect employment, amounting to €34.6 million. In addition, port service providers spent almost €50 million on non-labour business inputs, which in turn supported an additional €69.7 million in expenditures throughout the economy (see table overleaf).

**Table 2.14: Overall Economic Impacts of Port of Cork Service Providers**

| Component of Impact | 2012 Figures | | |
|---|---|---|---|
| | Direct Impact | Multiplier Impacts | Economy-wide Impacts |
| | | | |
| **Non-Labour Business Expenditure Impacts** | | | |
| Estimated Non-Labour Business Expenditure Impacts of Port Service Providers - €million | 48.7 | 69.7 | 118.4 |
| | | | |
| **Employment and Employment Incomes Supported** | | | |
| Estimated Employment Supported by Port Service Providers – FTEs | 460 | 159 | 619 |
| Estimated Employment Incomes Supported by Port Service Providers - € Million | 19.4 | 15.2 | 34.6 |

Source: Indecon analysis

*Economic Impacts of Ferry and Cruise Liner Tourism supported by Port of Cork*

The Port of Cork plays an important role in supporting tourism activity. This is achieved through its facilities which handle passenger/car ferries, in addition to being a major port for large cruise liners. These activities support very significant economic impacts in the local and wider economies through the expenditures undertaken by passengers and crew. Indecon's quantified estimates of the economic impacts of ferry and cruise tourism supported by the Port of Cork are detailed in the table below. The Port of Cork saw nearly 71,000 ferry passengers call during 2012. Making use of Fáilte Ireland overseas tourism expenditure data, Indecon estimated that each passenger, on average, spent €370.44 during their stay. This amounts to an estimated ferry-based tourism direct expenditure impact of €26.2 million based on 2012 figures.

**Table 2.15: Estimated Direct Expenditure Impact of Ferry-based Tourism Supported by the Port of Cork**

| | 2012 Figures |
|---|---|
| Number of passengers | 70,937 |
| Average Expenditure Per Capita (€)* | 370.44 |
| **Estimated Total Expenditure - € Million** | **26.2** |

Source: Indecon analysis based on Port of Cork and Fáilte Ireland data
* This is based on an average stay of approx. 5 days and a per diem average spend of €77 per day

The impact of cruise liner tourism supported by the Port of Cork is detailed in the table below. This impact category is made up of two components, namely cruise passengers and crew members. Our estimates make use of data from the Port of Cork as well as assumptions underlying the analysis of Moloney (2011).[10] Based on available full-year figures for 2012, nearly 48,000 cruise liner passengers came through the Port of Cork, while cruise vessels also employed 21,836 crew members. Indecon estimated that the average expenditure of passengers and crew was €185.90 per passenger and €22.60 per crew member. In combining these two impacts, Indecon estimated that the overall value of expenditure undertaken by cruise liner passengers and crew in the local economy in Cork amounted to €9.4 million during 2012.

**Table 2.16: Estimated Direct Expenditure Impact of Cruise Liner Tourism Supported by the Port of Cork**

| | **2012 Figures** |
|---|---|
| **Cruise Liner Passengers** | |
| Number of Passengers | 47,918 |
| Total Expenditure of Passengers (€million) | 8.9 |
| Average Spend Per Passenger (€) | 185.9 |
| **Cruise Liner Crew Members** | |
| Number of Crew Members | 21,836 |
| Total Expenditure of Crew Members (€million) | 0.492 |
| Average Spend Per Crew Member (€) | 22.5 |
| | |
| **Total expenditure - € Million** | **9.4** |

Source: Indecon analysis based on data provided by Port of Cork, Indecon model of Irish economy, and Moloney (2011)
Note: We assume that the disembarkation rate is 80% and that tourists from cruise liners spend on average one day in Cork. Crew expenditure is estimated at approx. 12% of passenger expenditure and the analysis takes the expenditure per capita numbers from Moloney (2011) and inflates these estimates using CSO CPI figures.

The overall economy-wide impacts of ferry and cruise tourism supported by the Port of Cork are detailed in the table overleaf. Taking both ferry and cruise liner tourism together, the overall direct expenditure impact on the local economy in Cork was estimated at €35.6 million based on 2012 figures. These direct expenditures were estimated to support 265 full-time equivalent jobs in the local economy. After factoring in indirect and induced multiplier impacts into the analysis, the overall economy-wide impact of this spend was estimated at €79.4 million, supporting almost 430 jobs.

[10] Moloney, R. (2011) 'Economic Contribution of the Port of Cork to the Irish Economy 2009', Centre for Policy Studies, University College Cork.

**Table 2.17: Estimated Economy-wide Expenditure and Employment Impacts of Ferry and Cruise Liner Tourism Supported by the Port of Cork**

| | 2012 Figures | |
|---|---|---|
| | **€ Million** | **Employment Supported - FTEs** |
| Direct Expenditure Impact of Ferry and Cruise Passengers/Crew | 35.6 | 265 |
| Indirect and Induced / Multiplier Impacts | 43.6 | 164 |
| **Economy-wide Expenditure Impact of Ferry and Cruise Activities handled by Port of Cork** | **79.4** | **429** |

Source: Indecon analysis based on data provided by Port of Cork and Indecon model of Irish economy

*Economic Impact of Value of Trade Handled at Port of Cork*

The above analysis indicates that significant impacts arise in terms of the Port of Cork Company's own operations, the activities of port service providers and the expenditures supported by the port in relation to ferry and cruise liner tourism. However, the greatest economic impact relates to the trade handled by the Port. This is considered in terms of the estimated value of trade throughout at the Port. Indecon has modelled the estimated value of trade handled by the Port of Cork, through combining data on trade volumes and unit values based on information supplied by the Port and by the CSO.

The table below describes the overall picture in terms of the volume or tonnage of trade handled at all Irish ports, based on figures available to 2012. The Port of Cork is the second largest multi-modal port and the largest natural harbour in Ireland, capable of handling all principal modes of port traffic. It is also the second largest LoLo port, handling almost 23% of all LoLo trade, and it accounts for 21% of break bulk and almost 39% of liquid bulk trade in the State.

**Table 2.18: Port of Cork in Context of Other Major Ports in Ireland – Trade Volumes – '000 Tonnes**

| **Port** | **All types of cargo** | **Roll-on/roll-off traffic** | **Lift-on/lift-off traffic** | **Liquid bulk** | **Dry bulk** | **Break bulk and all other goods** |
|---|---|---|---|---|---|---|
| Dublin | 19,898 | 9,691 | 4,892 | 3,444 | 1,813 | 59 |
| Shannon Foynes | 10,094 | .. | .. | 1,097 | 8,938 | 59 |
| Cork | 8,708 | 50 | 1,515 | 5,200 | 1,759 | 183 |
| **All Irish ports** | **47,649** | **11,605** | **6,716** | **13,417** | **15,042** | **870** |
| *Port of Cork % Share* | *18.3%* | *0.4%* | *22.6%* | *38.8%* | *11.7%* | *21.0%* |

Source: Indecon analysis of CSO Maritime Statistics. Figures relate to 2012 volumes of trade.

Official statistics do not measure the value of trade at each commercial seaport. However, they do provide details on the value and volume of trade by mode of transport. In order to estimate the value of trade at the Port of Cork, a first step is to estimate the value of trade per tonne. The table overleaf provides data on the average value per tonne of sea-based trade handled at Ireland's commercial seaports. This includes inbound as well as outbound trades, and indicates an average value across all sea-based trades handled across Irish commercial seaports of €1,600 per tonne in 2012.

**Table 2.19: Estimated Average Value of Trade per Tonne Handled at Commercial Seaports in Ireland**

| | 2009 - € 000 | 2010 - € 000 | 2011 - € 000 | 2012 - € 000 |
|---|---|---|---|---|
| Sea-based Trade | 1,429 | 1,341 | 1,555 | 1,600 |

Source: Indecon analysis based on CSO trade data

It is not possible due to data constraints to identify the precise features of trade at individual ports, including the Port of Cork. While the average value of trade handled may vary between ports, as a prudent central scenario and reflecting the Port of Cork's share of overall trade, we have assumed that the average value of trade handled by the port is consistent with that across Irish commercial seaports as a whole. On this basis, Indecon estimated that the overall value of trade handled by the Port of Cork based on the latest full-year figures available for 2012 amounted to €13.9 billion.

**Table 2.20: Estimated Value of Trade Handled by Port of Cork**

| | € Million (2012 figures) |
|---|---|
| Estimated Value of Trade at Port of Cork* | 13,937.0 |

Source: Indecon analysis
* Figure includes inbound and output trades.

The value of this trade also supports employment in the economy. Indecon estimates that the value of the trade through the Port of Cork supports almost 172,000 full-time equivalent jobs across in the Irish economy (see table below).

**Table 2.21: Estimated Employment Supported by Trade Handled at Port of Cork**

| | Employment – FTEs – 2012 figures |
|---|---|
| Economy-wide Employment supported by Trade Handled at Port of Cork – FTEs | 171,787 |

Source: Indecon analysis based on CSO Maritime Data and Indecon Assessment of Economic Impact of State Commercial Seaports on the Irish Economy[11]

The above analysis indicates that the Port of Cork directly and indirectly supports very significant economic impacts through its own operations and those of its service providers, tourism activity and, most importantly, the trade handled by the port. These impacts, in turn, have implications in terms of economic development regionally, nationally and internationally. We explore these implications further overleaf.

[11] Economic Impact of State Commercial Seaports on the Irish Economy, Indecon assessment completed for Irish Ports Association, March 2006.

## 2.4 Implications of Port for Wider Economic Development

The implications of the Port of Cork for future wider economic development relate to the need to ensure that the Port provides the capacity and external trade connectivity that the Irish economy requires. This is especially important for the regional and national economies in Ireland, and is also relevant at a wider EU level, given the port's status as a Core Network Port under the TEN-T network. We consider the wider economic development implications below.

### 2.4.1 Regional and local economic development

The importance of the Port of Cork for regional development is highlighted in the Cork Area Strategic Plan (CASP).[12]. Launched by Cork City and County Councils in 2001 and updated in 2008, the CASP strategy is articulated around a series of goals under the following broad strategic areas:

- Economic growth;
- Social inclusion;
- Balanced spatial development;
- Environment;
- Urban renewal;
- Transportation; and
- Infrastructure.

The CASP is designed to meet the Government's National Spatial Strategy (NSS) (Cork being a Gateway within the NSS framework) and National Climate Change Strategy, in terms of promoting balanced and sustainable economic development.
Importantly, the CASP highlights the regional as well as national strategic importance of the Port of Cork:

> *"The Port of Cork contributes significantly to the well-being of commerce, industry and tourism, not just of the Cork sub-region, but beyond, to the entire country."* (CASP (2008), Page 116.)

It also notes that:

> "The Cork Area Strategic Plan and the Port of Cork's Strategic Development Plan are mutually reinforcing." (CASP (2008), page 119.)

In particular, the strategy recognises that:

> *"The maintenance of modern port facilities and the need to release port related land in the Docklands and at Tivoli for mixed-use development formats are both critical to the overall strategy for the sustainable development of the CASP area and to the achievement of the target populations for the City."* (CASP (2008), page *xix*.)

Specifically in relation to the benefits of relocation of the port's activities, the CASP notes that:

> *"The relocation of the container terminal would have the knock on strategic benefits of releasing lands for redevelopment at the Docklands and at Tivoli thereby sup-*

[12] Cork City Council and Indecon Economic Consultants, Cork Area Strategic Plan (2008).

*porting the CASP goals of consolidating the role of Cork City."* (CASP (2008), Page 120.)

Importantly, the Port of Cork's own Strategic Development Plan is designed to integrate closely with the achievement of the strategy for the sustainable development of the Cork City Region, as set out in the CASP. This implies that the Port, through ensuring that adequate capacity is provided to meet the trading needs of its hinterland economy, can play a key role in realising the objectives and goals of the CASP in terms of facilitating trade and therefore investment in foreign-owned and indigenous exporting companies, as well as supporting tourism in the region.

In addition to these direct economic impacts, the CASP notes that the Port of Cork can also play an important catalytic role, through the planned relocation of its activities to Ringaskiddy and the vacation of port lands in the Cork Docklands, which in turn would release these lands for employment intensive, internationally traded services and other activities in Cork City.

### 2.4.2 National economic development

At the level of the Irish economy as a whole, the critical role played by the commercial seaports is highlighted in the Government's National Ports Policy statement. The core objective of Government policy is to facilitate a competitive and effective market for maritime transport services. Since Ireland is an island nation, it is critically important that international maritime gateways be fit for purpose:

> *"Ports act as international gateways, generate large volumes of traffic, and are key centres of economic activity. They are located at a unique interface between land and sea, in many cases in or near to major conurbations."* (page 43)

The National Ports Policy statement identifies Port of Cork as a 'Tier 1 Port of National Significance'. This reflects its status as the second largest multi-modal port in the State, as well as its TEN-T status (see further below).

The implications of the Government's policy, as enunciated in the National Ports Policy statement, are that the Port of Cork, as a Tier 1 port proposed for inclusion in the TEN-T core network, must continue to play a key role, both regionally and nationally, in serving the trading needs of the Irish economy, and that the continued commercial development of the port is a key policy objective in this regard. As noted in the policy statement:

> *"It is the Government's position that those ports considered to be of national significance must be capable of the type of port capacity required to ensure continued access to both regional and global markets for our trading economy."* (page 44)

The statement also notes that the Government "endorses the core principles underpinning the company's *Strategic Development Plan Review*, and the continued commercial development of the Port of Cork Company is a key strategic objective of National Ports Policy."

### 2.4.3 EU context

As indicated previously, the Port of Cork is not only important in a regional and national context, but also in an EU context.

*EI internal/single market*

Through its trade links, Ireland plays an important role in facilitating the functioning of the EU Internal Market. The importance of trade with the internal/single market is evidenced by the figures shown in the table overleaf, which indicate that total merchandise/good exports and imports to/from EU Member States and EFTA countries represented over 65% of the total value of Ireland's merchandise trade in 2013.

**Table 2.22: Importance of EU Internal/Single Market for Irish Trade**

| | **2013 - € '000** |
|---|---|
| Total Merchandise Exports from Ireland | 49,635,000 |
| Total Merchandise Imports to Ireland | 86,890,000 |
| **Total Merchandise Trade** | **136,525,000** |
| | |
| Exports to EU Member States and EFTA Countries | 34,076,500 |
| Imports from EU Member States and EFTA Countries | 55,022,300 |
| **Total Merchandise Trade to/from EU/EFTA Countries** | **89,098,800** |
| ***Trade to/from EU and EFTA Countries as % of Total*** | ***65.3%*** |

Source: Indecon analysis of CSO trade data.

As an island economy, it is therefore of strategic importance that Ireland's trading access to the EU Internal Market is underpinned. Given that the Port of Cork handles 19% of the overall volume of goods and 23% of container-based trade handled across ports in Ireland, ensuring that the port can continue to meet the requirements of businesses that trade with customers and suppliers in the EU is clearly important.

*EU Cohesion policy*

Cork is located in the Southern and Eastern NUTS 2 region in Ireland. The Cork City region is currently designated as a competitiveness and employment region. While GDP per capita across Ireland is above the EU average, the Cork City region has lagged behind the State as a whole and parts of the region suffer from high levels of socio-economic disadvantage (for example, unemployment in Cork City reached 22.2% in 2011 according to the Census of Population, compared with 19% across Ireland as a whole). Some 30% of the population of the region is at risk of poverty or social exclusion and 7% are classified as having severe material deprivation.[13] EU Cohesion policy and the Europe 2020 Strategy[14] share the objective of continuing to address the requirements for social and economic cohesion within the EU, and this includes ensuring that lagging regions and areas catch up with more developed regions.

*EU Trans-European Transport Networks*

EU policy considers that transport infrastructure is fundamental for the smooth operation of the internal market, for the mobility of persons and goods and for the economic, social and territorial cohesion of the European Union. Reflecting this, the new EU Trans-European Transport Networks (TEN-T) guidelines envisage a transport network across the 28 EU Member States that will be established by 2030. This will include a high priority core network which connects the major European urban areas and includes the major European transport corridors, bottlenecks and multimodal hubs. TEN-T will involve nine major transport corridors, namely two North-South corridors, three East-West corridors, and four diagonal corridors. Commercial seaports play a central role in the TEN-T as they define nodes which are connected by multimodal core transport links. The TEN-T proposal in-

[13] DG Regio, Country Fact Sheet, July 2012.

[14] Communication from the Commission: *Europe 2020: a strategy for smart, sustainable and inclusive growth*, COM (2010) 2020 final, 3 March 2010.

cludes 319 ports, 83 of which are in the core network and 236 in the comprehensive network.

The Port of Cork has been designated by the Government for inclusion as a Core Network Port under the EU TEN-T, in recognition of its strategic importance to the island of Ireland where practically all trade is exported by sea and its role in the movement of goods to and from the UK and Continental Europe. For inclusion in the core network, ports must enjoy significant volumes of freight and/or passenger traffic, have a high level of international connectivity and, by 2030, be connected to the core European rail and road network.[15]

*CAP Reform*
Because of its location close to Ireland's most productive agriculture and food producing region, the Port of Cork is strategically important in that it serves a growing agri-food business market within its hinterland. The Government has set an ambitious target to increase agricultural output by 2020. This, in part, is driven by the reform of the EU's Common Agricultural Policy (CAP), most notably through the planned abolition of quotas from 2015 onwards. As a consequence, the Port anticipates that imports of feed and other agri-inputs together with the export of agri-food products will grow significantly as an increase in production of up to 50% post-2014 is forecast for the dairy industry.

### 2.5 Summary of Findings

This section considered the wider national and regional economic context in terms of the nature of economic development in the Cork City and surrounding South West Region, as well as the economic and policy environment for port development at national and EU levels. The key findings from the assessment in this section are as follows:

- It is important to firstly set this in context by considering the key features of the wider Irish economy and, in particular, the role of external trade. As a small open economy, Ireland is critically dependent on external trade to support its development. This is evidenced by the fact that overall merchandise trade (including goods imports as well as exports, which are relevant to the component of trade handled by the commercial seaports) represents 85.9% of Irish economy GDP.
- In the manufacturing sector, exports represent over 87% of the value of output and almost 61% of raw material inputs used in the production of manufactured goods in Ireland.
- Access to export markets constitutes an important driver of foreign investment in Ireland among multinational companies, which typically use Ireland as a base for production and sales into European and other international markets. Exports represent over 94% of the overall value of output among foreign-owned multinational companies operating in the Irish manufacturing sector.
- Sea-based trade represents the single largest category of Ireland's merchandise trade, accounting for 70% of the total volume of exports and imports of goods, and 41% of the value of goods trade to/from Ireland. This underscores the critical role played by the commercial seaports in serving the trading needs of the Irish economy.
- The Port of Cork serves a catchment area which represents a large and strategically important part of the State's population and economic base. Almost 65%of the Port's customers are located in County Cork, while over 70% are in the South West

[15] National Ports Policy statement, Op. Cit.

Region and 92% are in Munster. This has important implications in terms of the requirements for port capacity to serve this catchment area.

- The Port serves a population catchment of over 664,000 persons in the South West Region and almost 1.25 million people in the Munster province, equivalent to over 27% of the population of the State as a whole.

- At the regional level, output in manufacturing industry located in Cork City and County represents over 33% of output across the State as a whole, while output in Munster accounts for over 49% of national manufacturing production. The South West is the second most important region after Dublin in terms of its contribution to Irish GDP.
- A particular feature of the manufacturing sector in Cork is the location in the Ringaskiddy area of a number of major international pharmaceutical manufacturing companies. This is a key strategic industry cluster which is important for the national economy.
- Among manufacturing firms in Cork, 89% of the value of their output is exported, while 78% of production inputs are imported, highlighting the importance of adequate port capacity and proximity for these firms.
- The Port of Cork delivers a substantial economic contribution/impact, both regionally and nationally, through its existing activities/operations. We estimated the value of trade throughput at the Port of Cork at €13.9 billion in 2012. We also estimated that this trade supports over 170,000 full-time equivalent jobs across regional and national economy. In addition, we estimated that the operation of the port directly supports 866 full-time equivalent jobs (through the activities of port service providers as well as the port company itself, and of tourism activities), and 1,267 FTEs on an economy-wide basis (when multiplier effects are taken into account). The extent to which investment in the capacity of the port can deliver future expansion of these impacts is important in the context of the proposed Ringaskiddy Port Re-Development.
- The implications of the Port of Cork for wider economic development relate to the need to ensure that the port provides the capacity and external trade connectivity that the Irish economy requires. This is especially important for the regional and national economy in Ireland, but is also relevant at a wider EU level in terms of how it contributes to the ongoing development of the Internal Market.
- The importance of the Port of Cork for regional development is highlighted in the Cork Area Strategic Plan. The CASP notes that the port, through ensuring that adequate capacity is provided to meet the trading needs of its hinterland economy, can play a key role in terms of facilitating trade and therefore investment in foreign-owned and indigenous exporting companies, as well as supporting tourism in the region. The Port of Cork can also play an important catalytic role, through the planned relocation of its activities to Ringaskiddy and the vacation of port lands in the Cork Docklands, which in turn would release these lands for employment intensive internationally traded services and other activities in Cork City.
- The critical wider economic role played by the commercial seaports is highlighted in the Government's National Ports Policy statement, which identifies the Port of Cork as a 'Tier 1 Port of National Significance'. This reflects its status as the second largest multi-modal port in the State, while the port has also been designated by the Government for inclusion as a Core Network Port under the EU TEN-T.
- The reform of the EU's Common Agricultural Policy is likely to provide important opportunities for the Port of Cork in relation to agricultural inputs and agri-food products.

# 3 ASSESSMENT OF DRIVERS FOR PORT DEVELOPMENT

## 3.1 Introduction

This section sets out and assesses the port operational and wider economic rationale and drivers for the planned Ringaskiddy Port Re-Development. We begin by identifying the nature of these drivers and then consider the rationale for why Ringaskiddy is considered the optimal location to address these drivers and to serve the future development of the port. We then examine the demand drivers, in terms of how the level of unitised and other trades handled by the Port of Cork would be projected to evolve under different development scenarios.

## 3.2 Key Drivers for Port Development

The key drivers or factors influencing the need for the Ringaskiddy Port Re-Development have been established in the Port of Cork's Strategic Development Plan, among other assessments undertaken since 2010.[16] These drivers/factors can be summarised as follows:

- The projected growth in trade volumes handled by the Port of Cork due to the national significance of the Cork Gateway serving a large population base with many significant customers;
- The port's anticipated contribution to the national economic recovery and long-term, sustainable development of the Irish economy, given its dependence on external trade;
- The existing physical constraints in handling larger vessels at Tivoli container terminal and the intensified operational constraints associated with projected further increase in container vessel size and cargo throughput;
- The changing nature of port activities, including the trend towards port-centred logistics, requiring a different nature of land banks adjacent to port facilities;
- National and regional spatial and economic strategies to develop Cork as a gateway, and the role of the Port of Cork in this context; and
- The catalytic role of the port in releasing port lands at City Quays and Tivoli to facilitate the re-development of the Cork Docklands into high density, mixed use development, and therefore to supporting the future sustainable growth of the population of Cork City.

## 3.3 Ringaskiddy – Optimal Location for Future Port Expansion

Following a detailed site selection process, the Port of Cork concluded that Ringaskiddy represents the optimal location to serve the port's future development in the key unitised trade modes. The table overleaf highlights some of the key characteristics of the Port of Cork's sites at Ringaskiddy, City Quays, Tivoli, Cobh and Marino Point. The port's site selection process highlighted a number of advantages of Ringaskiddy as a location, including the following:

- ❑ Ringaskiddy has the largest comparable approach depths (11.5m);
- ❑ It also has the largest maximum berth depths (13.4m);
- ❑ There is a significant estate of 70 hectares;
- ❑ It is integrated in a Strategic Industrial Zone; and
- ❑ Ringaskiddy is already the most significant location for activities at the port.

[16] Port of Cork, Strategic Development Plan Review (2010).

**Table 3.1: Overview of Current Operational Features of Port of Cork by Location**

| Location | Approach Depths (Below CD) | Maximum Berth Depths (Below CD) | Special Features | Modes |
|---|---|---|---|---|
| Ringaskiddy | 11.5m | 13.4m | 70ha Estate, Port Facilities and Integrated in Strategic Industrial Zone | Lo-Lo (TEU)<br>Ro-Ro (TEU)<br>Ro-Ro (Cars)<br>Ro-Ro Freight<br>Tourist Passengers<br>Tourist Cars / Caravans etc<br>Offshore<br>Break Bulk<br>Bulk Solid / Bulk Liquid |
| City Quays | 5.2m | 6.5m | Traditional Location, Urban | Bulk Solid / Bulk Liquid<br>Break Bulk<br>Offshore |
| Tivoli | 6.5m | 8.8m | Urban, Adjacent to Rail, 65Ha Port Owned Estate | Lo-Lo (TEU)<br>Ro-Ro (Cars)<br>Bulk Solid / Bulk Liquid |
| Cobh | 11.5m | 9.1m | Dedicated Cruise Terminal | Cruise |
| Marino Point | 10.0m | 10.0m | Seveso Zoning, 47ha Property, Adjacent Rail Line | Bulk Solid / Bulk Liquid |

Source: Port of Cork

The table overleaf highlights a number of aspects of the characteristics, constraints and future needs of the Port of Cork's sites. Both City Quays and Tivoli have limits on vessels size that can be accommodated, while these locations are also ring-fenced for mixed use waterfront development in the long run. This leaves Marino Point and Ringaskiddy as the long-term viable options for port development. However, Marino Point also suffers from a number of important constraints (discussed in detail in Chapter 2 re 'Need for the Scheme and Alternatives'), including the following:

- The site is not owned by the Port of Cork and would need to be acquired;
- While the site has potential rail connectivity, there is currently no existing Port of Cork activity at the site and so development at this location would not contribute to a consolidation of port operations, particularly in the key unitised/LoLo segment;
- Access for shipping is constrained and dredging would be required to provide sufficient depth.

Taken together, the constraints evident at Tivoli, City Quays and Marino Point lend further weight to the Ringaskiddy development option given its natural characteristics and existing development base.

**Table 3.2: Overview of Characteristics, Constraints and Future Needs of Port of Cork Sites**

| Location | Characteristics of Site | Current Constraints | Future Needs |
|---|---|---|---|
| Ringaskiddy | Prime deep water and primary site for the consolidation of port activities and the accommodation of trades to be relocated from City Quays and Tivoli. Zoned for new Port development. | | Statutory consents for Redevelopment need to be achieved, Consolidation of most port activities at this location. |
| City Quays | Urban relocation | Limit on vessel size and draft, Zoned for inner city redevelopment for mixed uses | Port operations required to relocate over time to facilitate urban redevelopment and increasing ship size. |
| Tivoli | Adjacent rail line, Urban situation | Limit on vessel size that can be accommodated, Length of jetties, Superstructure limitations | Ultimately site to be available for mixed use waterfront development, Short and Medium term needs also need to be accommodated, Restore Rail line for Medium term uses, Port users will gradually transfer to Ringaskiddy and / or Marino Point |
| Marino Point | Port of Cork Company on point of purchasing site | Statutory consent required for enabling works (including rail connectivity) to prepare site for port operations | Supplementary site to Ringaskiddy for certain categories of cargo, particularly in the liquid and solid bulk modes. |

Source: Port of Cork

## 3.4 International and Irish Developments in Port Trade

A particularly important driver of port development internationally concerns overall trends in the volume and characteristics of freight, as well as in the nature of vessels carrying this freight. In this section we highlight some of the features of international trends and developments in sea-based freight.

Since the mid 1980’s the world has increasingly moved towards being a global marketplace. This process of globalisation through increased international trade has facilitated the growth of both developed and developing economies and commercial seaports have been an integral part of this growth. Infrastructure is a key determinant of location decisions for multinational companies operating in the global market. Commercial seaports play a significant role in this as sea transport represents a preferred, and in some cases, the only suitable means of transport for the majority of traded goods. Sea transport is a relatively inexpensive method of transporting large amounts of cargo internationally. This is of fundamental importance to small open economies such as Ireland.

### 3.4.1 International trends

*Trade volumes*

The table overleaf considers the recent historical trends by type of cargo in the overall international volume of sea-based trade over the last decade. The analysis highlights the overall strong growth in world trade, including main bulks, in which volumes have almost doubled between 2000 and 2012, and other dry cargos (including containers), which increased by 96.7% since 2000. Taking into account all cargo, the data indicates that this has increased from 5.9bn tonnes in 2000 to 9.2bn tonnes in 2012, an increase of 55.4%.

**Table 3.3: Developments in International Seaborne Trade (Millions of Tonnes)**

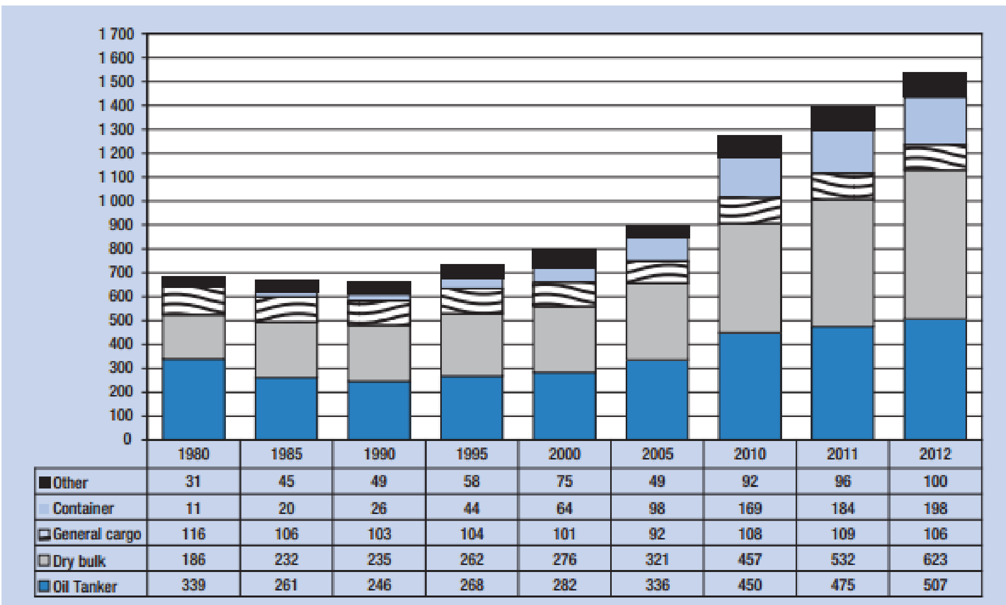
| Year | Oil and Gas | Main Bulks | Other Dry Cargo | Total (All Cargoes) |
|---|---|---|---|---|
| 2000 | 2,163 | 1,295 | 2,526 | 5,984 |
| 2005 | 2,422 | 1,709 | 2,978 | 7,109 |
| 2006 | 2,698 | 1,814 | 3,188 | 7,700 |
| 2007 | 2,747 | 1,953 | 3,334 | 8,034 |
| 2008 | 2,742 | 2,065 | 3,422 | 8,229 |
| 2009 | 2,642 | 2,085 | 3,131 | 7,858 |
| 2010 | 2,772 | 2,335 | 3,302 | 8,409 |
| 2011 | 2,796 | 2,477 | 3,475 | 8,748 |
| 2012 | 3,033 | 2,547 | 3,717 | 9,297 |
| *% Change 2000 - 2012* | *40.2%* | *96.7%* | *47.1%* | *55.4%* |

Source: UNCTAD Review of Maritime Transport 2012

*Growth on unitised trade and container vessels*

Detailing how this cargo is transported is useful for a number of reasons. It is useful in terms of analysing general changes in vessel type over time. It is also useful in the context of port infrastructure and the ability of ports to handle certain types of cargos and vessels. We can see from the figure below that in terms of recent history, the most common type of vessel in 1980 was the oil tanker and containerised shipping had a negligible share of vessel types overall. Moving forward to 2005, the use of dry bulk vessels begins to rival oil tankers and containerised/unitised shipping has become more commonplace. By 2012, dry bulk vessels have been established as the principal vessel type and another notably change is that containerised vessels now have the third largest share of vessel type in use.

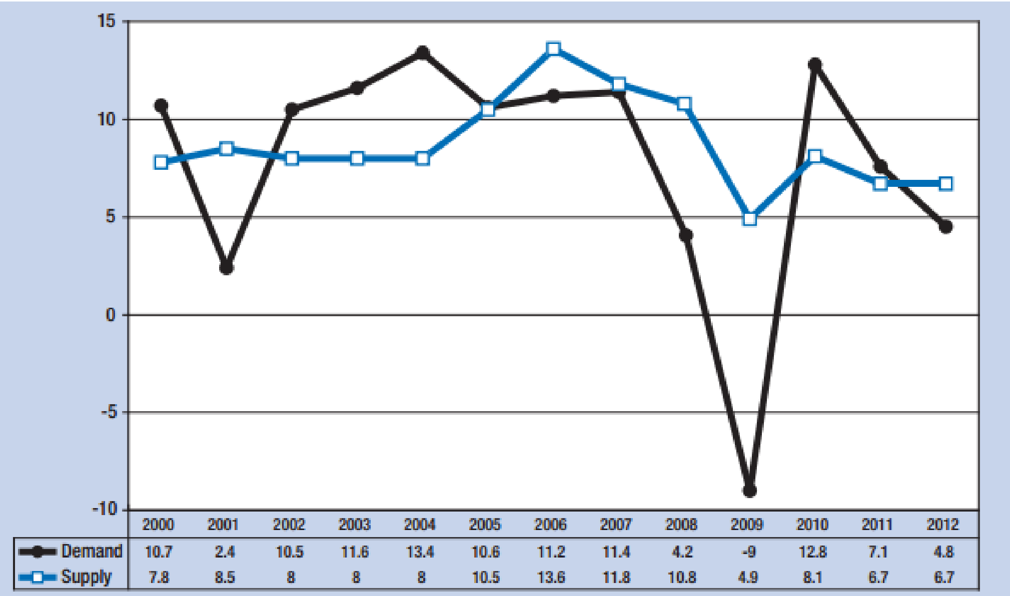
**Figure 3.1: World Fleet by Principal Vessel Type (Millions of Dead-Weight Tonnes)**




Source: UNCTAD Review of Maritime Transport 2012

The figure below takes a closer look at containerised shipping, namely, developments in supply and demand for container shipping from 2000 to 2012. In this time, there has been strong supply and demand for container shipping, with double-digit growth evident in many periods. This highlights the increasing role of container shipping and unitised trade.

**Figure 3.2: Annual Growth Rates in Demand and Supply of Container Shipping**




Source: UNCTAD Review of Maritime Transport 2012

*Trend towards larger vessels*

A second major international trend that is influencing the need for investment in the future of Ringaskiddy relates to larger vessel sizes. This relates to the use of larger vessel sizes to transport goods from port to port. We have already seen that, in terms of the type of vessel, containerised vessel use is increasing. However, the nature of these vessels is also evolving, most notably in relation to vessel size. The growing size of container ships is particularly noteworthy. Since 2007, the average size of container ships has increased by over 27%, while the average size has grown by 94% since 1997 (see table below).

**Table 3.4: Historical Trends in International Cellular Container Ship Fleet**

| Year | Number of Vessels | TEU Capacity | Average Vessel Size (TEU) |
|---|---|---|---|
| 1987 | 1,052 | 1,215,215 | 1,155 |
| 1997 | 1,954 | 3,089,682 | 1,581 |
| 2007 | 3,904 | 9,436,377 | 2,417 |
| 2008 | 4,276 | 10,760,173 | 2,516 |
| 2009 | 4,638 | 12,142,444 | 2,618 |
| 2010 | 4,677 | 12,824,648 | 2,742 |
| 2011 | 4,868 | 14,081,957 | 2,893 |
| 2012 | 5,012 | 15,406,610 | 3,074 |
| ***1997-2012*** | ***156.5%*** | ***398.6%*** | ***94.4%*** |

| | | | |
|---|---|---|---|
| *2007-2012* | *28.4%* | *63.3%* | *27.2%* |

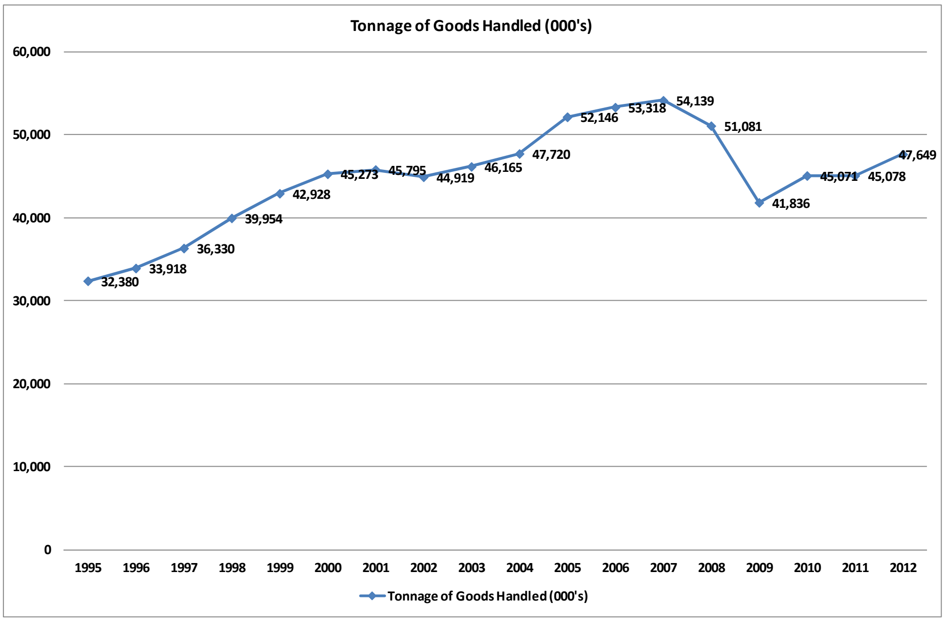
Source: UNCTAD Review of Maritime Transport 2012

### 3.4.2 Developments at Irish ports

*Trade volumes*

Trends in the volume of goods handled at Irish ports mirror those trends which we have outlined in an international context. The figure below presents the long-term trend in goods handled at Irish ports since 1995. The trend is very positive up to 2007, where the tonnage of goods handled at Irish ports peaked at over 54,000 tonnes across all ports in the Republic. The international and domestic economic recession led to a sharp decline in volumes in 2008 and 2009, but trade has recovered since 2010. Future movements in overall trade will be determined by international developments as well as recovery of the Irish economy. At issue, however, concerns the ability of the commercial seaports to service the needs of the expanding domestic and international economies in an efficient manner, and the role of the Port of Cork in this context.

**Figure 3.3: Long-term Historical Developments in Sea-based Trade in Ireland – Total Volume of Goods Handled across All Commercial Seaports in Republic of Ireland**




Source: Indecon analysis of CSO Maritime Data

The table overleaf describes the recent movements in the overall volume of good handled by port in Ireland over the period 2009 to 2012. Since 2009, overall port trade volumes have grown by 14%. The figures indicate significant variation in growth across the main ports, with Shannon Foynes recording a one-third increase in its volumes between 2009 and 2012, while Dublin Port saw an increase of just 7% and Port of Cork at 9%. These figures mask underlying developments across different modes of traffic and are sensitive to individual port customer developments. However, the port's ability to retain its overall share of the market in Ireland is important for the regional economies of Cork and Munster, and the commercial viability of the Port of Cork. This will require the port to respond to the developments that are taking place in shipping through ensuring sufficient capabilities and configuration of capacity, otherwise there is a danger that the port will lose market share, undermining its economic role both regionally and nationally.

**Table 3.5: Recent Developments in Volume of Trade Handled by Port in Ireland – '000 Tonnes**

| | 2009 | 2010 | 2011 | 2012 | *% Change 2009-2012* |
|---|---|---|---|---|---|
| Dublin | 18,606 | 19,548 | 19,467 | 19,898 | *7%* |
| Shannon Foynes | 7,577 | 9,134 | 9,899 | 10,094 | *33%* |
| **Cork** | **7,968** | **8,466** | **8,434** | **8,708** | ***9%*** |
| Rosslare | 2,328 | 2,502 | 2,192 | 1,864 | *-20%* |
| Waterford | 1,631 | 1,451 | 1,383 | 1,174 | *-28%* |
| Bantry Bay | 933 | 1,224 | 1,403 | 3,261 | *250%* |
| Galway | 723 | 671 | 554 | 501 | *-31%* |
| New Ross | 515 | 444 | 357 | 268 | *-48%* |
| Drogheda | 512 | 499 | 489 | 959 | *87%* |
| Greenore | 390 | 503 | 362 | 373 | *-4%* |
| Dundalk | 222 | 140 | 107 | 67 | *-70%* |
| Kinsale | 143 | 159 | 111 | 115 | *-20%* |
| Killybegs | 87 | 82 | 37 | 127 | *46%* |
| Wicklow | 73 | 89 | 99 | 74 | *1%* |
| Sligo | 53 | 54 | 46 | 34 | *-36%* |
| Youghal | 26 | 63 | 82 | 73 | *181%* |
| Castletownbere | 17 | 26 | 26 | 31 | *82%* |
| Tralee Fenit | 17 | 12 | 19 | 24 | *41%* |
| Dun Laoghaire | 14 | 2 | 12 | 1 | *-93%* |
| Kilrush | .. | .. | .. | 3 | - |
| **All RoI ports** | **41,836** | **45,071** | **45,078** | **47,646** | ***14%*** |

Source: Indecon analysis of CSO Maritime Data

*Developments in vessel size*

Given the nature of the Irish economy and the importance of external trade, international trends have a significant influence on national trends. Looking at the national picture, the table below examines the movements over the period from 1999 to 2012 in the number of vessel arrivals and the gross tonnage of vessels by vessel size using Irish ports. Most note-worthy from this analysis is the substantial growth evident in the number and tonnage of vessels of 40,000-80,000 tonnes and vessels exceeding 80,000 tonnes.

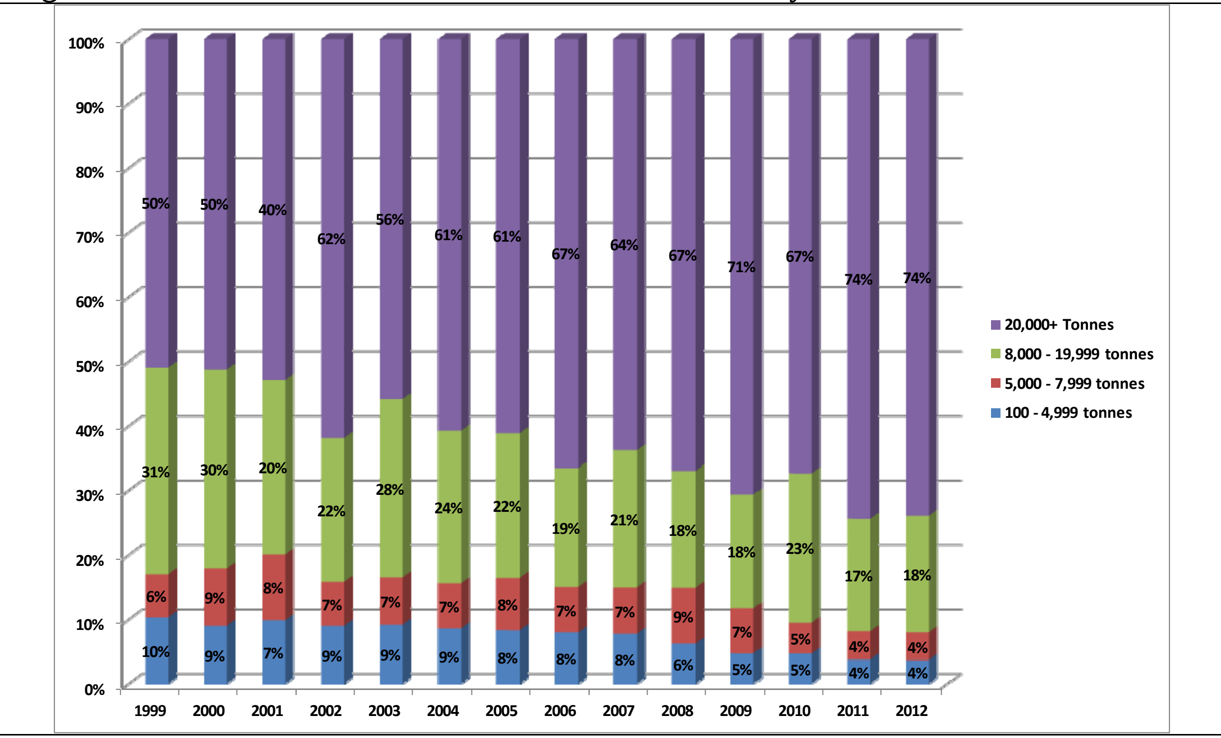
**Table 3.6: Recent Historical Trends in Size of Vessels Calling at Irish Ports – All Ports**

| Vessels Calling at Irish (RoI) ports | % Change in Number of Vessel Arrivals – 1999-2012 | % Change in Gross Tonnage – 1999-2012 |
|---|---|---|
| 100 - 4,999 Tonnes | -60.6% | -57.2% |
| 5,000 - 7,999 Tonnes | -21.3% | -21.2% |
| 8,000 - 19,999 Tonnes | -24.3% | -32.1% |
| 20,000 - 39,999 Tonnes | -1.2% | 0.4% |
| 40,000 - 79,999 Tonnes | 649.3% | 641.6% |
| >=80,000 Tonnes | 437.5% | 529.6% |
| **All Vessels** | **-33.1%** | **17.9%** |

Source: Indecon analysis based on CSO Maritime Data

The chart below provides a graphical presentation of these trends for Ireland as a whole. Here we analyse four categories of vessel size from 1999 to 2012. We can see that the percentage shares of the three smaller categories have declined, while there has been a marked growth in the share of larger vessels, with vessels having a capacity of 20,000+ tonnes increasing their share from 50% of arrivals in 1999 to 74% of arrivals in 2012.

**Figure 3.4: Recent Historical Trends in Vessel Arrivals by Size at Irish Ports**




Source: Indecon analysis of CSO Maritime Data

How does the Port of Cork compare with national trends? The analysis in the table below suggests that the Port of Cork has lagged behind national trends in terms of relative growth seen in the larger vessel categories.

**Table 3.7: Recent Historical Trends in Size of Vessels Calling at Irish Ports – Port of Cork**

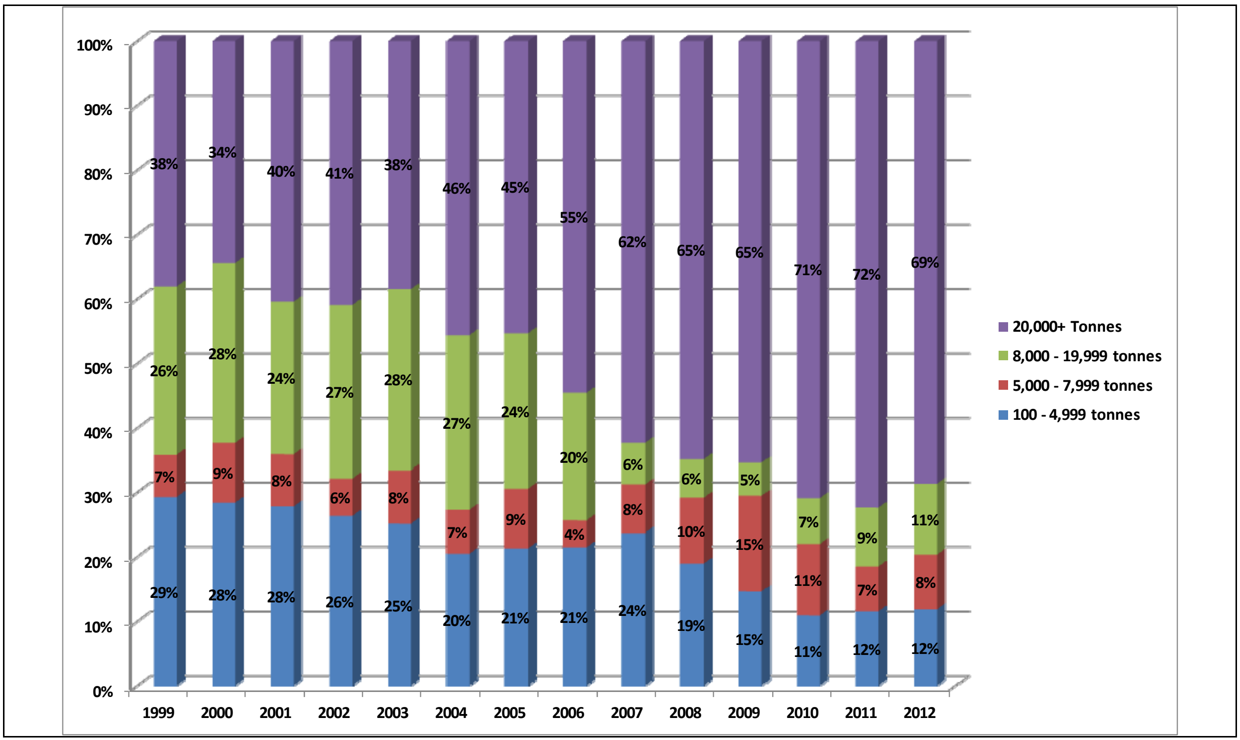
| Vessel Size Category | % Change in Number of Vessel Arrivals – 1999-2012 | % Change in Gross Tonnage – 1999-2012 |
|---|---|---|
| 100 - 4,999 Tonnes | -65.8% | -56.3% |
| 5,000 - 7,999 Tonnes | 26.3% | 39.2% |
| 8,000 - 19,999 Tonnes | -46.8% | -54.8% |
| 20,000 - 39,999 Tonnes | 62.7% | 45.6% |
| 40,000 - 79,999 Tonnes | 57.1% | 92.0% |
| >=80,000 Tonnes* | 120.0% | 159.4% |
| **All Vessels** | **-49.3%** | **7.5%** |

Source: Indecon analysis of CSO Maritime Data

Note: * For >=80,000 Tonnes category, % Change is measured from 2004 – 2012 as 2004 was the first year of 80,000+ arrivals.

Notably, the growth in number of vessels between 40,000 and 80,000 tonnes calling at Port of Cork, at 57.1% between 1999 and 2012 compares with an increase of 649% in this category nationally, suggests the Port of Cork has lagged behind developments in other ports including Dublin in terms of ability to handle larger vessels. This is also evident in the chart presented below. Again, we see that the general trend is similar to that of the national average. However, the extent of the growth in the share of larger vessel arrivals at Port of Cork has lagged behind the national level; and, in 2012, the share of vessel arrivals relating to vessels 20,000 tonnes was 74% across all Irish ports, compared to 69% at the Port of Cork. This is an important issue which has implications for the Port of Cork's ability to compete with other ports and meet the trading requirements of its regional hinterland, while also ensuring commercial viability. A key objective of the proposed Ringaskiddy Port Re-Development is to ensure that the port can handle larger vessels and respond to the wider market developments.

**Figure 3.5: Recent Trends in Gross Tonnage of Vessel Arrivals at Port of Cork**




Source: Indecon analysis of CSO Maritime Data

Further detailed analysis of developments and features of vessels calling at Irish ports is included in the technical annex to this report.

## 3.5 Scenarios for Port of Cork Future Trade Growth

The longer-run socio-economic impacts of the proposed Ringaskiddy Port Re-Development will be driven primarily by the expected evolution on trade volumes and the mix of trades handled by the port. The Port of Cork has developed a number of scenarios for projected levels of trade throughput at the port. These scenarios are framed around implementation or non-completion of the proposed extension of the port at Ringaskiddy, as well as the likely developments in the Irish economy and trade, and Port of Cork's share of this trade.

The following scenarios for trade growth have been formulated:

- Baseline Ringaskiddy Extension Scenario, i.e., central growth scenario assuming implementation of proposed Ringaskiddy Port Re-Development;
- Lower Growth Ringaskiddy Extension Scenario;
- Higher Growth Ringaskiddy Extension Scenario; and
- 'No Development' Scenario.

*Baseline scenario*

The baseline or central scenario for overall trade throughput at the Port of Cork, assuming completion of the proposed Ringaskiddy Port Re-Development, is presented in the table below, based on five-year intervals. It is assumed that if planning consent is achieved, an extended Ringaskiddy Port would open in 2018. Under this scenario, it is assumed that national economic (GDP) growth rate will average 2.5% per annum from 2022 onwards, while the Port of Cork will maintain its share of national LoLo traffic volumes at the 2012 level (i.e. 22.7%). This scenario implies that the projected overall volume/tonnage of trade handled by the Port of Cork will grow from 8.7 million tonnes in 2012 to just under 10.7 million tonnes by 2033. Of the total, LoLo trades, which the Port envisages would eventually be handled solely at Ringaskiddy, would increase from 166,225 TEUs in 2012 to 279,194 TEUs by 2033.

**Table 3.8: Projected Trade Handled by Port of Cork – Baseline Ringaskiddy Development Extension Scenario**

| | | 2012 | 2013 | 2017 | 2021 | 2025 | 2029 | 2033 |
|---|---|---|---|---|---|---|---|---|
| | | Actual | Projections | Projections | Projections | Projections | Projections | Projections |
| Lo-Lo | TEU | 166,225 | 168,732 | 187,340 | 207,597 | 229,148 | 252,936 | 279,194 |
| Lo-Lo | Units | 96,723 | 98,181 | 109,009 | 120,796 | 133,336 | 147,178 | 162,457 |
| Ro-Ro | FUs | 831 | 800 | 10,850 | 10,850 | 10,853 | 10,857 | 10,858 |
| Passengers | Units | 70,397 | 75,000 | 80,000 | 80,000 | 80,000 | 80,000 | 80,000 |
| Cars/Caravans | Units | 21,131 | 21,000 | 21,000 | 21,000 | 21,000 | 21,000 | 21,000 |
| Trade Cars | Units | 28,150 | 25,000 | 50,000 | 55,406 | 61,158 | 67,507 | 74,515 |
| Liquid Bulk | Tonnes | 5,200,128 | 5,245,000 | 5,367,774 | 5,381,374 | 5,395,846 | 5,411,821 | 5,429,453 |
| Solid (Dry) Bulk | Tonnes | 1,722,494 | 1,632,000 | 1,705,220 | 1,878,741 | 1,963,495 | 2,051,693 | 2,133,232 |
| Break Bulk | Tonnes | 220,346 | 250,000 | 298,163 | 295,589 | 304,128 | 337,000 | 337,000 |
| Other Cargo | Tonnes | 12 | 10,000 | 20,000 | 20,000 | 30,000 | 30,000 | 30,000 |
| Total excluding Unitised | Tonnes | 7,142,980 | 7,137,000 | 7,391,157 | 7,575,704 | 7,693,469 | 7,830,514 | 7,929,686 |
| Unitised | Tonnes | 1,560,357 | 1,578,065 | 1,891,059 | 2,083,097 | 2,287,442 | 2,513,007 | 2,761,953 |
| Total Trade | Tonnes | 8,703,337 | 8,715,065 | 9,282,216 | 9,658,801 | 9,980,910 | 10,343,521 | 10,691,639 |

Source: Port of Cork Trade Projections

Alternative lower and higher growth scenarios under Ringaskiddy Port extension were also developed, and these are presented in the technical annex to this report. Under the lower growth extension scenario, a national economic (GDP) growth rate of 1.5% per annum on average is assumed over the period to 2022, rising to 2% per annum thereafter, while it is also assumed that Port of Cork maintains its share of national LoLo traffic volumes at the 2012 level (i.e. 22.7%). The upper growth extension scenario by comparison assumes an increase in national GDP growth to an average of 3% per annum while the Port of Cork's share of LoLo traffic rises to 24.7% from 2022 onwards.

*'No Development' scenario*

The 'No Development' scenario assumes that consent to implement the proposed Ringaskiddy Port Re-Development is not achieved and that the Port of Cork would need to retain its existing LoLo and other unitised trade activities at Tivoli and the existing Ringaskiddy terminal. The outcomes assumed under this scenario are described in the table below.

**Table 3.9: Projected Trade Handled by Port of Cork – 'No Development' Scenario***

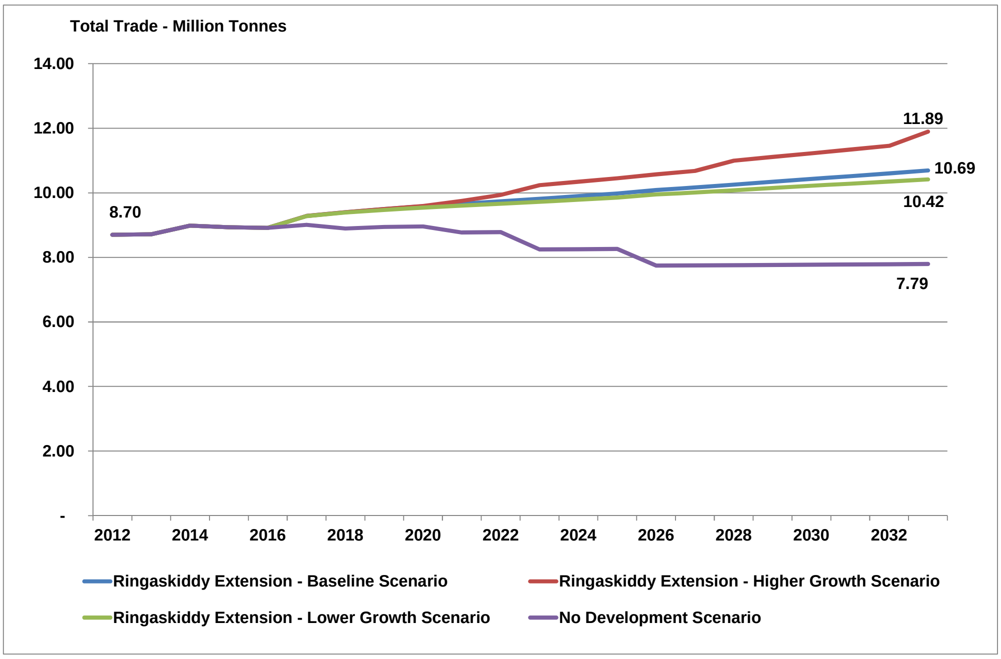
| | | 2012 | 2013 | 2017 | 2021 | 2025 | 2029 | 2033 |
|---|---|---|---|---|---|---|---|---|
| | | Actual | Projections | Projections | Projections | Projections | Projections | Projections |
| Lo-Lo | TEU | 166,225 | 168,732 | 187,340 | 180,000 | 120,000 | 60,000 | 60,000 |
| Lo-Lo | Units | 96,723 | 98,181 | 109,009 | 104,738 | 69,825 | 34,912 | 34,912 |
| Ro-Ro | FUs | 831 | 800 | 10,850 | 10,850 | 10,853 | 10,857 | 10,858 |
| passengers | Units | 70,397 | 75,000 | 80,000 | 80,000 | 80,000 | 80,000 | 80,000 |
| cars/caravans | Units | 21,131 | 21,000 | 21,000 | 21,000 | 21,000 | 21,000 | 21,000 |
| Trade Cars | Units | 28,150 | 25,000 | 50,000 | 55,406 | 61,158 | 67,507 | 74,515 |
| Liquid Bulk | Tonnes | 5,200,128 | 5,245,000 | 5,367,774 | 5,381,374 | 5,395,846 | 5,411,821 | 5,429,453 |
| Solid (Dry) Bulk | Tonnes | 1,722,494 | 1,632,000 | 1,430,220 | 1,385,887 | 1,396,208 | 1,418,658 | 1,419,924 |
| Break Bulk | Tonnes | 220,346 | 250,000 | 298,163 | 153,000 | 143,000 | 143,000 | 143,000 |
| Other Cargo | Tonnes | 12 | 10,000 | 20,000 | 20,000 | 30,000 | 30,000 | 30,000 |
| Total excluding Unitised | Tonnes | 7,142,980 | 7,137,000 | 7,116,157 | 6,940,261 | 6,965,054 | 7,003,479 | 7,022,377 |
| Unitised | Tonnes | 1,560,357 | 1,578,065 | 1,891,059 | 1,832,519 | 1,296,379 | 761,145 | 771,668 |
| Total Trade | Tonnes | 8,703,337 | 8,715,065 | 9,007,216 | 8,772,781 | 8,261,433 | 7,764,624 | 7,794,045 |

Source: Port of Cork Analysis
* Under this scenario national economic (GDP) growth is assumed to average 2.5% per annum over the projection period.

Failure to implement the proposed Ringaskiddy extension would mean that the Port of Cork would have to continue to rely on existing capacity at Tivoli and Ringaskiddy, and this would not allow the port to respond to wider market developments, including the ongoing trend towards larger vessels. Importantly, under this scenario, it is assumed that the port would lose some large customers from around 2020-2023 onwards, as the port's inability to handle larger vessels would mean that these ships would have to be served at other, more distant ports such as Dublin. These developments inform a projection under this scenario whereby overall trade handled by the Port of Cork would fall gradually over time, from 8.7 million tonnes in 2012 to 7.8 million tonnes by 2033, with steeper declines assumed from 2020 onwards, as capacity limits start to impact. LoLo trades under the 'No Development' scenario are expected to fall substantially, from 166,225 TEUs in 2012 to about 60,000 TEUs by the end of the next decade. This would imply that Port of Cork's share of national LoLo traffic would decline from 22.7% in 2012 to less than 5% by 2033.

The figure overleaf provides a graphical depiction of the Port of Cork's scenarios for projected levels of trade out to 2033.

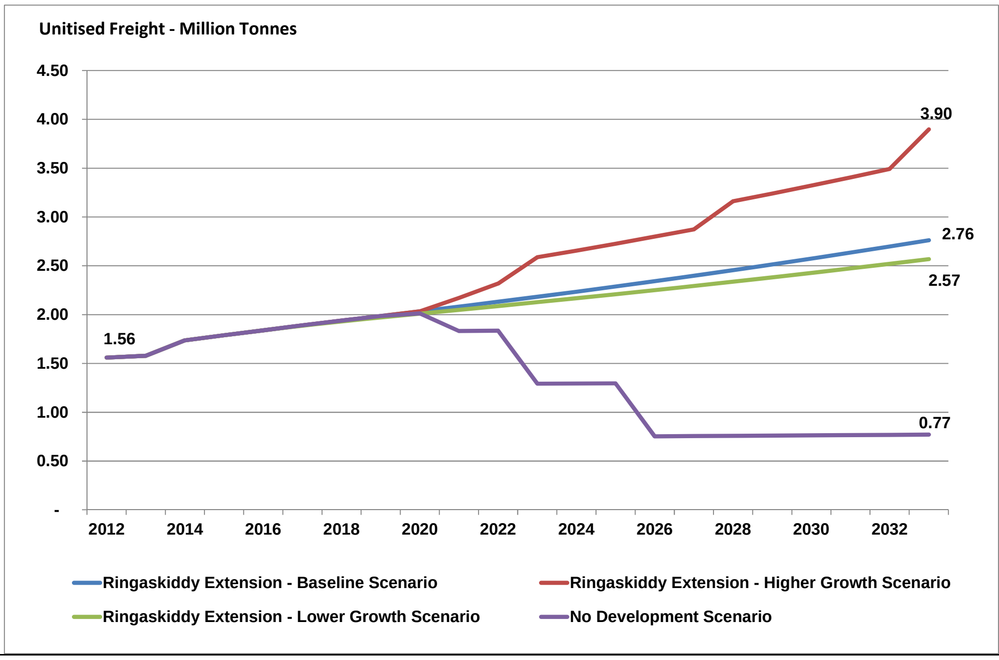
**Figure 3.6: Scenarios for Trade Handled at Port of Cork (Million Tonnes) – All Trades**




Source: Indecon analysis based on Port of Cork Trade Projections

The variation in trade levels implied by each scenario in respect of unitized (LoLo and RoRo) trades is highlighted in the figure below. LoLo in particular is the key component for Ringaskiddy Port.

**Figure 3.7: Scenarios for Trade Handled at Port of Cork (Million Tonnes) – Unitised Freight**



Source: Indecon analysis based on Port of Cork Trade Projections

The above graphical figures highlight in particular the gap that would open up over time between the levels of trade that the port would be in a position to handle if capacity constraints were addressed through the completion of the proposed Ringaskiddy extension, versus a scenario where the port attempts to continue at current levels of capability and capacity. This gap represents a substantial loss in trade and market share, with consequent implications for the commercial viability of the port, as well as regional and national economic competitiveness.

It is also important to note in the context of the current economic recovery that if national economic growth and external trade turn out higher than projected, these risks would be further increased.

In Section 4, we assess the positive economic impacts that would arise through development of the port. We also model the implications of failure to address the capacity requirements of the port through the proposed developments, in terms of the value of the loss in trade that would be projected to occur. We also consider the catalytic or indirect benefits of implementation of the proposed developments, in terms of how this would support the development of Cork Docklands.

# 4 ASSESSMENT OF ECONOMIC IMPACTS OF PORT DEVELOPMENT

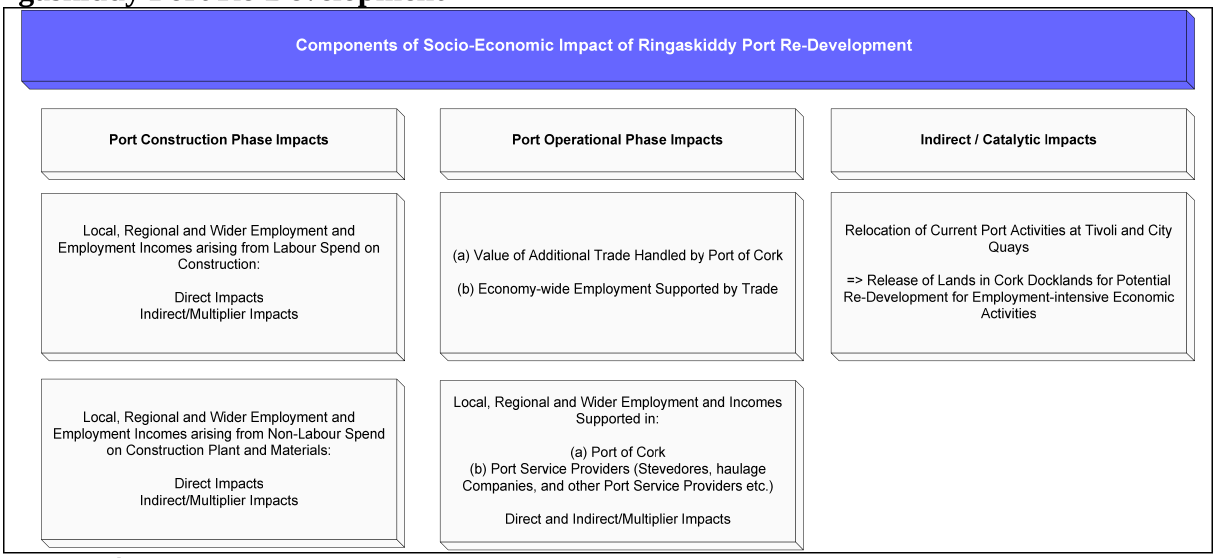
## 4.1 Introduction

This section assesses the socio-economic impacts of the proposed Ringaskiddy Port Re-Development, as well as the economic implications of failure to develop the port.

## 4.2 Assessment of Economic Impacts of Development of Port

Indecon has assessed the potential economic impacts that would unfold through the enhancement of Port of Cork's trading capacity if the proposed Ringaskiddy Port Re-Development is successfully completed. The schematic below identifies the key components of the socio-economic impact of the proposed developments. The potential overall impact includes impacts that would arise in the construction phase and in the operational phase of an expanded port. In addition to these impacts would be the indirect, catalytic impact emerging over time as the Port relocates its existing operations at Tivoli and City Quays to Ringaskiddy, thereby releasing current port lands in the Cork Docklands for potential re-development into employment-intensive economic activities.

**Figure 4.1: Overview of Components of Socio-Economic Impact of Proposed Ringaskiddy Port Re-Development**




Source: Indecon

### 4.2.1 Construction phase impacts

A summary of the main construction elements in the proposed development works at Ringaskiddy Port is presented in the table overleaf. These include a multi-purpose berth and container terminal at Ringaskiddy East, a potential Deep Water Berth extension at Ringaskiddy West, an amenity area at Paddy's Point, and various road improvements to facilitate access to/from the above developments.

**Table 4.1: Proposed Ringaskiddy Port Re-Development – Summary of Main Construction Elements**

| |
|---|
| ***Ringaskiddy East*** |
| *Multi-purpose Berth (MPB)* |
| • A new 314m quay wall and deck that will be capable of accommodating vessels carrying a range of different cargoes including containers, unaccompanied Roll On – Roll Off (RO-RO) freight and general cargoes |
| • Surfacing of existing port lands to provide hinterland storage |
| • Dredging of the seabed to a level of -13.0m Chart Datum |
| • Installation of linkspan comprising a floating pontoon and access bridge |
| *Container Terminal* |
| • A new 200m long berth |
| • Dredging of the seabed to a level of -13.0m Chart Datum |
| • Installation of container handling cranes and terminal transport equipment |
| • Relocation of the public slipway area, existing slipway to be retained for use by Port of Cork |
| • Car parking and administrative buildings |
| ***Amenity Area at Paddy's Point*** |
| • Construction of a new public slipway |
| • New planting and landscaping to provide new public amenity area |
| • New pedestrian circulation routes. |
| ***Ringaskiddy West - Deepwater Berth Extension*** |
| • A new 182m extension to the existing Deep Water Berth (DWB) which will comprise a filled quay structure extending no further seaward than the edge of the existing DWB (approx. 0.79 ha) |
| • Dredging works to varying levels to facilitate navigational access to the new facilities |
| ***Road Improvements*** |
| • Improvements to the external road entrance into the Ringaskiddy Deepwater Terminal and to Ringaskiddy West |
| • Incorporating these new improvements to provide alternative means of access to Ringaskiddy East |
| • Road improvement works within the existing harbour lands at Ringaskiddy East |
| • Improvements to internal road network at Ringaskiddy East to facilitate future access to the N28 |

Source: Port of Cork

### *Construction-phase expenditures and economic impacts*

The capital spending required to implement the above development works will give rise to economic impacts in the local, regional and national economies. These impacts will comprise:

- Employment and employment incomes arising from the labour spend component; and
- Indirect output, employment and incomes arising from non-labour spend on plant and materials.

The table overleaf describes the estimated levels of required capital expenditure to implement the above development works, including the estimated breakdown of expenditure into labour and non-labour (plant and equipment) components. Capital expenditures are examined in more detail later in Chapter 5.

**Table 4.2: Proposed Ringaskiddy Port Re-Development – Breakdown of Estimated Capital Costs**

| Cost Component | Est. Capital Costs - € Million | Of which: Estimated Labour Spend - € Million | Estimated Non-Labour Spend on Plant and Materials - € Million |
|---|---|---|---|
| | | | |
| Ringaskiddy East Developments - Total Phases 1, 2 and 3 | 88.7 | 29.6 | 59.1 |
| *Of which:* | | | |
| Phases 1 and 2 | 80.6 | 26.9 | 53.7 |
| Phase 3 (RoRo) | 8.1 | 2.7 | 5.4 |
| Ringaskiddy West (DWB Extension) | 13.2 | 4.4 | 8.8 |
| **Total Estimated Capital Costs - Ringaskiddy Developments** | **101.9** | **34.0** | **67.9** |

Source: Port of Cork

***Construction phase employment and incomes supported***

The capital spending required to implement the above development works will give rise to economic impacts in the local, regional and national economies. This will include direct construction-related employment and other employment arising from the labour spend component of overall capital investment. The table below presents Indecon's estimates of the direct and economy-wide (i.e., direct plus indirect) employment and employment incomes that would be supported as a result of the labour-related capital spending on the implementation of the proposed development works.

**Table 4.3: Economic Impact of Proposed Ringaskiddy Port Re-Development – Estimated Construction Phase Impacts on Employment and Employment Incomes**

| Proposed Development | Estimated Capital Expenditure - € Million | Estimated Labour Component of Capital Spend - €* | Estimated FTE Jobs per €1 Million of Construction Labour Spend | Implied Direct Construction Phase FTEs | Economy-wide FTEs (Direct + Indirect/ Multiplier Impacts) | Implied Economy-wide Employment Incomes Supported - € Million |
|---|---|---|---|---|---|---|
| Ringaskiddy East Phase 1, 2 and 3 | 88.7 | 29.6 | 25 FTEs | 739 | 1,282 | 51.2 |
| Ringaskiddy West (DWB Extension) | 13.2 | 4.4 | 25 FTEs | 110 | 191 | 7.6 |
| **Full Development Proposals (Ringaskiddy East + West)**** | **101.9** | **34.0** | **25 FTEs** | **849** | **1,473** | **58.8** |

Source: Analysis based on Port of Cork cost estimates and Indecon modelling
* Labour spend assumed to equate to one-third of overall capital spend.
** Full development proposals in this table includes Ringaskiddy East Phase 3 RoRo-related investment.

It is estimated that the construction of the Ringaskiddy East Phase 1 to 3 developments would support approximately 739 full-time equivalent jobs (FTEs) during the build-out phase. This would translate into an estimated 1,282 FTEs on an economy-wide basis when indirect/multiplier impacts are taken into account. This would be estimated to support €51.2 million in employment incomes on an economy-wide basis. If the Ringaskiddy West DWB Extension is added to this, the economy-wide impacts would be expected to increase to an estimated 1,473 FTEs and €58.8 million in employment incomes. The importance of this construction employment should not be underestimated in the context of the wider labour market and high levels of unemployment among construction sector professionals.

*Non-labour spend during construction phase*
In addition to the above impacts arising from the labour spend, additional impacts would arise from the non-labour component of overall construction phase capital spend. These additional impacts would be dependent on the precise nature of expenditure on plant and materials, including whether these construction inputs are imported or produced in Ireland. While detailed cost breakdowns and assumptions would be required to model these impacts, to the extent that elements of required plant, materials and non-labour services are produced in Ireland, this would be expected to support additional output and employment within local, regional and national supplier businesses.

### 4.2.2 Operational Phase Impacts

In addition to the impacts of the proposed developments on the volumes and value of trade handled by the port, and the employment supported at regional and national levels as a result of this trade, further economic impacts would arise directly and indirectly through expanded operational activity at the Port of Cork and within port service providers linked in with the port's activities. These impacts relate to the operational phase once the new facilities and associated capacity comes on-stream.

The precise implications for port operational employment and service provider activities is uncertain, as these will ultimately be shaped by the relationships between trade volumes and operational dimensions such as stevedoring, haulage and other port servicing requirements. In general, the trend towards greater unitisation of freight and technological developments in freight handling are implying a falling ratio between movements in volumes and movements in required labour and other servicing resources. Available full-year figures for 2012 suggest that overall between the Port of Cork and wider service providers linked in with the port's activities (stevedoring, haulage and other service providers, and excluding ferry and cruise activities) direct employment supported currently amounts to approximately 600 FTEs, while this rises to 838 FTEs when indirect/multiplier impacts are factored into the analysis. It is uncertain how this employment would rise over time as trading volumes expand under a developed/expanded Ringaskiddy Port. However, Indecon has developed some indicative scenarios for operational phase employment supported at the Port of Cork and in service providers, utilising the port's baseline development extension trade projection and alternative assumptions on the elasticity of employment relative to trade throughout/volumes. These estimates are presented in the table overleaf and suggest that direct employment supported could rise to between 785 and 815 FTEs, while economy-wide employment (including indirect/multiplier impacts) could increase to between 1,095 to 1,136 FTEs. The direct employment supported would be in the local and wider Cork areas.

**Table 4.4: Economic Impact of Proposed Ringaskiddy Port Re-Development – Scenarios for Port Operational Impacts on Employment**

| | Actual | Scenarios based on Baseline Extension Trade Projection and Alternative Elasticities w.r.t Trading Volumes | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.5 elasticity | | | | 0.8 elasticity | | | |
| | 2012 | 2018 | 2023 | 2028 | 2033 | 2018 | 2023 | 2028 | 2033 |
| Port Operational Employment Supported – Direct FTEs* | 601 | 648 | 692 | 737 | 785 | 676 | 718 | 764 | 815 |
| Employment Supported – Economy-wide FTEs | 838 | 904 | 964 | 1,028 | 1,095 | 943 | 1,001 | 1,066 | 1,136 |

Source: Analysis based on Port of Cork cost estimates and Indecon modelling
* Employment relates to Port of Cork operations and port service providers excluding ferry and cruise ship operators.

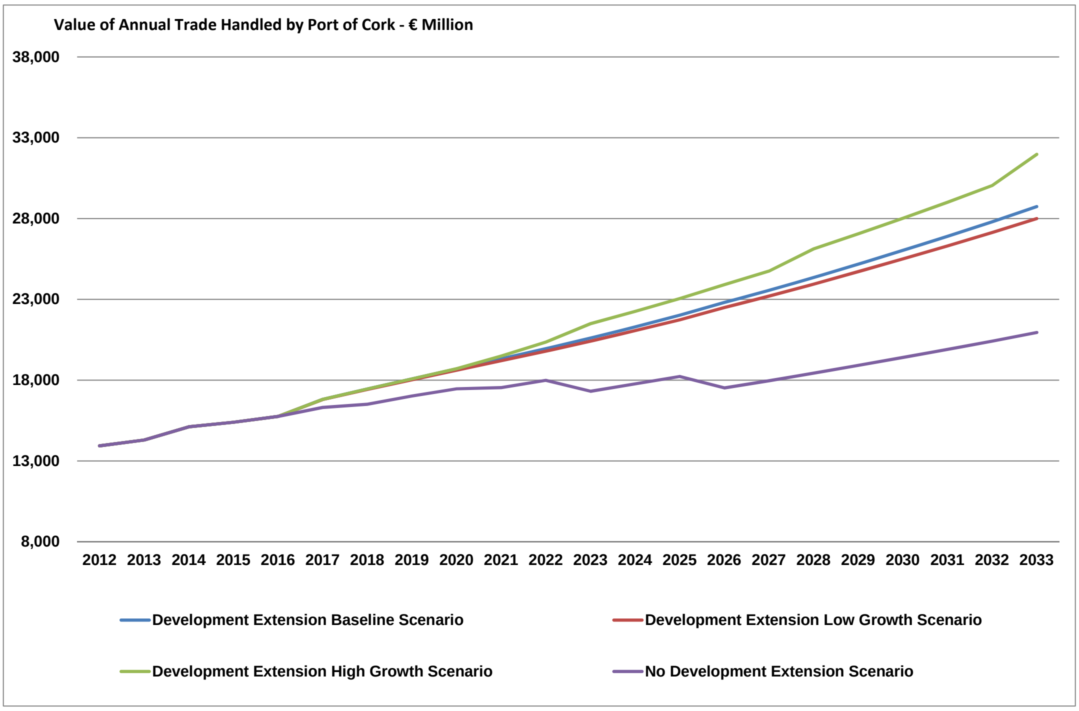
*External Trade Impacts*

While positive economic impacts would be expected to arise during the construction phase if the proposed developments are implemented, and these impacts would be important from a human impact and wider economic perspective at local, regional and national levels, the scale and duration of these impacts would be short-term in nature. From the perspective of longer-run, sustainable socio-economic impacts, the expected impacts arising from the implications for the external trade throughout of the Port of Cork would be considerable. Indecon has modelled the impacts of completion of the proposed developments in terms of how this investment would enhance port operational capacity and, in particular, the potential trading throughout of the Port of Cork.

The figure overleaf depicts Indecon's estimates for the evolution in the value of trade handled by Port of Cork based on comparison of the port's development scenarios with a base case, 'No Development' scenario. Under the baseline development extension scenario, where the proposed Ringaskiddy Port Re-Development is fully implemented, the overall value of trade handled by the Port of Cork is projected to expand to €28.7 billion per annum by 2033. By contrast, if the port fails to develop, the value of trade would increase at a much slower rate, and experience decline in some years.[17]

[17] These estimates for the projected value of trade assume that the average value of trade handled per tonne would increase by 2.5% per annum on average over the period to 2033. An alternative approach, whereby the average value per tonne is assumed to remain constant at 2012 levels, would see the value of trade reach an estimated €17.1 billion by 2033 under the Baseline Development Extension scenario but decline to €12.5 billion under the 'No Development' scenario (from a level of €13.9 billion in 2012).

**Figure 4.2: Scenarios for Value of Trade Handled by Port of Cork – Annual € Million**




Source: Port of Cork Trade Projections
* This assumes that the average value of trade handled by the port increases at an average rate of 2.5% per annum.

*Employment supported by trade*
The table below presents the outputs of Indecon's modelling of the estimated impact on the future value of trade handled by the Port of Cork and the level of economy-wide employment that would be supported by this trade, assuming the proposed Ringaskiddy developments are implemented. It is estimated that future expansion of the port could lead to an increase in employment supported by trade to over 254,000 FTEs by 2023 and to over 354,000 FTEs by 2033.

**Table 4.5: Economic Impact of Proposed Ringaskiddy Port Re-Development – Estimated Employment Supported by Future Trade Growth**

| | 2012 Actual | 2023 Estimate | 2033 Estimate |
|---|---|---|---|
| Estimated Employment Supported from Trade Handled by Port of Cork (Baseline Ringaskiddy Development Extension scenario) – Economy-wide FTEs | 171,787 | 254,089 | 354,256 |

Source: Indecon modelling
* This assumes that the average value of trade handled by the port increases at an average rate of 2.5% per annum.

### 4.2.3 Views of Multinationals on Importance of Development of Port

To complement the detailed modelling and analysis undertaken above, Indecon also completed extensive primary research among exporting multinationals and other companies/businesses located in Cork and the wider South West Region. We sought the views of firms on the following dimensions:

- The levels of importance attached to specific aspects of the role and future development of the Port of Cork;
- Whether the planned Ringaskiddy Port Re-Development would be likely to act as a key driver or catalyst for future economic growth and development of the Cork and Wider South West Regions; and
- The significance of potential implications arising from failure to address future capacity requirements of the Port of Cork through the development of Ringaskiddy Port. (We present the results on this aspect later in this section.)

The table below summarises the findings of Indecon's research in relation to the first item above, namely the levels of importance attached to specific aspects of the role and future development of the Port of Cork.

**Table 4.6: Views of Multinational and Indigenous Companies/Businesses Level of Importance Attached to the Role and Future Development of the Port of Cork**

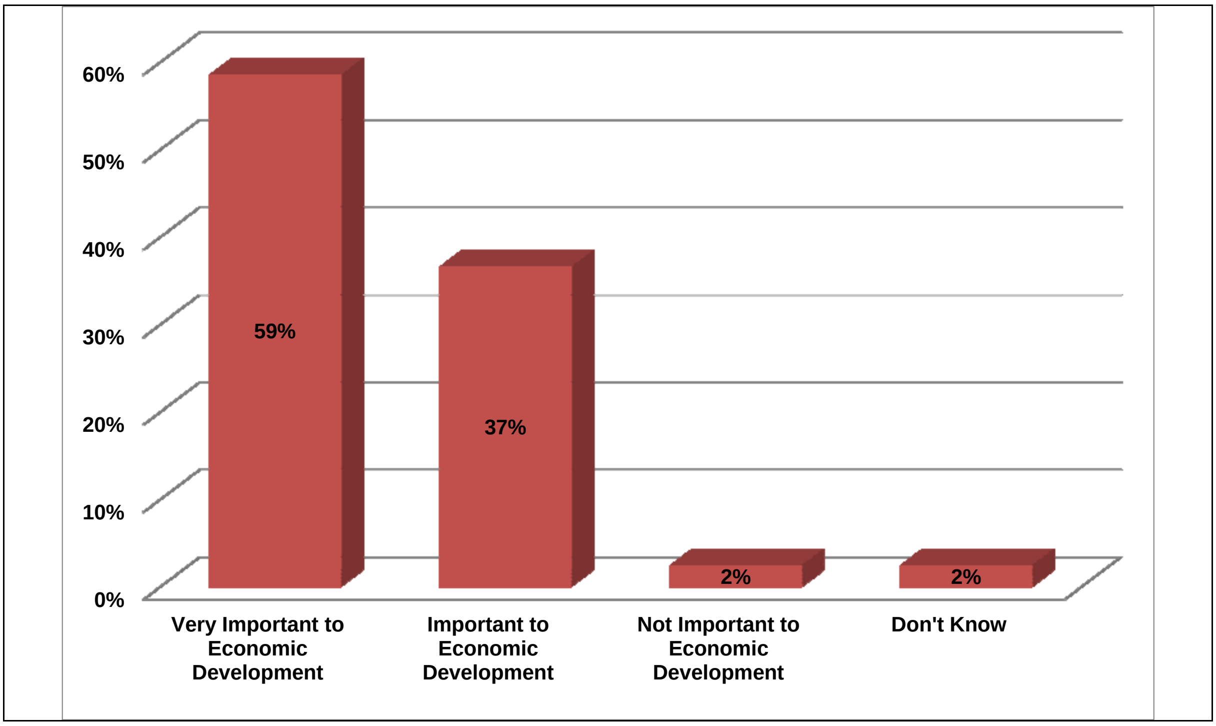
| | % of Responding Companies/Businesses | | |
|---|---|---|---|
| | **Very Important or Important** | **Neither Important Nor Unimportant** | **Not Important** |
| Contributing to National Economic Competitiveness | 98.8% | 1.2% | 0.0% |
| Ensuring the External Connectivity of Cork and the Wider South West Region | 97.5% | 2.5% | 0.0% |
| Facilitating Exporting from the Cork Region and Nationally | 97.5% | 2.5% | 0.0% |
| Boosting the Overall Economic Competitiveness of the Cork Region | 97.5% | 2.5% | 0.0% |
| Supporting the Attractiveness of the Cork and Wider South West Regions for Investment | 93.8% | 6.3% | 0.0% |
| Reducing the Environmental Impacts of Transporting Goods to/from the Cork Region | 87.7% | 12.3% | 0.0% |
| Facilitating the Development of the Ringaskiddy/Carrigaline Employment Zone | 83.8% | 16.3% | 0.0% |
| Facilitating Tourism in the Cork and South West Regions | 83.5% | 15.2% | 1.3% |

Source: Indecon Surveys of Multinational and Indigenous Exporting Companies/Businesses in Cork and South West Region and Port of Cork Service Providers

The above results indicate that exporting multinationals and other companies in the South West Region attached very high or high levels of importance to the role and future development of Port of Cork in terms of how this would contribute to regional as well as national competitiveness; ensuring the external connectivity of Cork and the wider South West Region; boosting the overall competitiveness of the Cork region; and supporting the ongoing attractiveness of the region for investment. Higher levels of importance were also attached to the role of the port in relation to facilitating the development of the Ringaskiddy/Carrigaline industry cluster and employment zone, and to facilitating tourism in the wider region.

The figure below summarises the results from Indecon's research in relation to multinationals and other companies overall views as to whether the proposed Ringaskiddy Port Re-Development would be likely to act as a key driver or catalyst for future economic growth and development of the Cork and wider South West Regions. It is notable that a very strong majority of firms are of the view that the planned development of Ringaskiddy Port would act as a key driver or catalyst for future economic growth and development in the region.

**Figure 4.3: Views of Multinational and Indigenous Companies/Businesses on Whether Planned Ringaskiddy Port Development would be Likely to Act as a Key Driver or Catalyst for Future Economic Growth and Development of the Cork and Wider South West Regions**




Source: Indecon Surveys of Multinational and Indigenous Exporting Companies/Businesses in Cork and South West Region and Port of Cork Service Providers

Given its role in relation to the attraction of foreign investment into Ireland, we also sought the views of IDA Ireland with regard to the importance of specific impacts of the Ringaskiddy Port Re-Development. The findings are summarised overleaf and highlight in particular the importance attached by the IDA to the development of the port in terms of ensuring the external connectivity of Cork and the wider South West Region; facilitating future export growth from the Cork region; boosting the overall economic competitiveness of the Cork City and wider South West Region; and facilitating the re-development and employment potential of the Cork Docklands.

**Table 4.7: Views of IDA Ireland on Importance Specific Impacts of Ringaskiddy Port Re-Development**

| | Very Important Impact of Port Development | Important Impact of Port Development | Not Important / No Impact |
|---|---|---|---|
| Ensuring the External Connectivity of Cork and the Wider South West Region | ✓ | | |
| Facilitating Future Export Growth from the Cork Region | ✓ | | |
| Boosting the Overall Economic Competitiveness of the Cork City and Wider South West Region | ✓ | | |
| Facilitating the Re-Development and Employment Potential of the Cork Docklands | ✓ | | |
| Facilitating Further FDI in the Ringaskiddy/Carrigaline Employment Zone | | ✓ | |
| Supporting the Overall Commercial Attractiveness of the Cork City and Wider South West Region for Foreign Investment | | ✓ | |
| Boosting the Overall Employment Potential of the Cork City Region | | ✓ | |

Source: Indecon consultation with IDA Ireland

## 4.3 Economic Implications of Failure to Develop

While it is important to assess the positive impacts of the planned Ringaskiddy Port Re-Development, it is also critical to highlight the costs associated with failure to develop the port. To assess the potential costs of failure to develop Indecon undertook modelling on the loss in value of trade handled by the port under a 'No Development' scenario relative to what would be likely to occur if the proposed Ringaskiddy Port Re-Development is completed. In addition, we also sought the views of multinationals and other businesses on this important aspect. We consider these dimensions below.

### 4.3.1 Loss of trade under 'no development' scenario

If the Port of Cork fails to respond to the wider port sector developments and, in particular, the ongoing trend towards larger container vessels, this would place it at an operational and competitive disadvantage relative to larger ports such as Dublin. Under this scenario, the Port of Cork would start to lose trade and larger unitised freight customers from around 2022 onwards and over-capacity trade would have to be handled at other, more distant ports. The gap between the volumes of trade throughput that are estimated to unfold under the development scenarios compared with the 'No Development' scenario represents the loss in trade that would occur. This loss would increase over time.

The table below presents Indecon's estimates of the overall present value of future loss in the value of trade handled by Port of Cork once reached capacity and additional over-capacity trade must be handled at other ports. It is estimated that the overall value of this loss in trade from Port of Cork could total between €21.1 billion and €28.4 billion in present value terms over the period to 2033, depending on the scenario applied.

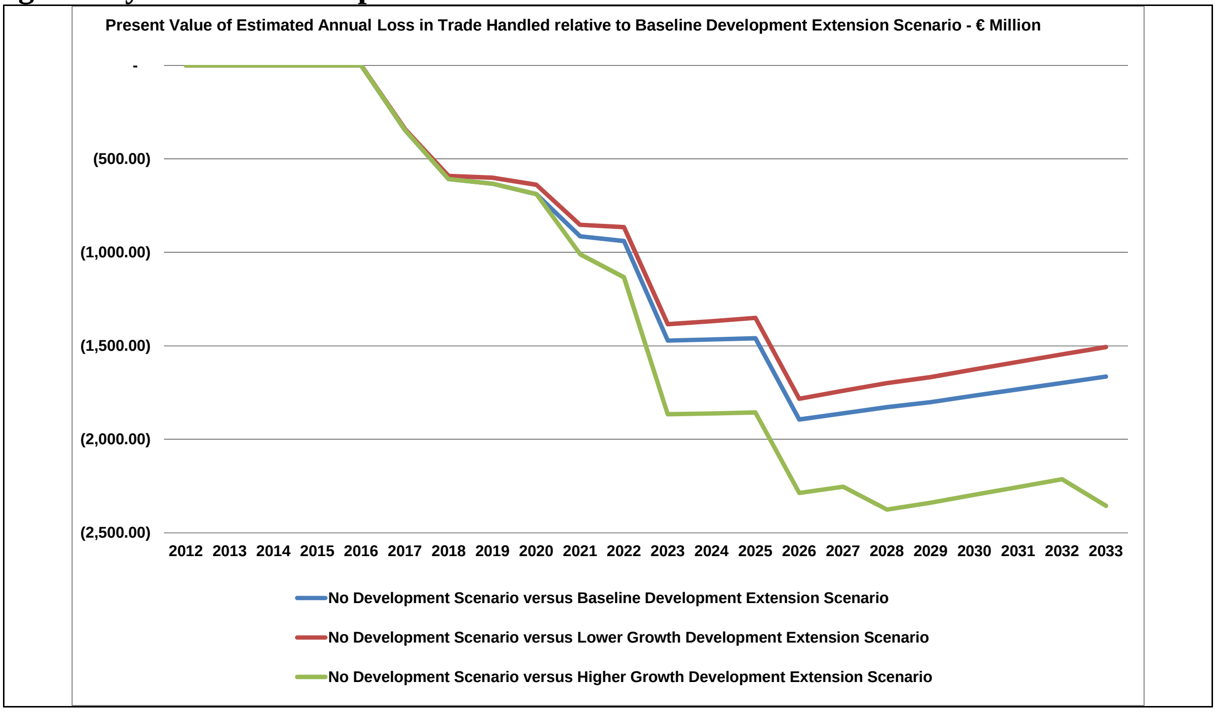
**Table 4.8: Estimated Scenario Projections of Present Value Loss of Trade at Port of Cork**

| | Present Value of Future Loss of Trade Relative to 'No Development' Scenario over period to 2033 - € Millions* |
|---|---|
| No Development vs Baseline Development Extension Scenario | -22,768 |
| No Development vs Lower Growth Development Extension Scenario | -21,143 |
| No Development vs Higher Growth Development Extension Scenario | -28,374 |

Source: Indecon Analysis
* Scenarios estimate value of loss in 2012 price terms and assume constant average value of trade over time. A discount rate of 5% per annum is used based on Department of Public Expenditure and Reform guidance.

The figure below presents a graphical depiction of the estimated loss in the value of trade handled by the port in annual present value terms over the period to 2033.

**Figure 4.4: Estimated Present Value of Projected Loss of Trade in Absence of Ringaskiddy Port Re-Development***




Source: Indecon modelling
* Scenarios estimate value of loss in 2012 price terms and assume constant average value of trade over time. A discount rate of 5% per annum is used based on Department of Public Expenditure and Reform guidance.

### 4.3.2 Views of multinationals and other businesses

The views of multinational and other companies located in the South West Region with regard to the potential implications arising from failure to address future capacity requirements of the Port of Cork through the development of Ringaskiddy Port are summarised in the table below.

**Table 4.9: Views of Multinational and Indigenous Companies/Businesses Significance of Potential Implications Arising From Failure to Address Future Capacity Requirements of the Port of Cork through the Development of Ringaskiddy Port**

| | % of Responding Companies/Businesses | | |
|---|---|---|---|
| | **Very Significant Impact or Significant Impact** | **Significant Nor Insignificant Impact** | **Insignificant Impact** |
| Result in Businesses having to Divert their Sea-based Trade to Alternative Ports | 92.8% | 7.2% | 0.0% |
| Result in a Loss of Economic Competitiveness in the Cork Region | 88.9% | 9.9% | 1.2% |
| Increase the Overall Costs of Transporting Goods to/from the Cork region | 87.8% | 12.2% | 0.0% |
| Undermine the Attractiveness of the Cork Region for Future Investment and Job Creation | 86.4% | 12.3% | 1.2% |
| Lead to Increased Environmental Costs associated with Transportation of Goods | 85.9% | 14.1% | 0.0% |
| Prevent Balanced Regional Development | 85.2% | 13.6% | 1.2% |
| Undermine the Potential for Re-Development of the Cork Docklands (through Re-Location of Port of Cork's Current Operations at City Quays and Tivoli) | 85.0% | 13.8% | 1.3% |
| Increase the Overall Costs of Transporting Goods to/from Ireland as a Whole | 81.7% | 15.9% | 2.4% |
| Undermine National Economic Competitiveness | 79.3% | 17.1% | 3.7% |
| Undermine Access to the Cork Region for Tourism/Ferry/Cruise Visitors | 78.0% | 20.7% | 1.2% |

Source: Indecon Surveys of Multinational and Indigenous Exporting Companies/Businesses in Cork and South West Region and Port of Cork Service Providers

Most notable among the findings from Indecon's research is that businesses believe the greatest repercussions would arise from failure to develop the port in terms of how this would result in businesses having to divert their sea-based trade to alternative ports; result in a loss of economic competitiveness in the Cork region; increase the overall costs of transporting goods to/from the Cork region; undermine the attractiveness of the Cork region for future investment and job creation; lead to increased environmental costs associated with transportation of goods; and undermine the potential for re-development of the Cork Docklands (through re-location of port of cork's current operations at City Quays and Tivoli); as well as increase the overall costs of transporting goods to/from Ireland as a whole.

# 5 COST-BENEFIT ANALYSIS

## 5.1 Introduction

This section presents Indecon's formal Cost-Benefit Appraisal of the socio-economic impacts of the proposed Ringaskiddy Port Re-Development. The objective of this appraisal is to assess whether the proposed developments would deliver a net economic return to the Irish economy.

## 5.2 Appraisal Methodology

The overall approach applied to this appraisal was to quantify the benefits and the costs of proceeding with the proposed Ringaskiddy Port Re-Development relative to a 'No Development' reference scenario. This was informed by projections developed by the Port of Cork for trade throughput at the port assuming (a) full implementation of the proposed capacity-enhancing measures for the Ringaskiddy Port site, and (b) no development of Ringaskiddy and 'business as usual' on the basis of intensification of the port's existing facilities and capacity.

It is important to emphasise that the appraisal estimates the net economic return that would arise on the proposed level of capital investment <u>at the level of the national economy</u> (as opposed to from the perspective of the Port of Cork or the local/regional economy). Overall, the methodology and assumptions applied are consistent with the national (Department of Expenditure and Reform and Department of Transport, Tourism and Sport) and EU (European Commission) guidance in this area, which indicates that appraisals of investments in national infrastructure on this scale and involving public or EU funding should be undertaken from the perspective of the economy as a whole.

## 5.3 Assessment of Benefits

*Context and rationale*

The context and rationale for the assessment of benefits in this appraisal relate to the wider developments in port trade nationally and internationally, and how the Port of Cork responds to these developments. In particular, the recent evolution of commercial sea freight is such that, in addition to a longer-term trend towards unitised freight, the average size and tonnage of freight vessels have experienced substantial growth, and the consensus is that this trend will continue as the industry seeks to benefit from economies of scale. This is likely to mean that the market for smaller vessels will decrease, while that for larger vessels will continue to expand. In this environment, while smaller 'feeder' vessels will continue to visit ports such as Port of Cork, cost advantages will mean that shipping companies will have a preference to migrate towards larger vessels over time. The primary implication is that if the Port of Cork fails to respond to these external port sector and economic trends by ensuring that it has the appropriate scale and configuration of capacity – particularly for unitised trades – it is likely that the port will be unable to handle vessels much beyond current sizes. Because of these technological and economic developments in shipping, the Port of Cork would face the real prospect of becoming uncompetitive for shipping companies who use the southern and eastern shipping corridors. As noted above, this would mean that additional trade beyond capacity levels would have to be handed at other, more distant ports. Given the predominance of Dublin in the key LoLo sector, the strong likelihood would be that over-capacity trade would be diverted and handled via Dublin, although smaller quantities of some trades may also be handled at Waterford and Shannon Foynes.

*Benefits*

Under a 'No Development' scenario involving diverted over-capacity trade, additional socio-economic costs would arise across the Irish economy associated with the internal haulage and other costs of moving this trade. The majority of this trade would otherwise have an origin-destination catchment in the Cork and Munster areas. These internal freight transport/connectivity costs would include additional journey times and vehicle costs, costs associated with increased traffic congestion along national primary routes and associated environmental/emissions costs. These effectively represent costs that could be avoided if the Port of Cork is positioned to respond to market developments by ensuring it has the appropriate scale and configuration of capacity in place, as would be envisaged under the proposed Ringaskiddy Port Re-Development. Thus, a key benefit of proceeding with the project is the avoidance of costs that would otherwise arise if over-capacity trade has to be diverted to more distant ports. A summary description of these benefits or avoided costs is provided in the table below.

**Table 5.1: Cost-Benefit Appraisal of Ringaskiddy Port Development - Summary Description of Internal Freight Transport/Connectivity-related Benefits of Port Development**

| Benefit Component |
|---|
| Avoided/Reduced Journey Time and Vehicle Operating Costs associated with Diversion of Over-capacity Trade to More Distant Ports |
| Avoided/Reduced Traffic Congestion-related Costs associated with Diversion of Over-capacity Trade to More Distant Ports |
| Avoided/Reduced Environmental Emissions-related Costs associated with Transporting of Over-capacity Trade to More Distant Ports |

Source: Indecon

*Trade diversion estimates*

The table below presents Indecon's modelling assumptions in relation the estimated volumes of over-capacity trade that would be diverted to other ports under a 'No Development' scenario compared to if Ringaskiddy Port is developed, and the destination ports for this trade.

**Table 5.2: Cost-Benefit Appraisal of Ringaskiddy Port Development - Estimated Annual Quantum of Over-Capacity Trade Diverted to Other Ports under No Development Scenario**

| Mode of Trade | Units and Assumed %s Diverted | Diversion Port | Estimated Over-Capacity Trade Diverted to Other Ports - Annual by Year | | | |
|---|---|---|---|---|---|---|
| | | | 2018 | 2022 | 2027 | 2033 |
| Lo-Lo | TEU | | 0 | 53,231 | 210,379 | 262,846 |
| | Units | | 0 | 26,615 | 105,189 | 131,423 |
| | 90% | => To Dublin | 0 | 23,954 | 94,670 | 118,281 |
| | 10% | => To Waterford | 0 | 2,662 | 10,519 | 13,142 |
| | 0% | => To Shannon Foynes | 0 | 0 | 0 | 0 |
| | | | | | | |
| Solid (Dry) | Tonnes | | 380,362 | 519,388 | 621,426 | 768,398 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Bulk | 80% | => To Shannon Foynes | 304,289 | 415,510 | 497,141 | 614,719 |
| | 10% | => To Dublin | 38,036 | 51,939 | 62,143 | 76,840 |
| | 10% | => To Waterford | 38,036 | 51,939 | 62,143 | 76,840 |
| | | | | | | |
| Break Bulk | Tonnes | | 129,000 | 148,395 | 183,949 | 194,000 |
| | 50% | => To Shannon Foynes | 64,500 | 74,197 | 91,974 | 97,000 |
| | 50% | => To Waterford | 64,500 | 74,197 | 91,974 | 97,000 |

Source: Indecon analysis based on Port of Cork trade projection scenarios and discussions with Port.

## 5.4 Assessment of Costs

The costs of the proposed Ringaskiddy Port Re-Development in the appraisal are summarised in the table below. These include the capital costs of constructing and operationalising the proposed developments, in addition to the journey time, vehicle operating costs and emissions associated with additional road network traffic that would result from the expanded port development.

**Table 5.3: Cost-Benefit Appraisal of Ringaskiddy Port Development - Summary Description of Costs of Development**

| Cost Component |
|---|
| Capital Costs of Ringaskiddy Port Re-Development |
| Journey times, vehicle operating costs and emissions along Port of Cork access corridor that would result from an expanded port development at Ringaskiddy |

Source: Indecon

A breakdown of the estimated capital costs required to implement the proposed Ringaskiddy Port Re-Development is presented in the table below.

**Table 5.4: Cost-Benefit Appraisal of Ringaskiddy Port Re-Development - Breakdown of Estimated Capital Costs**

| Cost Component | Est. Capital Costs - €* |
|---|---|
| | |
| Ringaskiddy East Developments -Total Phases 1, 2 and 3 | 88,700,000 |
| *Of which:* | |
| Phases 1 and 2 (Infrastructure, Plant, Roads, Berth Dredging, and Relocation of Existing Amenities**) | 80,600,000 |
| Phase 3 (RoRo) (depending on market demand) | 8,100,000 |
| | |
| Ringaskiddy West (DWB Extension) | 13,200,000 |
| **Total Estimated Capital Costs - Ringaskiddy Developments** | **101,900,000** |
| | |
| Assumed Exchequer or EU Funding Component of Phase 1 and 2 developments | 15,000,000 |
| Assumed Exchequer or EU Funding Component of Phase 3 and Ringaskiddy West developments | 20% |

Source: Indecon and Port of Cork
Notes: * Capital cost figures represent preliminary based on initial estimates prepared for Port of Cork.
** Includes roads for container terminal only. Does not include for future eastern road connection to N28.

While subject to considerable uncertainty at this juncture, it is assumed for the purposes of modelling that the Exchequer or EU funding component of capital investment would amount to €15 million in the case of Phases 1 and 2, and to 20% of Phase 3 and Ringaskiddy West developments. Department of Public Expenditure and Reform guidance on the shadow price of public funds and the discount rate was applied to this appraisal. An appraisal period of 25 years was used, in line with EU Commission guidance on port and similar infrastructure.

## 5.5 Cost-Benefit Modelling and Results

### 5.5.1 Modelling parameters and assumptions

A number of parameters and associated assumptions input to the cost-benefit appraisal, which are set out in this section. The first table below indicates the overall appraisal parameters, including the appraisal period, the opening year of the proposed expanded Ringaskiddy Port, the discount rate applied to derive present values associated with various cost and benefit streams that occur over the appraisal period, and the shadow price of public funds (which is a technical adjustment required to reflect the deadweight cost of taxation arising from any public or EU funding component of the overall capital investment costs associated with the proposed developments). Importantly, the levels assumed for the appraisal period, the discount rate and the shadow price of public funds parameters are consistent with Department of Public Expenditure and Reform Public Spending Code guidance, in addition to European Commission guidelines on cost-benefit analysis for port and similar major infrastructure investments.

**Table 5.5: Cost-Benefit Appraisal of Ringaskiddy Port Development - Appraisal Parameters**

| Parameter | Value Applied |
|---|---|
| | |
| Appraisal Period | 25 Years (2013-2038) |
| Development Assumed Opening Year (Year 1 of Operations) | 2018 (assumed Design Year) |
| Discount Rate (Real) | 5% |
| Shadow Price of Public Funds | 130% |

Source: Indecon, Department of Public Expenditure and Reform and European Commission (DG Regio) guidelines

A number of detailed modelling assumptions are required to derive the estimated benefits of the proposed port developments in relation to the avoidance of costs related to diversion of trade if the port does not develop, as discussed above. These assumptions vehicle operating and journey time costs and environmental emissions costs associated with the additional overland haulage required to handle trade at other, more distant ports. The technical assumptions applied in relation to key factors influencing vehicle operating costs are summarised in the table overleaf.

**Table 5.6: Cost-Benefit Appraisal of Ringaskiddy Port Development – Assumptions Informing Estimated Trade Diversion-related Costs – Vehicle Operating Cost Parameters**

| Parameter | Assumption | | | |
|---|---|---|---|---|
| *HGV-Trade Conversion Rates* | | | | |
| HGV = | 2 | * LoLo Units | | |
| HGV = | 0.098 | * Tonnage | | |
| | | | | |
| *Vehicle Types* | | | | |
| Petrol cars | 66% | | | |
| Diesel cars | 34% | | | |
| Cars | 85% | | | |
| HGV | 15% | | | |
| Petrol vehicles | 56% | | | |
| Diesel vehicles | 44% | | | |
| | | | | |
| *Fuel Consumption* | | | | |
| Vehicle Type | Fuel consumption (litres per 100 km) | | | |
| Car | 5.70 | | | |
| LGV | 8.00 | | | |
| HGV | 23.36 | | | |
| All vehicles | 8.53 | | | |
| | | | | |
| *Trade Diversion* | Distance (km) | Time (hr) | Fuel (l) | Speed (km/hr) |
| Mallow (average O-D) to: | | | | |
| Dublin Port | 257.00 | 3.05 | 60.04 | 84.26 |
| Waterford Port | 136.00 | 1.98 | 31.77 | 68.57 |
| Shannon Foynes Port | 92.00 | 1.43 | 21.49 | 64.19 |
| Fuel Consumption: Ringaskiddy - Dunkettle | 16.50 | | 1.41 | |
| | | | | |
| *Fuel Costs* | | | | |
| Fuel | Fuel Prices 2012 - Ex VAT | | | |
| Cost of petrol | 1.28 | | | |
| Cost of diesel | 1.20 | | | |
| | | | | |
| *Vehicle Operating Costs (non-Fuel) (Factor costs, 2009 Prices) cents/km* | | | | |
| Vehicle Category | Non-Fuel Parameters | | | |
| | a* | b* | | |
| Car | 6.39 | 36.78 | | |
| LGV | 11.41 | 65.60 | | |
| OGV1 | 10.62 | 417.43 | | |
| OGV2 | 20.67 | 804.63 | | |
| PSV | 48.20 | 1098.88 | | |
| * Cost = (a + b) / speed | | | | |

Sources:
HGV Conversion Rates: MVA Survey of HGVs using Port of Cork
Vehicle Types: Cartell (http://www.cartell.ie/2013/06/press-release-petrol-cars-in-position-for-comeback/)
Fuel Consumption: Vehicle type fuel consumption from WebTAG, based on vehicle speeds in the SATURN network (except for HGV, which uses speeds from the AA website for the trade diversion routes).
Distance, time and speed from DoT and NRA appraisal guidance national parameter values.
Fuel prices from AA.
Trade Diversion: Journey time and distance data from the AA Route planner.

The technical modelling assumptions governing the environmental emissions component of trade diversion-related transport costs are set out in the table overleaf. These assumptions have been informed by values from Department of Transport, Tourism and Sport and National Roads Authority national parameter values for project appraisal.

**Table 5.7: Cost-Benefit Appraisal of Ringaskiddy Port Development – Assumptions Informing Estimated Trade Diversion-related Costs – Vehicle Emissions Parameters**

| Carbon Cost Forecasts (Factor Prices) | |
|---|---|
| Year of Emission | Price per Tonne of Carbon - € |
| 2009 | 11.1 |
| 2010 | 11.7 |
| 2011 | 12.3 |
| 2012 | 13.1 |
| 2013 | 13.1 |
| 2014 | 15.1 |
| 2015 | 32.8 |
| 2016+ | Increase at 5% p.a. from 2016 |
| | |
| | Price per Tonne - € |
| $N_2O$ | 4,104 |
| $NO_x$ | 6,579 |
| VOC | 1,212 |
| $PM_{urban}$ | 799,443 |
| $PM_{rural}$ | 76,416 |
| | |

Sources: Emissions values from Department of Transport, Tourism and Sport and National Roads Authority national parameter values

### 5.5.2 Modelling results

*Estimated Benefits*

The table below describes the estimated present value in 2013 of avoided trade diversion costs, i.e., the journey time, vehicle operating, congestion and environmental emissions costs that would otherwise arise if over-capacity trade had to be diverted overland and handled at more distant ports if the Port of Cork does not proceed with the proposed Ringaskiddy Port Re-Development. It is estimated that if these developments are implemented and the Port of Cork is able to meet evolving capacity requirements, costs associated with trade diversion amounting to an estimated €541.3 million in present value terms over the period to 2038 could be avoided. Therefore, this represents a benefit of proceeding with the proposed Ringaskiddy Port Re-Development.

**Table 5.8: Cost-Benefit Appraisal of Ringaskiddy Port Development – Present Value of Estimated Annual Benefits (Avoided Trade Diversion Costs)**

| | Trade Diversion Costs - Costs Avoided/Reduced in Development Scenario vis-à-vis No Development Scenario | | | | | |
|---|---|---|---|---|---|---|
| | **Journey Time and Vehicle Operating Costs - €** | **Congestion Impacts - €** | **Environmental Emission Costs - €** | **Total Trade Diversion-related Costs Avoided - €** | **Total Benefits - €** | ***Present Value in 2013*** |
| 2018 | €6,101,862 | €621,967 | €393,010 | €7,116,838 | €7,116,838 | €5,576,229 |
| 2019 | €10,921,571 | €1,132,617 | €735,333 | €12,789,521 | €12,789,521 | €9,543,737 |
| 2020 | €15,741,280 | €1,643,267 | €1,077,657 | €18,462,203 | €18,462,203 | €13,120,743 |
| 2021 | €20,560,989 | €2,153,917 | €1,419,980 | €24,134,885 | €24,134,885 | €16,335,440 |
| 2022 | €25,380,698 | €2,664,567 | €1,762,303 | €29,807,567 | €29,807,567 | €19,214,224 |
| 2023 | €30,200,407 | €3,175,217 | €2,104,627 | €35,480,250 | €35,480,250 | €21,781,796 |
| 2024 | €35,020,116 | €3,685,867 | €2,446,950 | €41,152,932 | €41,152,932 | €24,061,267 |
| 2025 | €39,839,825 | €4,196,517 | €2,789,273 | €46,825,614 | €46,825,614 | €26,074,254 |
| 2026 | €44,659,533 | €4,707,167 | €3,131,597 | €52,498,297 | €52,498,297 | €27,840,968 |
| 2027 | €49,479,242 | €5,217,817 | €3,473,920 | €58,170,979 | €58,170,979 | €29,380,297 |
| 2028 | €54,298,951 | €5,728,467 | €3,816,243 | €63,843,661 | €63,843,661 | €30,709,893 |
| 2029 | €59,118,660 | €6,239,116 | €4,158,567 | €69,516,343 | €69,516,343 | €31,846,238 |
| 2030 | €63,938,369 | €6,749,766 | €4,500,890 | €75,189,026 | €75,189,026 | €32,804,723 |
| 2031 | €68,758,078 | €7,260,416 | €4,843,213 | €80,861,708 | €80,861,708 | €33,599,710 |
| 2032 | €73,577,787 | €7,771,066 | €5,185,537 | €86,534,390 | €86,534,390 | €34,244,597 |
| 2033 | €78,397,496 | €8,281,716 | €5,527,860 | €92,207,073 | €92,207,073 | €34,751,876 |
| 2034 | €78,397,496 | €8,281,716 | €5,527,860 | €92,207,073 | €92,207,073 | €33,097,025 |
| 2035 | €78,397,496 | €8,281,716 | €5,527,860 | €92,207,073 | €92,207,073 | €31,520,976 |
| 2036 | €78,397,496 | €8,281,716 | €5,527,860 | €92,207,073 | €92,207,073 | €30,019,977 |
| 2037 | €78,397,496 | €8,281,716 | €5,527,860 | €92,207,073 | €92,207,073 | €28,590,454 |
| 2038 | €78,397,496 | €8,281,716 | €5,527,860 | €92,207,073 | €92,207,073 | €27,229,004 |
| **Total** | | | | | | **€541,343,427** |

Source: Indecon and Systra modelling

*Estimated costs*

A breakdown of the present value of estimated costs associated with the proposed Ringaskiddy Port Re-Development is presented in the table below. Total costs, including capital costs and costs associated with additional network traffic along the Port of Cork access corridor resulting from an expanded port at Ringaskiddy, are estimated to amount to €222.4 million in present value terms over the appraisal period.

**Table 5.9: Cost-Benefit Appraisal of Ringaskiddy Port Development – Present Value of Estimated Annual Costs**

| | **Incremental Costs vis-à-vis No Development Scenario** | | | | | |
|---|---|---|---|---|---|---|
| | **Capital Costs - €** | **Capital Costs after Shadow Pricing - €** | **Additional Traffic/AADT Costs - €** | **Residual Value of Infrastruc-ture - €** | **Total Costs - €** | ***Present Value in 2013*** |
| 2013 | €0 | €0 | €0 | | €0 | €0 |
| 2014 | €0 | €0 | €0 | | €0 | €0 |
| 2015 | €0 | €0 | €0 | | €0 | €0 |
| 2016 | €26,866,667 | €28,366,667 | €0 | | €28,366,667 | €24,504,193 |
| 2017 | €26,866,667 | €28,366,667 | €0 | | €28,366,667 | €23,337,327 |
| 2018 | €26,866,667 | €28,366,667 | €11,435,821 | | €39,802,488 | €31,186,291 |
| 2019 | €0 | €0 | €11,700,924 | | €11,700,924 | €8,731,410 |
| 2020 | €0 | €0 | €11,966,027 | | €11,966,027 | €8,504,032 |
| 2021 | €0 | €0 | €12,231,130 | | €12,231,130 | €8,278,510 |
| 2022 | €0 | €0 | €12,496,233 | | €12,496,233 | €8,055,183 |
| 2023 | €21,300,000 | €22,578,000 | €12,761,336 | | €35,339,336 | €21,695,287 |
| 2024 | €0 | €0 | €13,026,439 | | €13,026,439 | €7,616,289 |
| 2025 | €0 | €0 | €13,291,542 | | €13,291,542 | €7,401,228 |
| 2026 | €0 | €0 | €13,556,645 | | €13,556,645 | €7,189,378 |
| 2027 | €0 | €0 | €13,821,748 | | €13,821,748 | €6,980,922 |
| 2028 | €0 | €0 | €14,086,851 | | €14,086,851 | €6,776,016 |
| 2029 | €0 | €0 | €14,351,954 | | €14,351,954 | €6,574,795 |
| 2030 | €0 | €0 | €14,617,057 | | €14,617,057 | €6,377,373 |
| 2031 | €0 | €0 | €14,882,160 | | €14,882,160 | €6,183,845 |
| 2032 | €0 | €0 | €15,147,263 | | €15,147,263 | €5,994,286 |
| 2033 | €0 | €0 | €15,412,365 | | €15,412,365 | €5,808,758 |
| 2034 | €0 | €0 | €15,412,365 | | €15,412,365 | €5,532,151 |
| 2035 | €0 | €0 | €15,412,365 | | €15,412,365 | €5,268,715 |
| 2036 | €0 | €0 | €15,412,365 | | €15,412,365 | €5,017,824 |
| 2037 | €0 | €0 | €15,412,365 | | €15,412,365 | €4,778,880 |
| 2038 | €0 | €0 | €15,412,365 | -€13,237,315 | €2,175,050 | €642,298 |
| **Total** | | | | | | **€222,434,993** |

Source: Indecon and Systra modelling

*Summary of overall results*

The table overleaf presents a summary of the overall findings of Indecon's Cost-Benefit Appraisal on the proposed Ringaskiddy Port Re-Development.

**Table 5.10: Cost-Benefit Appraisal of Ringaskiddy Port Development – Summary of Results**

| **Benefit/Cost Component** | **Present Value of Annual Benefits/Costs over period 2018-2038 @ 5% Discount Rate - €** |
|---|---|
| *Benefits (relative to 'Do Nothing' Scenario)* | |
| Trade Diversion Costs Avoided through Development of Port | €514,332,843 |
| | |
| *Costs (relative to 'Do Nothing' Scenario)* | |
| Capital costs of Proposed Ringaskiddy Developments | €83,928,479 |
| Costs associated with additional HGV traffic on local network | €142,415,530 |
| Residual Value of Infrastructure | -€3,909,016 |
| Total Costs | €222,434,993 |
| | |
| **Net Present Value** | **€291,897,850** |
| **Benefit-Cost Ratio (X : 1)** | **2.31** |

Source: Indecon and Systra modelling

Taking into account the benefits in the form of avoided costs of trade diversion and setting these against the incremental capital and traffic-related costs, Indecon estimates a net present value associated with proceeding with the proposed Ringaskiddy Port Re-Development of €291.9 million. This implies a Benefit-Cost Ratio (BCR) is 2.31 to 1, which represents not only a positive result, but also one that is rigorously based.

# 6 OVERALL CONCLUSIONS

This report prepared a detailed independent analysis and assessment of the socio-economic impacts of the proposed Ringaskiddy Port Re-Development. It also considered the economic costs that would arise from failure to develop the port. The key conclusions are summarised below.

**Context and Existing Economic Importance of Port of Cork**

The Port of Cork plays a key strategic role in the development of both the Cork City region and the wider Irish economy. The Port of Cork is the second largest multi-modal port in Ireland and the largest natural harbour Ireland, capable of handling all principal modes of port traffic.

As a small open economy, Ireland is critically dependent on external trade to support its development. Overall merchandise trade represents 85.9% of Irish economy GDP, while in the manufacturing sector exports represent over 87% of the value of output and almost 61% of raw material inputs used in the production of manufactured goods in Ireland. Access to export markets also constitutes an important driver of foreign investment in Ireland among multinational companies, which typically use Ireland as a base for production and sale into European and other international markets.

Sea-based trade represents the single largest category of Ireland's merchandise trade, accounting for 70% of the total volume of exports and imports of goods, and 41% of the value of goods trade to/from Ireland. This underscores the critical role played by the commercial seaports in serving the trading needs of the Irish economy.

The Port of Cork serves a catchment area which represents a large and strategically important part of the State's population and economic base. Almost 65% of the Port's customers are located in County Cork, while over 70% are in the South West Region and 92% are in Munster. The Port also serves a population catchment of over 664,000 persons in the South West Region and almost 1.25 million people in the Munster province, equivalent to over 27% of the population of the State as a whole. This has important implications in terms of the requirements for port capacity to serve this catchment area.

The Port of Cork delivers a substantial economic contribution/impact, both regionally and nationally, through its existing activities/operations. We estimated the value of trade throughput at the Port of Cork at €13.9 billion in 2012. We also estimated that this trade supports over 170,000 full-time equivalent jobs across regional and national economy. In addition, we estimated that the operation of the Port directly and indirectly supports almost 1,300 jobs through the activities of port service providers as well as the port company itself, and of tourism activities.

The implications of the Port of Cork for wider economic development relate to the need to ensure that the Port provides the capacity and external trade connectivity that the economy requires. This is especially important for the regional and national economies in Ireland, and is also relevant at a wider EU level in terms of how it contributes to the ongoing development of the Internal Market.

The importance of the Port of Cork for regional development is highlighted in the Cork Area Strategic Plan, which notes that the port can play a key role in terms of facilitating trade and therefore investment in foreign-owned and indigenous exporting companies, as well as supporting tourism in the region. In addition, the Government's National Ports Policy statement identifies the Port of Cork as a 'Tier 1 Port of National Significance' and the port has been proposed for designation as Core Network port under the EU TEN-T framework.

**Drivers for Port Development**

The key drivers of the rationale and need for the proposed Ringaskiddy Port Re-Development include the existing physical constraints in handling larger vessels and the changing nature of port activities, including the trend towards port-centred logistics. Addressing these needs would allow the Port of Cork to meet and secure its future development potential, and this would translate into significant quantified economic benefits for Cork and the surrounding region, as well as the national economy.

Of importance for the regional economies of Cork and Munster, and the commercial viability of the Port of Cork, concerns the port's ability to retain its overall share of the market in Ireland. This will require the port to respond to the developments that are taking place in shipping through ensuring sufficient capabilities and configuration of capacity.

Failure to adequately respond to port sector developments, however, would likely mean that the Port of Cork will lose competitiveness and market share to other ports, including Dublin. This will result in greater costs for the Irish economy, as well as undermining the commercial viability of the Port of Cork.

**Economic Impacts of Port Development**

The potential overall economic impact that would arise from successful expansion of the Port of Cork at Ringaskiddy includes the direct impacts that would arise in the construction phase and in the operational phase of an expanded port.

It is estimated that the construction of the Ringaskiddy East Phase 1 to 3 developments would support approximately 739 full-time equivalent jobs (FTEs) during the build-out phase. This would translate into an estimated 1,282 FTEs on an economy-wide basis when indirect/multiplier impacts are taken into account. This would be estimated to support €51.2 million in employment incomes on an economy-wide basis. If the Ringaskiddy West Deep Water Berth extension is added to this, the economy-wide impacts during the construction phase would be expected to increase to an estimated 1,473 FTEs and €58.8 million in employment incomes. The impact of construction phase employment should not be underestimated in the context of the wider labour market and high levels of unemployment among construction sector professionals.

During the operational phase of an expanded port at Ringaskiddy, additional ongoing economic impacts would arise. Indecon's modelling suggests that direct employment supported could rise to between 785 and 815 FTEs while economy-wide employment (including indirect/multiplier impacts) could increase to between 1,095 and 1,136 FTEs. The direct employment supported would include jobs in the local and wider Cork areas.

Of considerably greater importance from the perspective of longer-run, sustainable socio-economic impacts would be the expected impacts that would arise through the implications for the external trade throughout of the Port of Cork. Assuming the proposed Ringaskiddy developments are fully implemented, it is estimated that future expansion of the port would lead to an increase in employment supported by trade to over 254,000 FTEs by 2023 and to over 354,000 FTEs by 2033.

In addition to these direct impacts, an important indirect, catalytic impact would emerge over time as the Port relocates its existing operations at Tivoli and City Quays to Ringaskiddy, thereby releasing current port lands in the Cork Docklands for potential re-development into employment-intensive economic activities.

While it is important to assess the positive impacts of the planned Ringaskiddy Port Re-Development, it is also critical to highlight the costs associated with failure to develop the port. These costs would arise primarily in the form of a loss in the value of trade handled by Port of Cork once reached capacity and additional over-capacity trade must be handled at other ports. We estimated that the overall value of this loss in trade from Port of Cork could amount to up to €25.7 billion in present value terms over the period to 2033. While this does not represent a net loss in trade to the national economy (as the trade could still be handled at other ports), the additional transport and other costs associated with handling this trade at more distant ports would place the Cork region at a competitive disadvantage, and this would adversely impact on investment and overall economic development.
Indecon also undertook a formal Cost-Benefit Appraisal of the socio-economic impacts of the proposed Ringaskiddy Port Re-Development. The objective of this appraisal was to assess whether the proposed developments would deliver a net economic return to the Irish economy. The results of the rigorous appraisal suggested that proceeding with the proposed Ringaskiddy Port Re-Development would be likely to deliver a net economic return to the Irish economy. This is evidenced by an economic Benefit-Cost Ratio of 2.31 to 1 in favour of the project.

## Annex 1 ADDITIONAL TECHNICAL ANALYSIS

### Port of Cork Catchment Area

| Port of Cork Catchment - Analysis of Origin and Destination of Road Haulage Traffic to/from Port* | |
|---|---|
| **Arrivals from:** | **% of Total Trips** |
| County Cork | 64.7% |
| South West Region | 72.2% |
| South East Region | 9.8% |
| Munster | 93.0% |
| Other Locations | 7.0% |
| | |
| **Departures to:** | |
| County Cork | 64.5% |
| South West Region | 69.1% |
| South East Region | 9.7% |
| Munster | 90.8% |
| Other Locations | 9.2% |
| | |
| **All Trips to/from:** | |
| County Cork | 64.6% |
| South West Region | 70.8% |
| South East Region | 9.7% |
| Munster | 92.0% |
| Other Locations | 8.0% |

**Source: Indecon analysis of survey research undertaken by Systra**
* Analysis based on interviews with sample of road hauliers arriving into and departing from Tivoli and Ringaskiddy terminals

### Vessel size calling at Port of Cork Terminals

| Breakdown by Terminal at Port of Cork - Draft of Vessel (Meters) – 2007 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** |
| City Quays | 9.4 | 4.5 | 7.1 | 4.7 | 4.7 | 6.3 |
| Tivoli Container Terminal | 7.0 | 7.3 | 7.3 | 7.4 | 7.3 | 7.3 |
| Ringaskiddy DWB | 14.3 | 12.5 | 13.1 | 14.4 | 14.6 | 12.5 |
| **Source: Port of Cork Data** | | | | | | |

| Breakdown by Terminal at Port of Cork - Maximum Gross Tonnage - 2007 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** |
| City Quays | 9,965 | 6,030 | 6,219 | 6,142 | 5,599 | 5,599 |
| Tivoli Container Terminal | 9,962 | 9,981 | 9,990 | 8,273 | 8,273 | 8,273 |
| Tivoli Other | 9,693 | 11,591 | 21,010 | 21,010 | 11,591 | 11,591 |
| Ringaskiddy DWB | 52,485 | 52,485 | 52,485 | 52,485 | 52,485 | 52,485 |
| **Source: Port of Cork Data** | | | | | | |

| Breakdown by Terminal at Port of Cork - Draft of Vessel (Meters) with Max Gross Tonnage – 2007 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** |
| City Quays | 9.4 | 8.5 | 7.1 | 7.5 | 7.0 | 6.8 |
| Tivoli Container Terminal | 8.7 | 8.7 | 8.7 | 7.4 | 7.4 | 7.4 |
| Tivoli Other | 6.0 | 6.2 | 7.4 | 7.4 | 6.2 | 6.2 |
| Ringaskiddy DWB | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 |
| **Source: Port of Cork Data** | | | | | | |

| Arrivals and Gross Tonnage of Vessel (000 Tonnes) - All Vessel Size Classes - 2009 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | | 2011 | | 2012 | |
| | Arrivals | Gross Tonnage | Arrivals | Gross Tonnage | Arrivals | Gross Tonnage |
| All Irish ports | 13,311 | 230,276 | 12,059 | 223,795 | 11,810 | 224,983 |
| | | | | | | |
| Dublin | 7,434 | 148,652 | 6,767 | 137,448 | 6,624 | 140,394 |
| % of All Irish Ports | 55.8% | 64.6% | 56.1% | 61.4% | 56.1% | 62.4% |
| | | | | | | |
| **Cork** | **1,448** | **18,445** | **1,274** | **16,728** | **1,252** | **15,540** |
| **% of All Irish Ports** | **10.9%** | **8.0%** | **10.6%** | **7.5%** | **10.6%** | **6.9%** |
| | | | | | | |
| Shannon Foynes | 694 | 6,949 | 680 | 9,130 | 734 | 8,018 |
| % of All Irish Ports | 5.2% | 3.0% | 5.6% | 4.1% | 6.2% | 3.6% |
| **Source: Indecon analysis of CSO Data** | | | | | | |

| Arrivals and Gross Tonnage of Vessel (000 Tonnes) - Vessels 100 - 4,999 Tonnes - 2009 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | | 2011 | | 2012 | |
| | Arrivals | Gross Tonnage | Arrivals | Gross Tonnage | Arrivals | Gross Tonnage |
| All Irish ports | 3,665 | 10,682 | 2,959 | 8,376 | 2,881 | 8,221 |
| | | | | | | |
| Dublin | 876 | 2,670 | 821 | 2,526 | 771 | 2,477 |
| % of All Irish Ports | 23.9% | 25.0% | 27.7% | 30.2% | 26.8% | 30.1% |
| | | | | | | |
| **Cork** | **696** | **2,020** | **652** | **1,938** | **625** | **1,849** |
| **% of All Irish Ports** | **19.0%** | **18.9%** | **22.0%** | **23.1%** | **21.7%** | **22.5%** |
| | | | | | | |
| Shannon Foynes | 386 | 1,204 | 303 | 1,016 | 391 | 1,236 |
| % of All Irish Ports | 10.5% | 11.3% | 10.2% | 12.1% | 13.6% | 15.0% |
| **Source: Indecon analysis of CSO Data** | | | | | | |

| Arrivals and Gross Tonnage of Vessel (000 Tonnes) - Vessels 5,000 - 7,999 Tonnes - 2009 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | **2010** | | **2011** | | **2012** | |
| | **Arrivals** | **Gross Tonnage** | **Arrivals** | **Gross Tonnage** | **Arrivals** | **Gross Tonnage** |
| All Irish ports | 1,657 | 11,159 | 1,497 | 9,872 | 1,463 | 9,729 |
| | | | | | | |
| Dublin | 1,198 | 7,964 | 1,101 | 7,159 | 1,021 | 6,770 |
| % of All Irish Ports | 72.3% | 71.4% | 73.5% | 72.5% | 69.8% | 69.6% |
| | | | | | | |
| **Cork** | **278** | **2,040** | **162** | **1,152** | **192** | **1,311** |
| **% of All Irish Ports** | **16.8%** | **18.3%** | **10.8%** | **11.7%** | **13.1%** | **13.5%** |
| | | | | | | |
| Shannon Foynes | 91 | 568 | 97 | 604 | 104 | 632 |
| % of All Irish Ports | 5.5% | 5.1% | 6.5% | 6.1% | 7.1% | 6.5% |
| **Source: Indecon analysis of CSO Data** | | | | | | |

| Arrivals and Gross Tonnage of Vessel (000 Tonnes) - Vessels 8,000 - 19,999 Tonnes - 2009 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | **2010** | | **2011** | | **2012** | |
| | **Arrivals** | **Gross Tonnage** | **Arrivals** | **Gross Tonnage** | **Arrivals** | **Gross Tonnage** |
| All Irish ports | 3,597 | 53,337 | 2,901 | 38,892 | 2,803 | 40,568 |
| | | | | | | |
| Dublin | 2,420 | 33,344 | 2,304 | 30,925 | 2,290 | 33,706 |
| % of All Irish Ports | 67.3% | 62.5% | 79.4% | 79.5% | 81.7% | 83.1% |
| | | | | | | |
| **Cork** | **130** | **1,307** | **154** | **1,529** | **181** | **1,712** |
| **% of All Irish Ports** | **3.6%** | **2.5%** | **5.3%** | **3.9%** | **6.5%** | **4.2%** |
| | | | | | | |
| Shannon Foynes | 120 | 1,367 | 160 | 1,770 | 129 | 1,417 |
| % of All Irish Ports | 3.3% | 2.6% | 5.5% | 4.6% | 4.6% | 3.5% |
| **Source: Indecon analysis of CSO Data** | | | | | | |

| Arrivals and Gross Tonnage of Vessel (000 Tonnes) - Vessels 20,000 - 39,999 Tonnes - 2009 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | | 2011 | | 2012 | |
| | Arrivals | Gross Tonnage | Arrivals | Gross Tonnage | Arrivals | Gross Tonnage |
| All Irish ports | 2,757 | 75,443 | 3,046 | 84,460 | 2,979 | 84,057 |
| | | | | | | |
| Dublin | 1,485 | 35,268 | 1,080 | 26,770 | 1,071 | 27,212 |
| % of All Irish Ports | 53.9% | 46.7% | 35.5% | 31.7% | 36.0% | 32.4% |
| | | | | | | |
| **Cork** | **199** | **4,707** | **169** | **4,013** | **122** | **3,331** |
| **% of All Irish Ports** | **7.2%** | **6.2%** | **5.5%** | **4.8%** | **4.1%** | **4.0%** |
| | | | | | | |
| Shannon Foynes | 69 | 2,309 | 75 | 2,464 | 55 | 1,892 |
| % of All Irish Ports | 2.5% | 3.1% | 2.5% | 2.9% | 1.8% | 2.3% |
| **Source: Indecon analysis of CSO Data** | | | | | | |

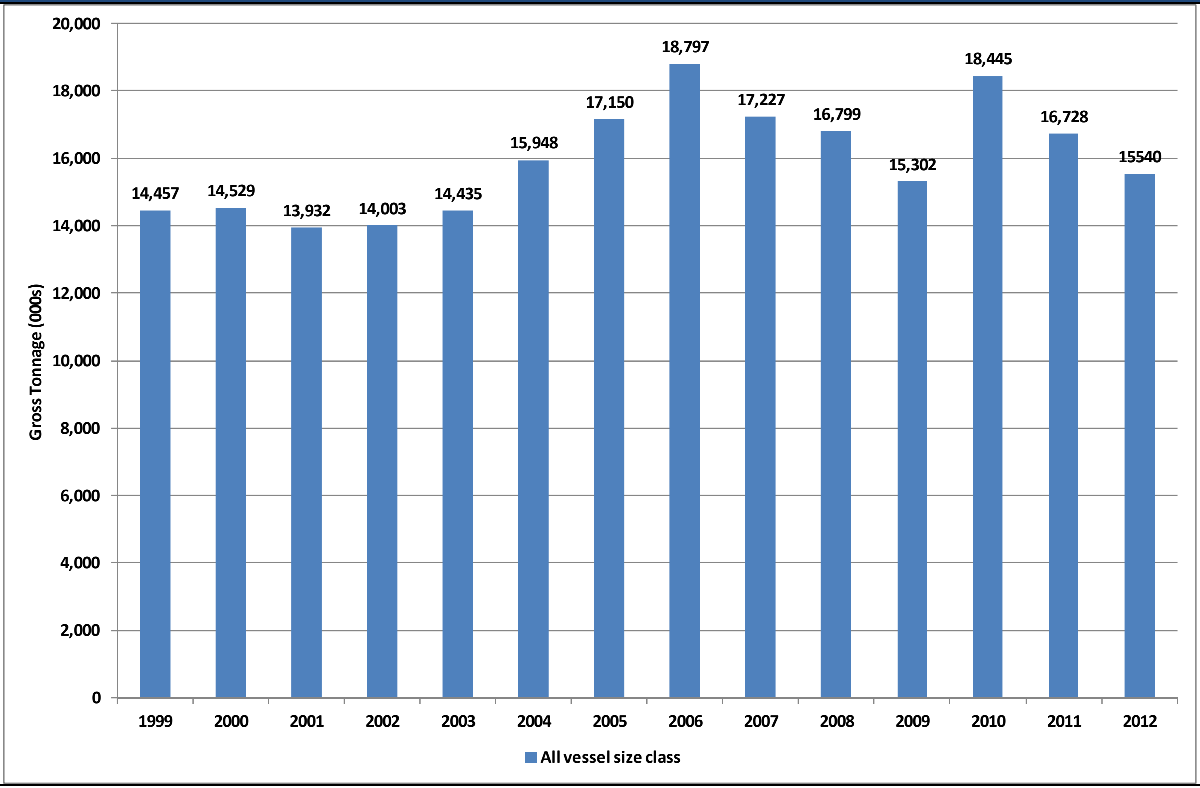
| Arrivals and Gross Tonnage of Vessel (000 Tonnes) - Vessels 40,000 - 79,999 Tonnes - 2009 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | | 2011 | | 2012 | |
| | Arrivals | Gross Tonnage | Arrivals | Gross Tonnage | Arrivals | Gross Tonnage |
| All Irish ports | 1,603 | 76,360 | 1,606 | 77,176 | 1,641 | 78,089 |
| | | | | | | |
| Dublin | 1,445 | 68,451 | 1,447 | 68,737 | 1,461 | 69,189 |
| % of All Irish Ports | 90.1% | 89.6% | 90.1% | 89.1% | 89.0% | 88.6% |
| | | | | | | |
| **Cork** | **130** | **6,659** | **120** | **6,241** | **121** | **6,168** |
| **% of All Irish Ports** | **8.1%** | **8.7%** | **7.5%** | **8.1%** | **7.4%** | **7.9%** |
| | | | | | | |
| Shannon Foynes | 21 | 871 | 28 | 1,544 | 45 | 1,937 |
| % of All Irish Ports | 1.3% | 1.1% | 1.7% | 2.0% | 2.7% | 2.5% |
| **Source: Indecon analysis of CSO Data** | | | | | | |

| Arrivals and Gross Tonnage of Vessel (000 Tonnes) - Vessels Greater Than or Equal to 80,000 Tonnes - 2009 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | **2010** | | **2011** | | **2012** | |
| | **Arrivals** | **Gross Tonnage** | **Arrivals** | **Gross Tonnage** | **Arrivals** | **Gross Tonnage** |
| All Irish ports | 32 | 3,296 | 50 | 5,018 | 43 | 4,319 |
| | | | | | | |
| Dublin | 10 | 955 | 14 | 1,331 | 10 | 1,041 |
| % of All Irish Ports | 31.3% | 29.0% | 28.0% | 26.5% | 23.3% | 24.1% |
| | | | | | | |
| **Cork** | **15** | **1,712** | **17** | **1,855** | **11** | **1,170** |
| **% of All Irish Ports** | **46.9%** | **51.9%** | **34.0%** | **37.0%** | **25.6%** | **27.1%** |
| | | | | | | |
| Bantry Bay | - | - | 1 | 81 | 12 | 1,204 |
| % of All Irish Ports | - | - | 2.0% | 1.6% | 27.9% | 27.9% |
| | | | | | | |
| Shannon Foynes | 7 | 629 | 17 | 1,731 | 10 | 905 |
| % of All Irish Ports | 21.9% | 19.1% | 34.0% | 34.5% | 23.3% | 21.0% |
| **Source: Indecon analysis of CSO Data** | | | | | | |

| Number of Vessel Arrivals at Port of Cork by Vessel Size – 2010 – 2012 | | | | | | |
|---|---|---|---|---|---|---|
| **Port of Cork** | **Number of Arri-vals - 2010** | **% of Arri-vals** | **Number of Arri-vals - 2011** | **% of Arri-vals** | **Number of Arri-vals - 2012** | **% of Arri-vals** |
| All Vessel Size Class | 1,448 | 100% | 1,274 | 100% | 1,252 | 100% |
| 100 - 4,999 Tonnes | 696 | 48.1% | 652 | 51.2% | 625 | 49.9% |
| 5,000 - 7,999 Tonnes | 278 | 19.2% | 162 | 12.7% | 192 | 15.3% |
| 8,000 - 19,999 Tonnes | 130 | 9.0% | 154 | 12.1% | 181 | 14.5% |
| 20,000 - 39,999 Tonnes | 199 | 13.7% | 169 | 13.3% | 122 | 9.7% |
| 40,000 - 79,999 Tonnes | 130 | 9.0% | 120 | 9.4% | 121 | 9.7% |
| >=80,000 Tonnes | 15 | 1.0% | 17 | 1.3% | 11 | 0.9% |
| **Source: CSO Maritime Data** | | | | | | |

| Arrivals at Port of Cork by Vessel Size (Gross Tonnage and % of All Irish Ports) – 2010 - 2012 | | | | | | |
|---|---|---|---|---|---|---|
| **Port of Cork** | **Gross Tonnage of Arrivals - 2010** | **% of All Irish Ports** | **Gross Tonnage of Arrivals - 2011** | **% of All Irish Ports** | **Gross Tonnage of Arrivals - 2012** | **% of All Irish Ports** |
| All Vessel Size Class | 18,445 | 8.0% | 16,728 | 7.5% | 15,540 | 6.9% |
| 100 - 4,999 Tonnes | 2,020 | 18.9% | 1,938 | 23.1% | 1,849 | 22.5% |
| 5,000 - 7,999 Tonnes | 2,040 | 18.3% | 1,152 | 11.7% | 1,311 | 13.5% |
| 8,000 - 19,999 Tonnes | 1,307 | 2.5% | 1,529 | 3.9% | 1,712 | 4.2% |
| 20,000 - 39,999 Tonnes | 4,707 | 6.2% | 4,013 | 4.8% | 3,331 | 4.0% |
| 40,000 - 79,999 Tonnes | 6,659 | 8.7% | 6,241 | 8.1% | 6,168 | 7.9% |
| >=80,000 Tonnes | 1,712 | 51.9% | 1,855 | 37.0% | 1,170 | 27.1% |
| **Source: CSO Maritime Data** | | | | | | |

**Overview of Gross Tonnage at Port of Cork - 1999 - 2012**



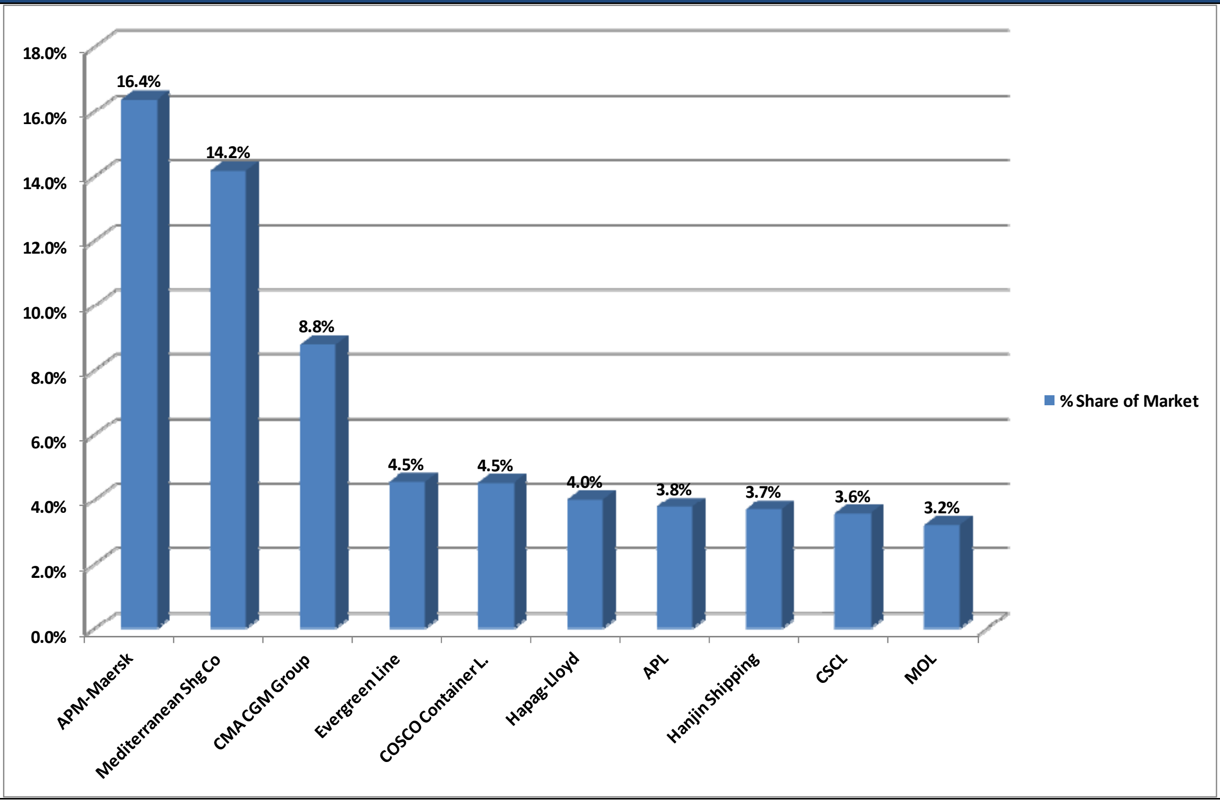

**Source: CSO Data**

| Age Distribution of World Merchant Fleet by Vessel Size - Percentage of Total Ships and Dead Weight Tonnes | | | | | |
|---|---|---|---|---|---|
| **World** | **0 - 4 Years** | **5 - 9 Years** | **10 - 14 Years** | **15 - 19 Years** | **20 Years +** |
| **Bulk Carriers** | 33.7% | 14.3% | 11.3% | 12.4% | 28.2% |
| **Dead Weight Tonnes** | 41.5% | 16.6% | 11.3% | 13.1% | 17.6% |
| **Average Vessel Size (dwt)** | 78,098 | 73,344 | 63,300 | 66,520 | 39,569 |
| | | | | | |
| **Container Ships** | 23.8% | 27.9% | 18.3% | 17.4% | 12.6% |
| **Dead Weight Tonnes** | 32.8% | 31.0% | 16.6% | 12.0% | 7.5% |
| **Average Vessel Size (dwt)** | 54,465 | 43,915 | 35,837 | 27,267 | 23,718 |
| | | | | | |
| **General Cargo** | 11.5% | 10.7% | 8.2% | 11.2% | 58.4% |
| **Dead Weight Tonnes** | 21.4% | 13.7% | 11.8% | 10.2% | 42.8% |
| **Average Vessel Size (dwt)** | 9,698 | 6,670 | 7,451 | 4,723 | 3,795 |
| | | | | | |
| **Oil Tankers** | 24.7% | 21.2% | 11.0% | 10.5% | 32.6% |
| **Dead Weight Tonnes** | 34.7% | 29.0% | 18.4% | 9.4% | 8.5% |
| **Average Vessel Size (dwt)** | 63,483 | 61,884 | 75,896 | 40,588 | 11,756 |
| | | | | | |
| **Other Types** | 10.6% | 9.7% | 9.2% | 8.4% | 62.0% |
| **Dead Weight Tonnes** | 27.2% | 18.3% | 10.7% | 7.7% | 36.1% |
| **Average Vessel Size (dwt)** | 4,417 | 3,240 | 1,992 | 1,580 | 1,006 |
| | | | | | |
| **All Ships** | 15.1% | 12.5% | 9.9% | 10.0% | 52.6% |
| **Dead Weight Tonnes** | 35.8% | 22.5% | 14.3% | 11.2% | 16.2% |
| **Average Vessel Size (dwt)** | 34,827 | 26,518 | 21,378 | 16,431 | 4,543 |
| **Source: UNCTAD Review of Maritime Transport 2012** | | | | | |

| Number of Vessels and Gross Tonnage of Vessels in the EU27 - 2005 - 2011 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | % Change - 2005 - 2011 |
| Number of Vessels | 1,951,022 | 2,010,720 | 2,046,661 | 2,017,846 | 1,928,806 | 2,014,025 | 2,019,653 | 3.5% |
| Gross Tonnage ('000s) | 12,230,678 | 12,746,355 | 13,526,040 | 13,697,996 | 13,837,498 | 14,392,551 | 14,818,674 | 21.2% |
| Average Size of Vessel | 6,269 | 6,339 | 6,609 | 6,788 | 7,174 | 7,146 | 7,337 | 17.0% |
| Source: Eurostat Maritime Data | | | | | | | | |
| Notes: Figures exclude France | | | | | | | | |

## Wider Port Sector Trends

**Top 10 Containership Operators by TEU - 2012**




**Source: IMDO Irish Maritime Transport Economist 2013**

## Scenarios for Trade Throughput at Port of Cork

| Summary of Traffic Projections for Port of Cork – Ringaskiddy Development Extension Low Growth Scenario | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 2012 | 2013 | 2017 | 2021 | 2025 | 2029 | 2033 |
| | | Actual | Projections | Projections | Projections | Projections | Projections | Projections |
| Lo-Lo | TEU | 166,225 | 168,732 | 186,975 | 203,980 | 220,794 | 238,995 | 258,695 |
| Lo-Lo | Units | 96,723 | 50,648 | 56,124 | 61,228 | 66,275 | 71,738 | 77,652 |
| Ro-Ro | FUs | 831 | 800 | 10,850 | 10,850 | 10,853 | 10,857 | 10,858 |
| Passengers | Units | 70,397 | 75,000 | 80,000 | 80,000 | 80,000 | 80,000 | 80,000 |
| Cars/Caravans | Units | 21,131 | 21,000 | 21,000 | 21,000 | 21,000 | 21,000 | 21,000 |
| Trade Cars | Units | 28,150 | 25,000 | 50,000 | 54,547 | 59,044 | 63,911 | 69,179 |
| Liquid Bulk | Tonnes | 5,200,128 | 5,245,000 | 5,367,529 | 5,378,945 | 5,390,237 | 5,402,460 | 5,415,691 |
| Solid (Dry) Bulk | Tonnes | 1,722,494 | 1,632,000 | 1,704,769 | 1,859,396 | 1,926,571 | 2,001,954 | 2,065,033 |
| Break Bulk | Tonnes | 220,346 | 250,000 | 297,849 | 292,477 | 296,942 | 337,000 | 337,000 |
| Other Cargo | Tonnes | 12 | 10,000 | 20,000 | 20,000 | 30,000 | 30,000 | 30,000 |
| Total excluding Uni-tised | Tonnes | 7,142,980 | 7,137,000 | 7,390,147 | 7,550,818 | 7,643,750 | 7,771,414 | 7,847,724 |
| Unitised | Tonnes | 1,560,357 | 1,578,065 | 1,887,746 | 2,048,966 | 2,208,418 | 2,381,021 | 2,567,818 |
| Total Trade | Tonnes | 8,703,337 | 8,715,065 | 9,277,893 | 9,599,784 | 9,852,168 | 10,152,436 | 10,415,542 |
| Source: Port of Cork Analysis | | | | | | | | |

| Summary of Traffic Projections for Port of Cork – Ringaskiddy Development Extension High Growth Scenario | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 2012 | 2013 | 2017 | 2021 | 2025 | 2029 | 2033 |
| | | Actual | Projections | Projections | Projections | Projections | Projections | Projections |
| Lo-Lo | TEU | 166,225 | 168,732 | 187,340 | 217,270 | 254,858 | 286,845 | 322,846 |
| Lo-Lo | Units | 96,723 | 50,648 | 56,233 | 65,217 | 76,500 | 86,101 | 96,908 |
| Ro-Ro | FUs | 831 | 800 | 10,850 | 10,850 | 30,000 | 50,000 | 80,000 |
| Passengers | Units | 70,397 | 75,000 | 80,000 | 80,000 | 100,000 | 125,000 | 150,000 |
| Cars/Caravans | Units | 21,131 | 21,000 | 21,000 | 21,000 | 30,000 | 35,000 | 40,000 |
| Trade Cars | Units | 28,150 | 25,000 | 50,000 | 55,541 | 62,512 | 70,358 | 79,189 |
| Liquid Bulk | Tonnes | 5,200,128 | 5,245,000 | 5,367,774 | 5,381,714 | 5,399,252 | 5,418,992 | 5,441,209 |
| Solid (Dry) Bulk | Tonnes | 1,722,494 | 1,632,000 | 1,705,220 | 1,882,879 | 1,984,862 | 2,087,620 | 2,188,322 |
| Break Bulk | Tonnes | 220,346 | 250,000 | 298,163 | 296,024 | 308,493 | 337,000 | 337,000 |
| Other Cargo | Tonnes | 12 | 10,000 | 20,000 | 20,000 | 30,000 | 30,000 | 30,000 |
| Total excluding Unitised | Tonnes | 7,142,980 | 7,137,000 | 7,391,157 | 7,580,617 | 7,722,606 | 7,873,612 | 7,996,531 |
| Unitised | Tonnes | 1,560,357 | 1,578,065 | 1,891,059 | 2,171,136 | 2,725,876 | 3,240,086 | 3,898,226 |
| Total Trade | Tonnes | 8,703,337 | 8,715,065 | 9,282,216 | 9,751,753 | 10,448,483 | 11,113,698 | 11,894,757 |
| Source: Port of Cork Analysis | | | | | | | | |

**Supplementary Survey Findings**

| Indecon Confidential Survey of Businesses in Cork Region re Development of Port of Cork – Export Activity | |
|---|---|
| **Companies/businesses engaged in Exporting** | **% of Respondents** |
| | |
| Yes | 73.2% |
| No | 26.8% |
| | |
| **Total** | **100%** |
| | |
| **Source: Indecon Confidential Survey of Businesses in Cork Region re Development of Port of Cork** | |

# APPENDIX 2.2 PORT OF CORK RAIL CONNECTION REPORT

# Port of Cork Rail Connection

## Draft Final Report

# Booz & Co were asked to assess the case for rail freight to/from the Port of Cork to inform both its planning and Government policy

**Brief**

- The overall aim of the assessment was to establish under what circumstances, if any, a rail connection to the Port of Cork would be feasible. Specifically, the objectives of the study were to:
  - Establish which of the port's existing market segments or individual customers could be served by rail, and under what scenarios
  - Taking a long term view, establish if there are new (existing or future) markets which could be attracted to rail, and under what scenarios
  - Establish the benefit that would accrue from these markets being served by rail
  - Set out options for serving the Ringaskiddy and Marino Point container terminal sites by rail
  - Set out the impact of the rail options on the wider rail network (infrastructure, rolling stock, operations, etc.)
  - Establish the life cycle costs of the rail transport options, including costs incurred elsewhere on the rail network
  - Complete a cost/benefit analysis for the scheme

**Approach**

- Bottom-up assessment:
  - A set of conditions were developed which would contribute to a rail freight operation being feasible
  - Individual freight flows were examined to assess their suitability towards rail freight
  - Supply side factors were examined to determine what infrastructure gaps exist and their impact on a case for rail freight
- Top-down assessment:
  - A "best possible" demand scenario and three infrastructure options were devised to test feasibility
  - Socio-economic analysis was used to determine feasibility of each option
  - Interviews and site visits were conducted to strengthen confidence in findings

# "Business as usual" would not support a rail link, so we developed a Best Possible Scenario involving a Distribution Centre

**Existing Rail Freight Baseline**

- Rail freight in Ireland is negligible, it has been in decline for some time and now serves only niche markets
- Nationally there is a lack of rail freight facilities and none of the port's customers are connected to the railway
- The Loop Line at Kent Station would need to be retained if the Cork suburban line were to be used by freight
- Using existing wagons, 9 ft 6 in containers cannot pass through the Cork Rail tunnel but this can be overcome with new rolling stock
- By comparison with rail, the road haulage industry itself is highly competitive: there is a large supply of trucks mainly owner-operated. Road and traffic conditions regionally are reasonably good
- While distance need not be a limiting factor, lengths of haul to and from the Port of Cork are generally on the low side for rail freight operations
- Customers are dispersed. Individual businesses generally do not generate sufficient volumes to form full trainloads
- In summary, many factors can contribute to the attractiveness of cargoes being moved by rail, but the current situation in Cork is unpromising.

**Our hypothesis for a "Best Possible Scenario"**

- A Distribution Centre concept was developed as the Best Possible Scenario to overcome market and infrastructure difficulties
- Containers for export would be taken from the customer by road to a Distribution Centre where they would be assembled into full train loads to be taken to the port by rail. Imported containers would travel from the port to the Distribution Centre by rail and onward from there by road. This overcomes the lack of customer railheads and relatively small volumes generated by individual customers
- The Distribution Centre would be located in the Mallow area (no site identified) as most of the Port's customers are located to the North and North West of the catchment
- Over time, there would be a socio-economic benefit in removing trucks from the road between the container terminal (whether it were located at Ringaskiddy or Marino Point) and the Distribution Centre

# None of the options we developed for Marino Point or Ringaskiddy proved to be feasible under expected circumstances

| | |
|---|---|
| **Marino Point** | ▪ Option1: build a rail terminal at Marino Point and connect to Cork - Cobh Line. Operate a shuttle service between it and a Distribution Centre in the Mallow area<br>▪ Loop Line at Kent Station must be retained<br>▪ Capital Cost c. €25 million (excluding rolling stock)<br>▪ Leasing of new rolling stock means that height clearance for 9ft 6inch containers is not a problem at rail tunnel<br>▪ Investment also needed in additional operations and maintenance staff<br>▪ Cost / benefit ratio: 60% over 30 years under our central estimate.<br>▪ The Marino Option is not feasible under expected circumstances |
| **Ringaskiddy Options** | ▪ Option 2: build a rail terminal at Ringaskiddy and a new link between it and the Cork - Cobh Line, requiring some 10km of new railway and a major bridge over the West Passage<br>    ▪ Operate a shuttle service between Ringaskiddy and a Distribution Centre in the Mallow area<br>    ▪ Capital Cost €500m +/- 50%<br>    ▪ Cost / benefit ratio: 10% over 30 years under central estimate<br>▪ Option 3: build a rail terminal at Ringaskiddy and a new link between it and the Cork - Dublin Line, requiring some 30km of new railway<br>    ▪ Operate a shuttle between Ringaskiddy and a Distribution Centre in the Mallow Area<br>    ▪ Capital cost €250m +/- 50%<br>    ▪ Cost/benefit ratio: 20% over 30 years under the central estimate<br>▪ For both options, investment is also needed in rolling stock and additional operations and maintenance staff<br>▪ The Ringaskiddy options are not feasible under any reasonable circumstances due to high cost |

# The case for the Marino Point - Distribution Centre option is not robust but there are circumstances where it may be worthwhile

**Prerequisites for a rail connection to Marino Point**

- The Kent Station Loop Line must be retained or an alternative provided when site developed. Discussions with Iarnród Éireann indicated that this would not be a problem as there is no longer a plan to remove it
- The potential line from Marino Point must then be mothballed until one of two viable scenarios for rail freight materialises:
- Scenario A:
  - Niche customer(s) emerge along the lines of Lisheen Mines, with sufficient scale to warrant a rail service to and from the Port, and the provision of infrastructure at either end of the route
- Scenario B:
  - The scale of growth of the Port occurs broadly in line with the forecasts made for the Oysterbank Proposal
  - An inland port operation is established with a distribution centre and rail shuttle, run by a commercial logistics provider and subsidised by government
  - Rail competes better against road, for example, with increased congestion, so that is a reasonable proposition for the distribution centre to handle at least 25% of all the port's containers.
  - Government meets capital and operating expenditure funding gaps

**Stakeholder Engagement**

- The findings of the study were discussed with the main stakeholders, including Iarnród Éireann, Cork City Council, Cork County Council and Department of Transport's Maritime Transport, Public Transport, Sustainability and Freight & Logistics Divisions
- The stakeholders accepted the findings of the study and recognised the need for regional, county and local planning policies to support the Port's strategic development plan

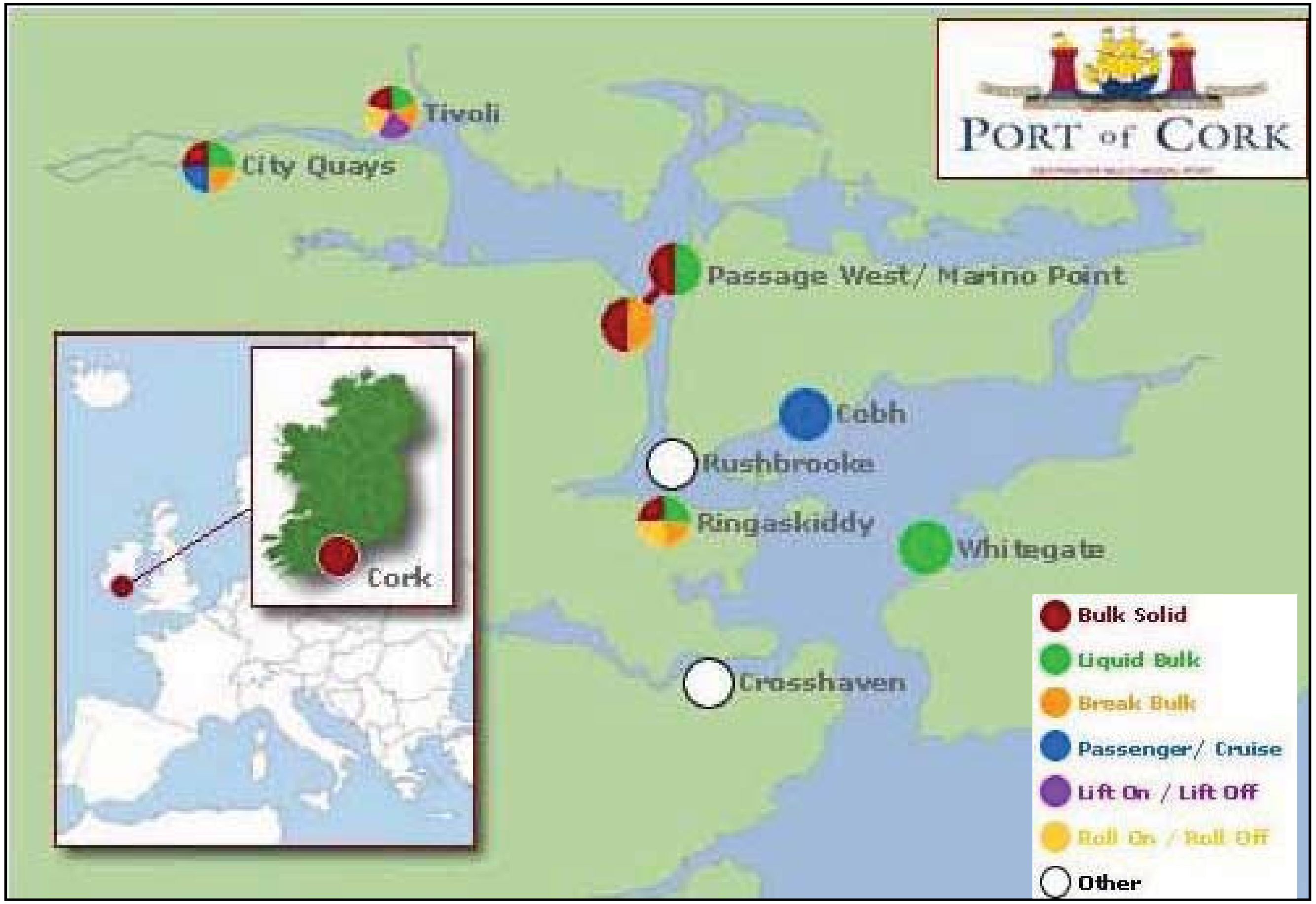
# For optimal future sustainability, local and regional policies need to support the Port's future development

**Conclusions**

- The Kent Station Loop Line must be retained or an alternative provided when site developed. Discussions with Iarnród Éireann indicated that this would not be a problem as there is no longer a plan to remove it. The City Council are aware of this and recognise it will be taken into account in plans to redevelop the station to turn to face the river
- If the Port is not allowed to develop its container handling capability, it will become increasingly uncompetitive. More goods will be taken to and from the Port of Cork's catchment via other ports. The result will be longer truck trips than at present with a subsequent increase in negative impacts
- Having a competitive regional port will therefore provide for a sustainable future for the region. It follows that the port should relocate to the site which best meets its business needs, providing the best competitive advantage
- This study shows that there is no socio-economic case for a rail operation to the Port of Cork under expected circumstances. Even at the Marino Point site, which is close to the railway, there is no robust case for a rail operation for transporting containers. The circumstances under which the railway opportunity might be taken up are unlikely
- Given these findings, whether or not the site for a future container terminal is near to a railway should not be given undue weighting in decision making. It would be undesirable and ultimately unsustainable to encourage the port to select a railway-oriented site if it does not make business, operations, economic or environmental sense and if the limitations of that site constrained the port's potential competitive advantage
- The Regional Planning Guidelines, in expressing objectives in relation to the region's port, should clarify the strategic regional development, competitiveness and sustainability issues
- The Local Area Plans that cover the Ringaskiddy and Marino Point sites should support the Port's Strategic Development Plan

| | |
|---|---|
| **Chapter 1** | **Context** |
| Chapter 2 | Policy Background |
| Chapter 3 | Rail Freight Baseline |
| Chapter 4 | Existing Demand |
| Chapter 5 | Future Scenario with Rail |
| Chapter 6 | Rail Connection Options |
| Chapter 7 | Socio Economic Evaluation |
| Chapter 8 | Other Options |
| Chapter 9 | Conclusions and Next Steps |

# In June 2008, Port of Cork was refused permission to relocate its container terminal from Tivoli to Oysterbank, Ringaskiddy




**Decision**

- The decision is final
- It cannot be appealed
- It will affect all future port development applications

# The reasons for the decision were the perceived negative impact on the road network and the lack of rail access to Ringaskiddy

**An Bord Pleanála's Reasons and Considerations**

- *The proposed development entails the relocation of commercial freight activities of the Port of Cork from its existing location at Tivoli Docks, which is served by a railway line and has reasonably direct access to the national road network, to a location to the south-east of Cork city at Ringaskiddy which is not connected to the national rail system and would be totally reliant on road-based transport.*

- *While the Board accepts that there is a need to move port activities from Tivoli Docks and expand at other location(s) within the Cork Harbour area, it is considered that the proposed development would:*

  *(a) result in much of the port related traffic traversing the city road network which would adversely impact on the carrying capacity of the strategic road network in and around Cork city and in particular the carrying capacity of the strategic interchanges at Bloomfield, Dunkettle and Kinsale Road and the Jack Lynch Tunnel which it is necessary to preserve. The proposed development would exacerbate serious traffic congestion at these strategic interchanges, and*

  *(b) be unable to make use of rail freight carrying facilities in the future and would, therefore, represent a retrograde step in terms of sustainable transport planning having regard to the policies in the RPG and CASP.*

- *The proposed development would, therefore, be contrary to the proper planning and sustainable development of the area.*

Source: Board Direction, 24th June, 2008

# While Inspector accepted the poor viability of a rail service in the short term he thought this would change in the longer term

- The Inspector:
  - Stated that *"The applicants in my view have demonstrated adequately that current Government commitment to promoting unitised freight is low"*
  - Took the view that *"in the medium to long term the need for more sustainable transport requirements will force the State to prioritise (rail) freight transport"*
  - Acknowledged that the applicants had demonstrated:
    - The decline in rail freight in Ireland
    - The low priority given to freight by Iarnród Éireann
    - The difference between Cork and the major Northern European ports
    - That there is "little evidence of government policy actively pursuing or supporting major expansion in rail freight services"
  - Considered that "*there is a firm policy commitment to rail freight transport particularly in relation to the Port of Cork"*, shown in
    - The National Spatial Strategy
    - Cork Area Strategic Plan (CASP)
    - Regional Planning Guidelines for the South West Region
  - Argued that *"in the medium to long term the viability of transporting goods by rail freight will improve and become more competitive as costs associated with road-based transport will increase"*

Source: Planning Inspector's Report

# Booz & Co were asked to assess the case for rail freight to/from the port to inform both its planning and Government policy

- The overall aim of the assessment was to establish under what circumstances, if any, a rail connection to the Port of Cork would be feasible.
- Specifically, the objectives of the study were to:
  - Establish which of the port's existing market segments or individual customers could be served by rail, and under what scenarios
  - Taking a long term view, establish if there are new (existing or future) markets which could be attracted which would be served by rail, and under what scenarios
  - Establish the benefit that would accrue from these markets being served by rail
  - Set out options for serving the Ringaskiddy and Marino Point container terminal sites by rail – be it a direct link or a barge and rail combination
  - Set out the impact of the rail options on the wider rail network (need for new infrastructure, rolling stock, operational considerations, etc.)
  - Establish the life cycle costs of the rail transport options, including costs incurred elsewhere on the rail network
  - Complete a cost/benefit analysis for the scheme

# Essentially, what was needed was an analysis of the gap between the existing situation and aspirations for a future rail link

## Existing Situation

- Road freight is a highly competitive industry
- Although the existing container terminal at Tivoli Docks is adjacent to the railway, no goods have been transported by rail to/from Cork for many years.
- Elsewhere in Ireland, some bulk and containerised commodities continue to be transported by rail to port, but some key customers have exited rail freight in recent years (e.g. sugar beet, kegged beer)
- IÉ's freight infrastructure has been reduced
- Since 2005, IÉ only offers container transport on the basis of a full train load (18 containers)
- The only intermodal container service now operating is between Ballina, Co. Mayo and Waterford Port
- 65% of trips to/from the existing container terminal are to/from counties Cork and Kerry i.e local in nature and generally not served by the rail network

## External Views and Expectations

- EU policy encourages for modal transfer from road to rail - both for passengers and rail
- National and local policy for modal transfer from road to rail implicit in some policy documents (at the time of the planning inquiry - specific policy has been developing rapidly since then)
- Planning Inspector's acceptance that economic viability of rail freight is questionable but *"Notwithstanding the above arguments, the advantage of rail freight cannot be underestimated in my opinion"*
- ABP view that it is unsustainable to plan for a new port facility without rail access
- Well organised objectors have already succeeded in intervening in the port development process

- **The assessment should therefore be regarded as a "Gap Analysis" rather than a "Feasibility Study"**

# The assessment was undertaken in the spirit of the Inspector's view that, in the long term, a rail connection will become desirable

- The reasons why the container terminal is no longer served by rail, the lack of a market or any Iarnród Éireann or Government support to develop the market, and the particular difficulties of serving the Ringaskiddy site by rail were all adequately demonstrated during the planning process
- The situation the port finds itself in called for a fresh approach with every effort made to determine how a rail operation might work and the circumstances under which that might be enabled
- The aim is to help answer the key questions that have been raised since the planning decision:

**Is there a financial reason?**

- Our initial hypothesis is that a rail connection would not be financially viable and it would need government support to fund capital and running costs, in order for it to be financially attractive to users.

**Is there a socio-economic reason?**

- Our assumption is that government might consider funding if there were a socio-economic case for the rail connection based on the benefits of removing trucks that would otherwise be on the roads. If there were, it might be worth examining the commercial proposition.

**Is there another policy reason?**

- Even with a weak socio-economic case, if the scheme were affordable, there may be a case for its prioritisation if it were strongly supported by other policies. This is addressed in the next chapter.

| | |
|---|---|
| Chapter 1 | Context |
| **Chapter 2** | **Policy Background** |
| Chapter 3 | Rail Freight Baseline |
| Chapter 4 | Existing Demand |
| Chapter 5 | Future Scenario with Rail |
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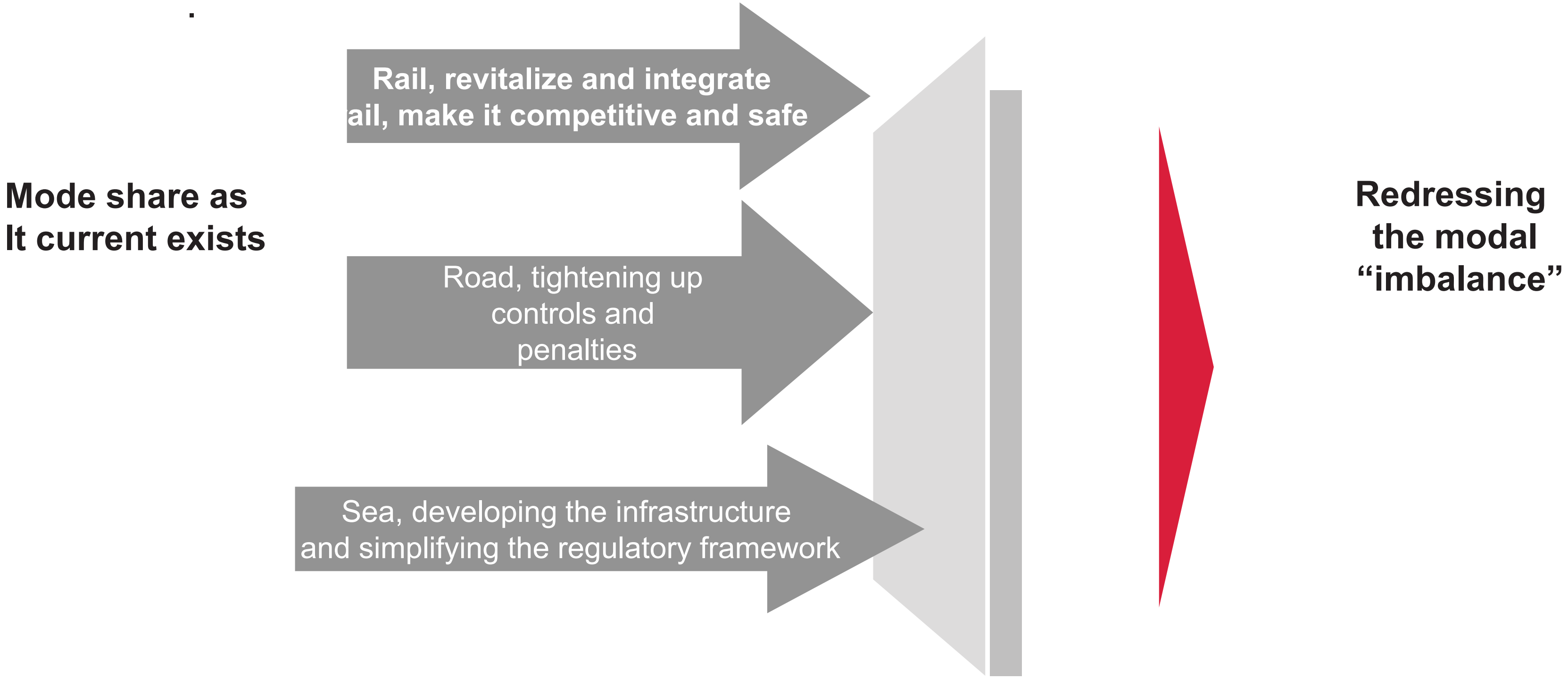
# The assessment has been informed by the latest rail freight policy at European through to local level

| Policy Levels | Summary of Current Situation |
|---|---|
| **European** | ▪ 2001 White Paper: European Transport Policy to 2010<br>▪2006 Transport Policy Review<br>▪2007 Logistics: Keeping Freight Moving<br>▪2009: The Future of Transport |
| **National** | ▪National Spatial Strategy 2002 - 2020 (2002)<br>▪Smarter Travel - A Sustainable Transport Future: A New Transport Policy for Ireland 2009 - 2020 (2009)<br>▪"Assessment of Port Services Issues for Enterprise, Forfas, January 2009 |
| **Regional** | ▪ Revision of the Regional Planning Guideline for the South West (2004) is currently well underway and will culminate in the *Regional Planning Guidelines for the South West 2010-2022* |
| **Local** | ▪Cork Area Strategic Plan Update 2008<br>▪Cork City Development Plan 2009-2014<br>▪Cork County Development Plan 2009 - 2014 |

# European Commission White Paper of 2001 – 'European transport policy for 2010: time to decide', still provides the EU policy context

**Re-dressing the modal balance – The White Paper**



# The White Paper's approach was to incentivise sustainable modes and discourage the reliance on road*

**Rail- revitalize and integrate rail, make it competitive and safe**

- Removing barriers to rail freight market entry
- Engaging the ERA (European Rail Agency) and OTIF (Intergovernmental Organisation for International Carriage by Rail)
- Marco Polo Intermodality "open to appropriate proposals to shift freight from road to more environmentally friendly modes"

.

Road - tighten up controls and penalties

- Proposed road user charging for road freight related to:
  - axle loadings
  - impact on congestion
  - distance travelled
- Attempt to "tighten up" on road freight practices e.g. safe driving time

*The EU's goal was not only modal shift for environmental reasons but from a sociteal perspective - Improve road safety and halve the number of road deaths by 2010

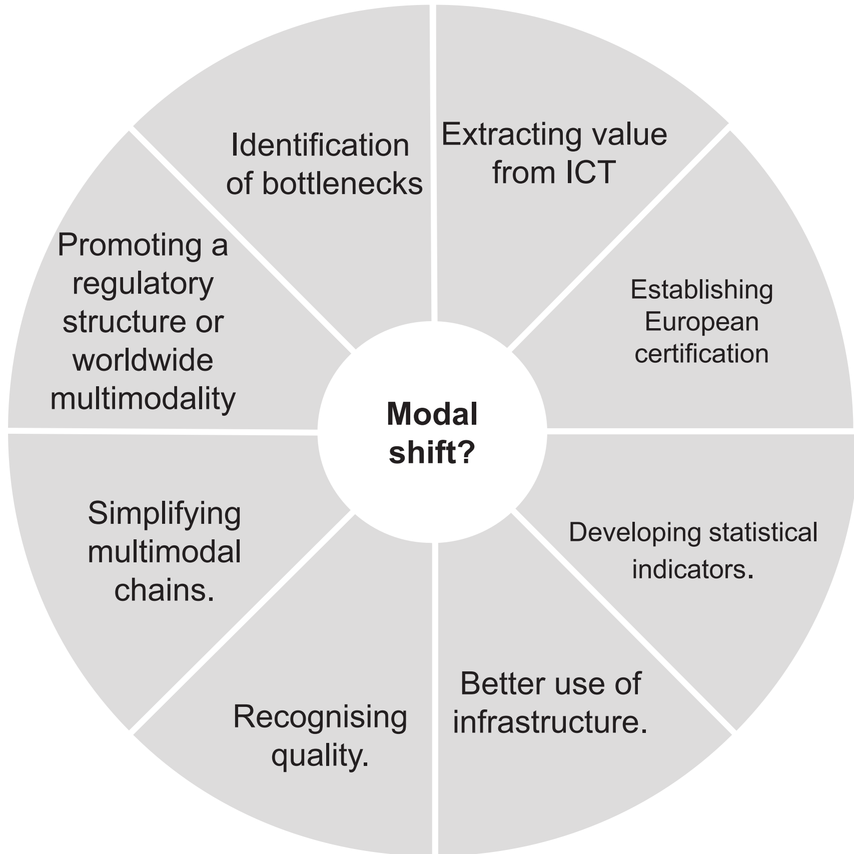
# The White Paper had a mid term review in 2006 which reinforced policies to try to shift freight from road to rail

- Although rail freight volumes were growing, rail's share of the freight market was not
- However, there were several relevant success stories, including:
  - Opening up of rail freight transport to competition
  - Definition of 30 TEN priority projects
  - New road charging directive
  - Promotion of intermodal transport via Marco Polo
- It was decided that policy should continue along the lines set by the 2001 White Paper
- Specific actions were set relating to freight:
  - Road transport: internal market review (2006), review of legislation on working conditions (2007)
  - Rail transport: remove technical barriers to interoperability (2006), promote rail freight corridors
  - (2006), rail market monitoring (2007)
- The concept of "Co-Modality" was introduced to recognise the lack of success to the extent expected in implementing modal shift policies. "…….therefore, the future policy will have to optimise each mode's own potential to meet the objectives of clean and efficient transport systems"

# There were subsequent moves to ensure logistics was considered in transport policy, making it a factor in decision making

- EU Communication (2006) 336 The “key to sustainable mobility” recommended modernizing logistics to boost efficiency of individual modes of transport and their combinations.
- This communication in particular recommended inititaives which may “lead” to changes in mode choice towards “ more environmentally friendly, safer and more energy efficient modes of transport”.

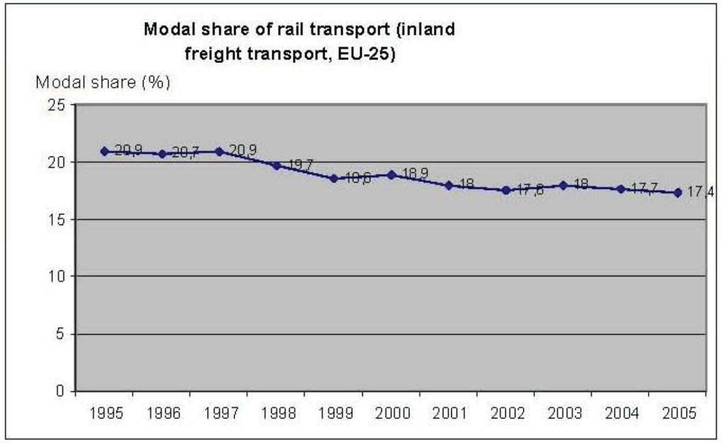
**Initiatives from EU with regard to logistics**



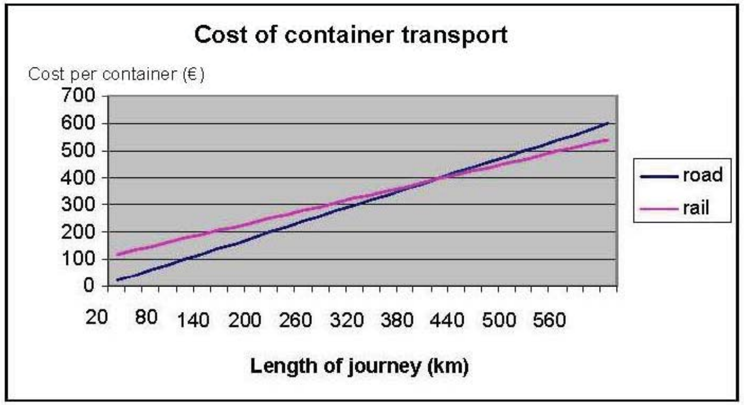
# European research showed rail freight to be more cost effective over very long distances (over 400 km)…

## Memo "Towards a more competitive rail freight sector"

- Predicted goods transport will grow by a further 50% between 2000 and 2020
- Noted that the initiatives aimed at revitalising rail freight transport which were launched over the last 15 years or so, by the European Community have produced satisfactory results, but concluded that they do not go far enough.
- Reported that, in the first half of 2007, rail freight increased by 7%, However rail's modal share of freight transport was scarcely increasing.
- Reported on research that indicated that it would cost less to transport a container by road than by rail unless the distance was over 400km or so.




*Source : Eurostat*




*Source : Impact assessment, Atkins*

Source: EC Com 2007Logistcs: Keeping Freight Moving, Memo "Towards a more competitive rail freight sector

# … but other European research [1] suggested that the distance where rail can compete with road on cost is lower, at around 150 km

- The Communication cites *"A pilot study on rail freight performance by distance conducted in 2006 by the Community of European Railways (CER) and the International Union of Railways (UIC) on a group of railway undertakings holding 20% of the rail freight market showed that:*
  - *the market share of rail compared with road is significantly higher for longer distances (> 150 km = 22%, > 300/325 km = 26% and > 500 km = 30% compared with 19% of the total traffic).*
  - *On distances exceeding 150 km the average costs of moving goods by rail are usually lower than for transporting them by road .*

1 Monitoring Development of the Rail Network - COM(2007) 609

**Are the distances in the Port of Cork case too short for rail?**

- There are no "hard and fast" rules about whether it costs more to transport a container by road or rail - a lot will depend on the local infrastructure and service providers, and their charges
- It is, however, safe to say that the Port of Cork's hinterland does not cover the distances normally considered for rail freight (leaving aside the fact that little of the area is covered by the rail network).
- Despite the fact that rail transport may cost more than road, many European governments chose to fund the cost differential on the basis that there are environmental and other socio-economic benefits associated with removing trucks from the road.
- While we are confident that there would be no commercial case for transferring freight from road to rail in the Cork area at present, we have to establish if there may be a socio-economic case to do so in future.

# The European Commission is currently looking at "The Future of Transport" which will input to the next 10-year White Paper

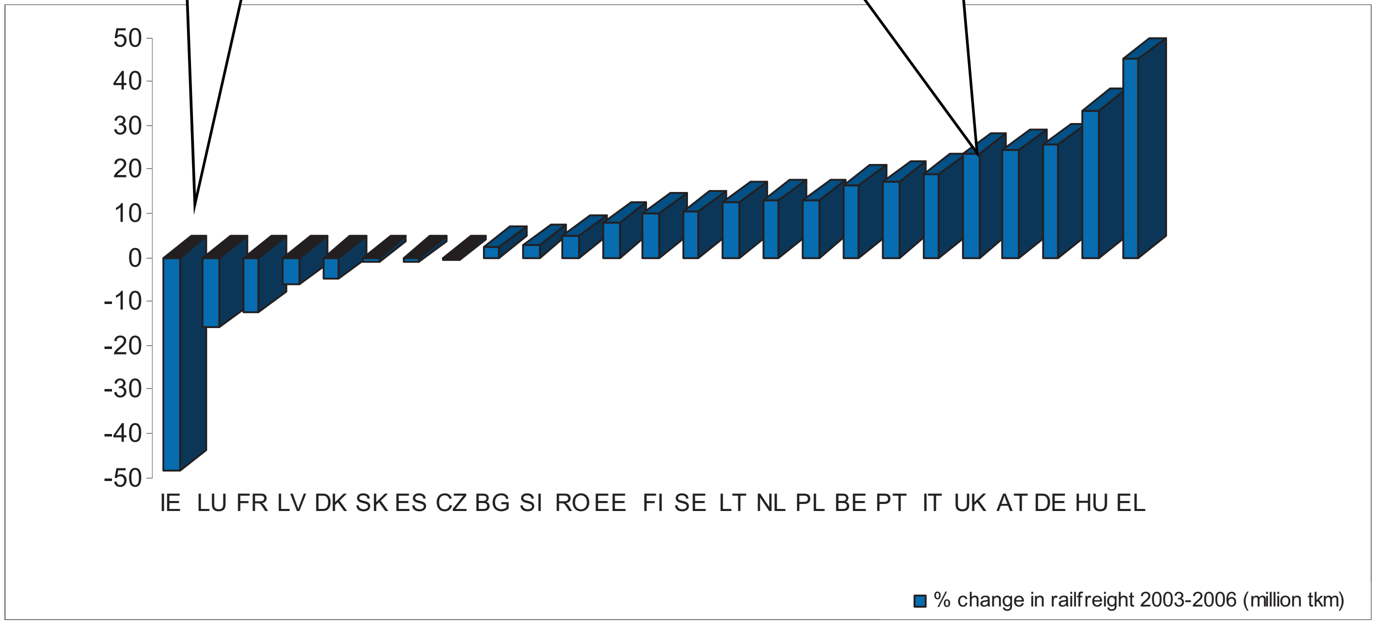
**The Future of Transport (2009) - emerging themes relating to rail freight**

- The trend of increasing demand for long distance freight transport is unlikely to reverse
- The logistics sector would be creating more flexible, but complex networks
- Large intercontinental ports might reach high congestion levels ….smaller ports may present spare capacities if not integrated in the established circuits.
- European network of rail freight corridors and increased competition in the railway markets would facilitate enlarging the share of rail
- Rail freight vehicles would very likely become longer, bigger and more energy efficient.
- Trucks, ships and aircrafts would increasingly rely on alternative fuels

# The result of EU directives and initiatives has been varied

- There was a 48.5% decline in rail freight in Ireland between 2003 and 2006

- Railfreight in the other island economy, UK, grew by 23.4% between 2003 and 2006
- UK Government has taken measures, including financial incentives, to encourage freight to shift from road to rail

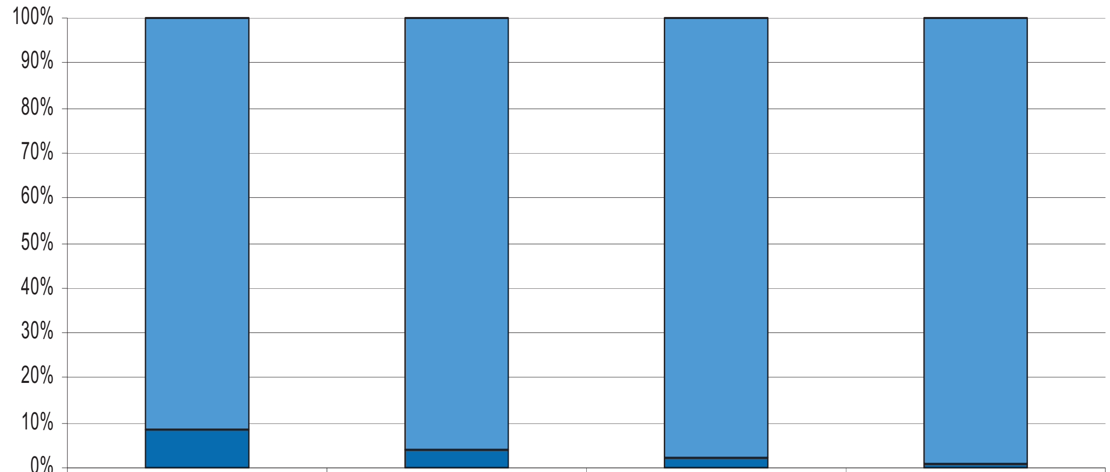



Source: Eurostat, Booz Analysis

**Limitations of European Examples**

- Compared with Ireland, in continental Europe:
  - distances are long; and
  - port opportunities are few
- In the case of Netherlands, for example, data include freight travelling between Dutch ports and other countries.
- International traffic accounts for 44% of all rail freight in Europe and is the fastest growing sector
- In UK, the only other island economy in the EU, rail freight is growing
- Beyond Europe, in New Zealand, for example, there are many examples of freight going by rail over short distances

# Rail freight in Ireland has now declined to the point where it has nearly ceased, carrying only 0.7% of trade in 2007




| | 1996 | 2001 | 2004 | 2007 |
|---|---|---|---|---|
| Road | 91.7% | 96.0% | 97.7% | 99.3% |
| Rail | 8.3% | 4.0% | 2.3% | 0.7% |

Source: Eurostat

## Milestones in the Decline

- 2009: IÉ discontinues Fastrack, its parcels business
- 2006: cessation of sugar refining in Ireland and loss of beet trains
- 2006: Diageo decide to transfer beer kegs from rail to road
- 2003: Closure of North Wall Freight Depot
- 2002: closure of IFI at Marino Point
- Growth of a highly competitive road freight sector
- Gradual closure of freight lines (e.g. to Tivoli, to Foynes) and of freight yards

**According to the Strategic Rail Review (2003), many of the underlying causes for the decline were institutional**

# The Strategic Rail Review (2003) forecast this decline in rail freight in the absence of a national Government policy to halt it

- Much of the freight traffic carried in 2001 was loss-making and most of the freight rolling stock was nearly life-expired. Since then, IÉ has exited the loss-making traffics and now concentrates on more profitable niche businesses
- There were no direct support schemes to rail freight in Ireland similar to those operating in many European countries which explicitly aim to recognise rail's social benefits in the haulage task. There has been no change since them.
- Four strategic options were considered by the SRR. The outturn situation has been Option 1, but with elements of Option 4.

| Criterion | **Freight Option 1** Continue current policy | | **Freight Option 2** Stimulate IÉ to improve position | | **Freight Option 3** Active Government involvement | | **Freight Option 4** Limit IÉ role; New logistics partnerships | |
|---|---|---|---|---|---|---|---|---|
| **Exploit rail strengths for high quality competitive service** | 0 | • Service quality is inconsistent<br>• Reliability of service is poor (over 20% of services cancelled)<br>• Asset renewal unlikely | 1 | • Improvement in rail competitiveness<br>• Sustainable traffic growth<br>• Potential nevertheless may be limited | 3 | • Greatest likelihood of modal shift from road to rail, through operating or capital support and incentives | 2 | • Creates opportunities for innovative and efficient services, resulting in growth<br>• Nevertheless, degree of partner interest and viability still uncertain |
| **Support land use, social and economic policy** | 0 | • Rail traffic lost to road will increase | 1 | • Some shift of traffic to rail | 3 | • Greatest shift of traffic to rail | 2 | • Also greater shift to rail, but uncertain degree of partner interest |
| **Improve environmental quality** | 0 | • Further decline of rail traffic will have a negative impact on the environment | 1 | • Some shift of traffic to rail will reduce external costs to society | 3 | • Greatest shift to rail<br>• Allows government to target services with greatest environmental benefit | 2 | • Also greater shift to rail, but uncertain degree of partner interest |
| **Promote sound project selection** | 2 | • No approvals or policy changes required<br>• May not fulfil pragmatic political objectives | 3 | • Minimal policy changes required<br>• Should be a win-win for all involved | 2 | • Potential political cost of increased public funding<br>• Increased public consultation on investment/service targets | 1 | • Possible stakeholder resistance to changed IÉ activity and private participation in market |

***Legend:***

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4 | *Best or fully meets* | 3 | *Substantially meets* | 2 | *Partially meets* | 1 | *Remotely meets* | 0 | *No or negative effect* |

Source: Strategic Rail Review, 2003

# Although the National Spatial Strategy (2002) called for the future role of rail freight in the Irish economy to be developed in the light of the SRR, commitment to action has been very recent

- *Smarter Travel - A Sustainable Transport Future: A New Transport Policy for Ireland 2009 - 2020* was published by the Department of Transport in February 2009. It commits to specific actions to address the national deficit in freight policy
- The Oyster Bank planning decision has focused attention on the need for policy guidance in relation to rail freight.
- *Smarter Travel* notes that little is known about the potential for rail freight.
- The Department of Transport intends that the proposed freight forum will be established in Autumn 2009
- The Port of Cork Rail Connection Analysis will be of significant interest to the proposed Forum

***Smarter Travel - A Sustainable Transport Future (2009)***

**Action 10**

*We will:*

- *Ensure that the Department of Transport deals with freight policy issues in a more integrated manner and prepares a specific strategy for the freight sector. We will set a target aimed at reducing the environmental impact of freight while at the same time improving efficiency in the movement of goods and promoting economic competitiveness*
- *Organise a forum to bring all interested parties together, including industrial development agencies and industry representative bodies, to explore in greater depth the issues relating to the movement of goods, including:*
  - ***The realistic potential for rail freight***
  - *Priority freight routes allowing access to vehicles with greater load factors and capacity*
  - *Developing key logistics centres to transfer goods to more sustainable forms of transport for final delivery in urban areas*
  - *Scheduling of deliveries from the ports and in urban areas to avoid peak use of networks as far as possible*
  - *The incentives and disincentives needed to move to more fuel-efficient vehicles*
  - *The need to have more rigorous testing of goods vehicles to reduce emissions*
  - *The potential of Intelligent Transport Systems and Services to improve efficiency.*

**Action 29**

- *We will also review ports policy and the 2005 Ports Policy Statement with a view to maximising efficiency in the movement of goods and in the light of the review of the freight sector referred to in Action 10, Chapter 4.*

# The Forfás policy priorities for ports in 2009 include the development of a deep water container terminal at Ringaskiddy

- In January 2009, Forfás published **"Assessment of Port Services Issues for Enterprise"** which identified the following key policy priorities:
  - *Improving internal access:* The timely upgrade of the N28 (Cork to Ringaskiddy)…. is required. A recent An Bord Pleanála decision refusing an application for a significant port capacity project at Ringaskiddy cited the absence of a rail link as one of the main reasons for refusal. This highlights the need for an integrated approach to transport policy across all modes (road, rail, seaports and airports).
  - *Improving the use of ICT:* While by and large the quality of service offered to enterprise today
  - *Provision of deeper water facilities:* ….. the proposed development by the Port of Cork at Ringaskiddy has the type of deeper water levels that will be required to accommodate larger ships; and
  - *Certainty regarding future of the Port of Dublin*

**Implications**

- Forfás appears to take the view that:
  - The proposed container terminal at Ringaskiddy is a national priority
  - Ringaskiddy would be adequately served by road
  - The planning refusal was due to unclear, fragmented and/or disconnected transport policies across modes.
- Elsewhere in the paper, Forfás comments that rail cannot be expected to play more than a limited role in transporting freight in Ireland[1]

[1] quotes EC Com 2007 609 as saying that rail freight is only viable over distances of over 150km. In fact, as discussed on page 14, the research reported that " *On distances exceeding 150 km the average costs of moving goods by rail are usually lower than for transporting them by road " - which amounts to the same point for the purposes of the Forfás analysis*

# The Regional Planning Guidelines 2004 - 2009 assumed and supported further port development at Ringaskiddy, while seeking to promote rail generally, but these are now being revised

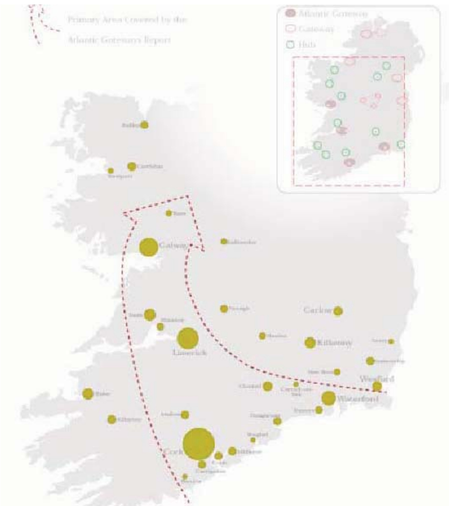
## Regional Policy

- The Regional Planning Guidelines for the South West 2004 recommend that the local and port authorities:
  - *Identify and reserve key strategic sites for the further development of the Port at downstream locations, replacing the loss of the City quays and the demand for extra capacity.*
  - *Prioritise the upgrading of the N28, Cork to Ringaskiddy, to facilitate ease of access to the Port. This will also facilitate industrial development in Ringaskiddy. Provision for public transport priorities should be built into this scheme.*
  - *Work together with Iarnród Éireann to promote expansion of rail freight connections to port facilities. Access exists at Tivoli and Marino Point, which should be considered as strategic access points and protected in development plan policies. Use of rail reduces the need for HGVs, increases the sustainability of development and reduces environmental pollution.*
  - *Work together to implement the Cork Docklands Strategy, which is critical to the regeneration of the City.*
  - *Promote the development of a lower harbour, wastewater treatment scheme, to facilitate the development of lands at Ringaskiddy.*

- The 2004 RPG support for port development at Ringaskiddy and raise no expectation of a rail freight while also expressing a desire for the existing line to be used for rail freight.
- There is more clarity expressed in the issues for the revised guidelines - see next page.

# The port's relocation from the City Quays and Tivoli is one of the issues for the revised Regional Planning Guidelines 2010-2022

**Atlantic Gateways**



**PoC related Issues**

- *" …there is an urgent need for the Port to move its operations out of the Docklands area of the Gateway to a new location in lower Cork Harbour. Public investment will be required primarily in the upgrading particularly of roads to facilitate this development."*
- *… "Cork is the principal conurbation on the Atlantic Gateways and has a population, which exceeds that of Limerick Galway and Waterford combined. The Cork Gateway is very significant contributor to national output…"*
- *"….if the Atlantic Gateways are to provide a viable counter-pole to the Dublin and the Mid East,,, the Cork Gateway will provide the greatest levels of population, employment, productive outputs and wealth creation and is the key engine of growth of the Atlantic Gateways. Therefore, it is logical that investment in Cork on specific drivers of growth within the Gateway is prioritised,… These include…. the relocation of the Port of Cork, to free up space in the heart of the gateway for new developments"*

- There is no mention of freight in the issues paper - road or rail
- The removal of the Port from the City Quays and Tivoli is clearly an objective
- No specific guidance is provided on where to the port should relocate
- Road upgrading to facilitate port development is supported, rail is not mentioned
- The revised Guidelines are expected to be aligned with the City and County Development Plans

Source: Issues Paper On the Review of the Regional Planning Guidelines 2010-2022, South West Regional Authority

# Cork Area Strategic Plan (CASP), at sub-regional level, influences both regional and local policy

| CASP (2001) | CASP Update (2008) |
|---|---|
| ▪ The Regional Planning Guidelines were strongly influenced by the Cork Area Strategic Plan (2001) (CASP) and reflect CASP policies<br><br>▪ CASP assumed the relocation of port activities from the City Quays and Tivoli to Ringaskiddy while also seeking to maximise use of the railway and protect its alignment and access arrangements | ▪ An update of CASP to take account of the outturn population and employment growth and the role envisaged for the City Region under the National Spatial Strategy was published in July 2008.<br><br>▪ The Draft CASP Update aims to refocus growth in line with CASP objectives as well as identifying locations for expanded growth. Its main findings have been included in the City and County Draft Development Plans (see next page).<br><br>▪ The City Council Development Plan is currently at Draft Consultation stage.<br><br>▪ The County Development Plan was adopted in February 2009. |

# The Cork City (Draft) and County Development Plans support the move to Ringaskiddy and ...

- **City Draft Development Plan**
  - *The Port of Cork proposes to relocate container traffic downstream to the Oyster bank and to relocate bulk and other trade from the city quays to Ringaskiddy. This will provide for major regeneration and development opportunities at the Docklands, and Tivoli areas. - It is the policy of Cork City Council to support the Port of Cork in its strategically important operations and future plans for expansion and relocation. (Policy 5,20 Port of Cork)*

- **County Development Plan**
  - The Strategy

    *…..Other important elements of the strategy for the area concern the critical need to relocate land uses from the port/industrial areas on the eastern approaches to the City so that these areas can be redeveloped to provide a new focus for population and employment growth close to the City centre. The preferred area for the relocation of many of these uses is in the lower harbour mainly near Ringaskiddy, where deep-water berths exist and are capable of expansion, and modern motorway standard roads are planned to facilitate the movement of freight to and from the new port facilities.* (Section 2.3.10)
  - Objectives:

    *….To assist in the redevelopment of the Cork City Docklands by providing for the relocation and development of industrial uses and major port facilities, primarily at Ringaskiddy, where deep-water berths can be developed and modern road infrastructure is planned to facilitate freight transport.*
  - Marino Point

    *…there is also potential to redevelop the former IFI site at Marino Point. The review of the Local Area Plan will establish an appropriate development framework for this site.* (Section 3.2.38)
  - Ringaskiddy

    *Ringaskiddy, with excellent port facilities, will also play an important role in the redevelopment of the Cork City Docklands by providing for the relocation and development of industrial uses and major port facilities. (Section 3.4.3)*

# ….the new County Development plan specifically deals with An Bord Pleanála's decision

- *Port of Cork Strategic Plan was aligned with the CASP goals and the CASP Strategy articulated the key linked benefits of the Port's strategy of relocating the Container Terminal from Tivoli to Ringaskiddy. The Planning Authorities in conjunction with the Port of Cork will carefully assess the issues raised by An Bord Pleanála in relation to future Ringaskiddy developments and if necessary consider possible alternatives.*

- CON 3-5 - Locations for Port Related Development
  - *It is an objective to ensure that land with the potential to accommodate port related development, particularly at Ringaskiddy, but also at the other ports throughout the County, is, normally, protected from inappropriate development that would prejudice its long term potential to accommodate this form of development.*

- The Port of Cork
  - *It is an objective to support the relocation of port activities and other industry away from the upper harbour on the eastern approaches to the city. Ringaskiddy remains the preferred location for the relocation of these activities. The Council is committed to engage with the Port of Cork and other relevant stakeholders in order to address the issues in relation to Ringaskiddy and, if necessary, give consideration to possible alternative locations.*
  - *A recent decision by An Bord Pleanála, relating to a proposed container terminal at Ringaskiddy, has identified concerns regarding traffic impact at key locations on the road network and the lack of potential for the future transport of freight by rail in the Ringaskiddy area. The maintenance of modern port facilities and the need to release port related land in the Docklands and at Tivoli for mixed-use development formats are both critical to the overall strategy for the sustainable development of the CASP area and to the achievement of the target populations for the City. (6.4.2)*
  - *While Ringaskiddy remains the preferred location for the relocation of port activities, Cork County Council is committed to engage with the Port of Cork and other relevant stakeholders, to seek a resolution to the difficulties raised by An Bord Pleanála and, if necessary, give consideration to possible alternative locations. (6.4.3)*
  - *In order to establish an appropriate land-use strategy for Ringaskiddy, the Carrigaline Electoral Area Local Area Plan will address the land use issues associated with the port relocation, set out a strategy to maximise the regional economic potential of other undeveloped land and to establish infrastructure to support enhanced public transport to serve the area. (6.4.5)*

# In summary, evaluation of the emerging policies does not show a rail connection for Port of Cork to be an objective

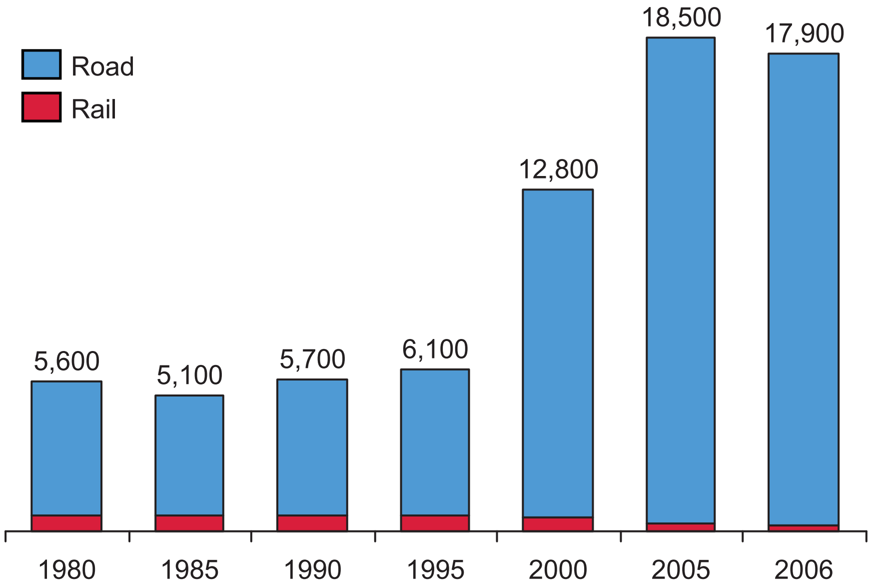
| Policy Level | Main Interests |
|---|---|
| **Port customers** | ▪Cost<br>▪Speed and reliability |
| **Port Company** | •Customer retention and growth, ability to compete with other ports on cost<br>•Environmental and economic sustainability |
| **Local & Regional Authorities** | •Viable local/regional port<br>•Efficiently operating road network<br>•Best possible local environment<br>•Specifically, the City and County Development Plans:<br>  •Support the redevelopment of Docklands/relocation of port<br>  •Support a container terminal at Ringaskiddy<br>  •Contain no stated objective to get trucks off the roads in the Cork City area<br>•Forthcoming Regional Planning Guidelines expected to align with Development Plans |
| **National Government** | •Sound socio-economic case for State investment (DoT/DoF)<br>•Affordability (DoT/DoF)<br>•Efficient provision of transport services (DoT/DoF)<br>•Despite the recommendations of the Strategic Rail Review and the National Spatial Strategy, no specific rail freight policy has been developed (DoT/DoE)<br>•*Smarter Travel : A New Transport Policy for Ireland 2009 - 2020* commits to addressing the national deficit in freight policy, has no explicit objective to shift freight from road to rail but commits to exploring the realistic potential for rail freight (DoT)<br>•Support for the container terminal to relocate to Ringaskiddy (Forfas, Jan 2009) |
| **EU** | •Shift of freight from road to rail desirable but policy should optimise the potential of each mode. Competitive transport markets are key<br>•Irish Government usually granted derogations in relation to EU rail policy |

- Local and National Policy has developed since the ABP decision against the Oysterbank proposal
- Local policies support the relocation of the container terminal at Ringaskiddy
- Emerging national policies unlikely to support rail freight projects unless they were affordable and supported by a robust case
- EU policy allows individual countries to determine what suits them best and will not support rail freight where there is no case for it

| | |
|---|---|
| Chapter 1 | Context |
| Chapter 2 | Policy Background |
| **Chapter 3** | **Rail Freight Baseline** |
| Chapter 4 | Existing Rail Freight System |
| Chapter 5 | Future Scenario with Rail |
| Chapter 6 | Rail Connection Options |
| Chapter 7 | Socio Economic Evaluation |
| Chapter 8 | Other Options |
| Chapter 9 | Conclusions and Next Steps |

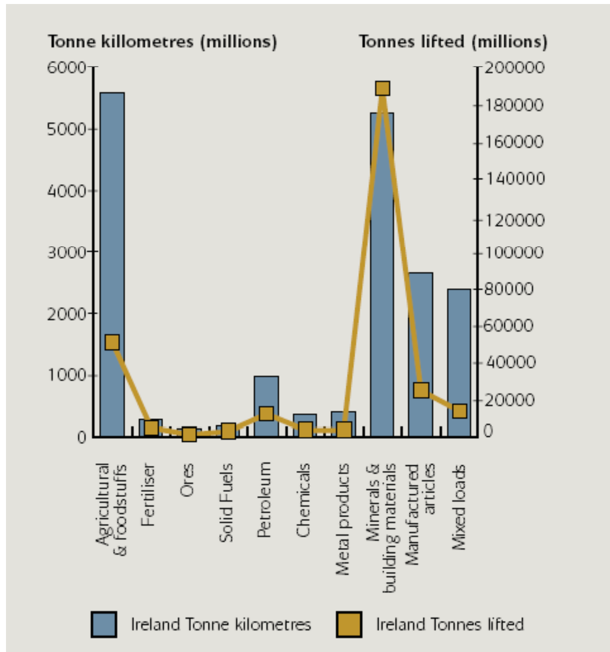
# Nearly all of Ireland's freight is carried by road. Main cargoes are agricultural and foodstuffs, and minerals & building materials…

**Ireland's freight movements (Million tonne kilometres) - 1980-2006 ***




In 2006, road accounted for 98% of freight kilometre movements in Ireland. Rail accounted for the remaining 2%

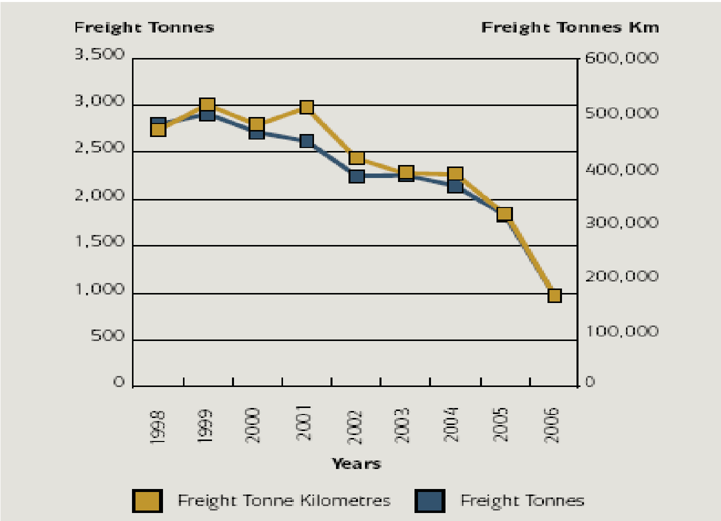
**Ireland's main road freight movements 2005 ****




* Source: Booz & Company analysis based on Eurostat data in Evidence by Bernard Feeney, Goodbody Economic Consultants, 2008, p16
** Source: Inter TradeIreland, 2007, Freight Transport Report for the Island of Ireland

# …Ireland's relatively small rail freight task is contained to a few niche cargoes, and has been in decline for some time

**Ireland's rail freight movements (tonnes, and tonne kilometres) - 1998-2006 ***




Over the past ten years, there has been a rapid decline in Irish rail freight.

The highest declines in cargo types has been in cement, fertiliser, sugar, beer and general freight commodity classes.

## Current Freight Operations in Ireland

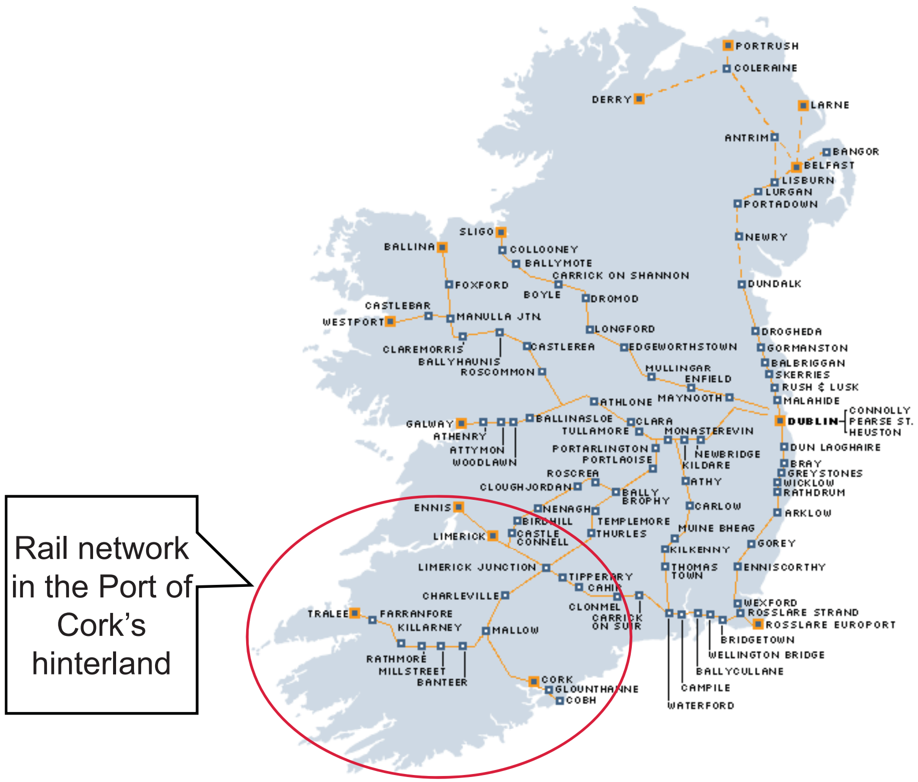
| From – To | Type of traffic | Miles | Trains per week |
|---|---|---|---|
| Ballina -Waterford | Containers (mainly soft drinks) | 215 | 3-4 |
| Kilmastulla (Bird Hill) – Castelmungret (Limerick) | Bulk (shale) | 21 | 12 |
| Navan – Dublin Port | Bulk (Tara mines) | 50 | 15-20 |
| Drogheda – Tullamore | Bulk (cement) | 98 | 2-3 |
| Ballina – Westport-Waterford | Timber | 211 | 4 |

- The only freight trains running are full train loads - IÉ no longer carries single containers and consolidates them into train loads
- A new freight service between Ballina and Dublin started operation in September 2009:
  - 2 trains per week initially with plans to rise to 3 later
  - 9' high containers initially increasing to 9' 6" later (50/50 split between 9' and 9' 6" needed)
  - Same customer (Atlantic Industries) and operator (DFDS) as Ballina -Waterford service which will not be affected.

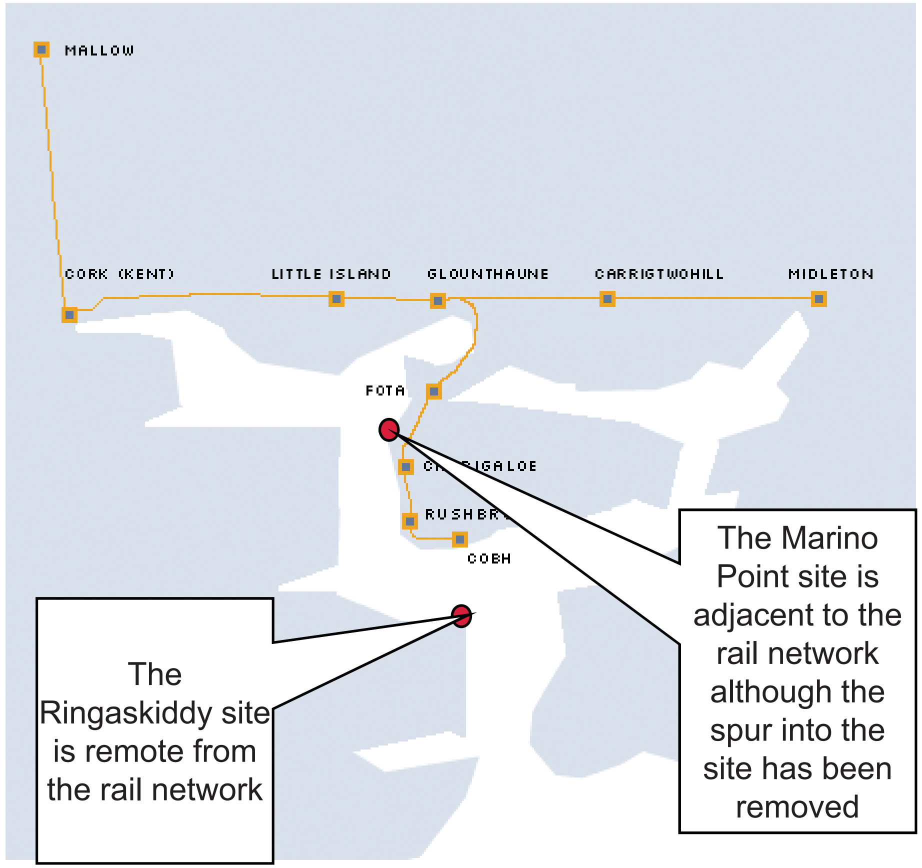
* Source: Inter TradeIreland, 2007, Freight Transport Report for the Island of Ireland
** Source: Booz analysis based on railway timetable data

# The national rail network is mainly radial, centred on Dublin. Locally, there is a local line between the City and Cobh/Midleton

## National Rail Network




## Local Cork - Cobh /Midleton Line



# For many years, passenger operations have been Iarnród Éireann's primary business, and the existing rail infrastructure reflects this

- The Dublin – Cork and Cork – Cobh routes are double tracked:
  - €700m of track renewal work is required on the Dublin-Cork line but this is not yet programmed
  - 4-tracking of the Dublin - Cork line between Dublin and Kildare is underway at present.
  - The remainder of the network is single line, except the DART line and the Dublin-Belfast Line
- The signalling system is Centralized Traffic Control (CTC) for the most part but routes that are not highly used  for passenger traffic tend to have mechanical signalling i.e Kilmastulla (Birdhill) – Castlemungret (Limerick), Ballina through to Knockcroghery, Drogheda to Navan.

**Cork Rail Tunnel**

Source: Iarnród Éireann, Booz & Company analysis

Note :It was reported at the Rail Freight Meeting arranged by Trade Facilitation Ireland on 17th April that Iarnród Éireann was to assess the implicaitons of clearing the Portarlington - Dublin line

# The current height and weight restrictions are also reflective of a primarily passenger network

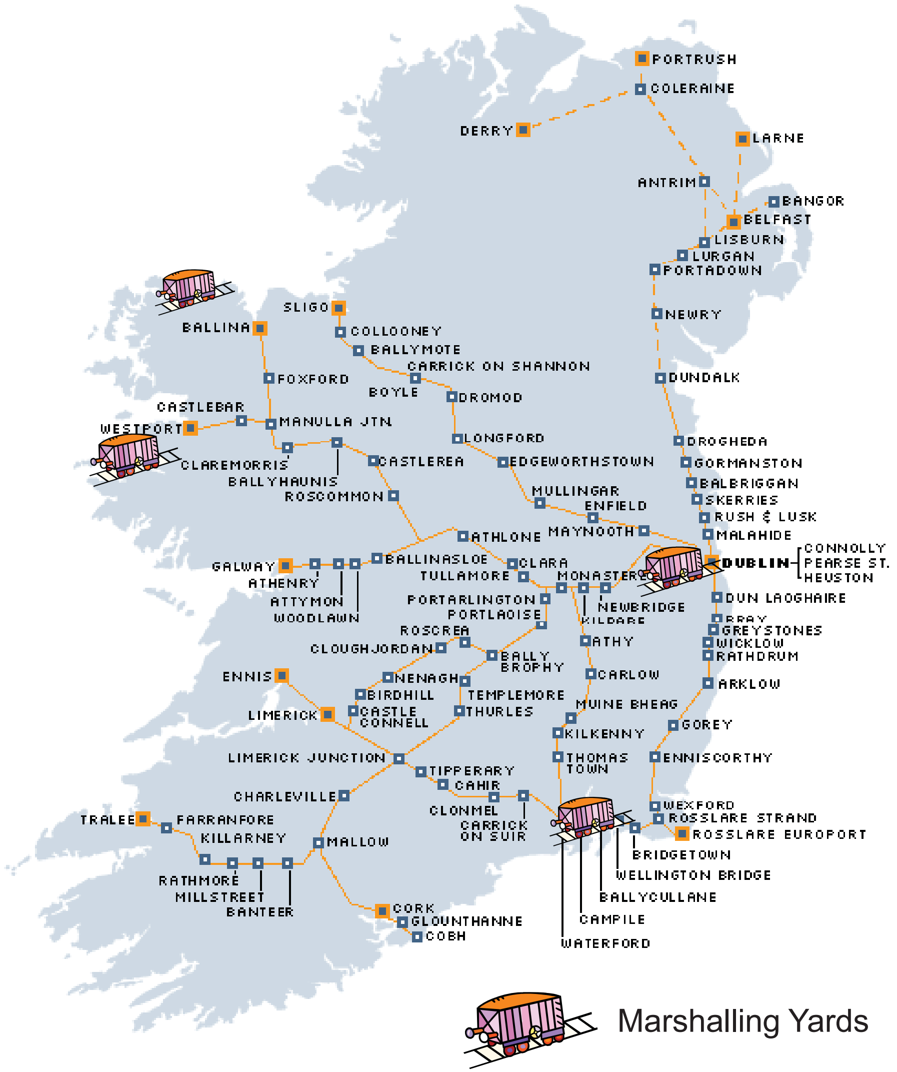
- Weight clearance:
  - The current network is cleared for an axle loading of 15.75 T
  - This axle loading is not a key issue/constraint for passenger traffic; however, internationally, rail freight networks are gradually increasing their axle loadings well past 18T and are stretching to 22T-25T
- Height clearances:
  - The Ballina – Waterford line is cleared for 9' 6" high containers. The Belfast and Sligo lines are cleared for 8'6" containers and the remainder of the network for 9' containers.
  - On the Dublin - Cork Line, height clearance is only an issue north of Kildare, except at the Cork Rail Tunnel on the Cork-Dublin Line immediately to the north of Kent Station.

**Options for getting clearance**

- In discussions, IÉ reported that axle loadings are constrained by the current rolling stock and loadings could be taken past 20T with new rolling stock.
- The height clearance required at the Cork Rail Tunnel is minimal. It can be gained either by:
  - Lowering the level of the tracks - but this would cause major disruption to existing services; or
  - Procuring new rolling stock.
- Iarnród Éireann are currently undetaking an assessment of the Cork Rail Tunnel to understand what might be required to achieve clearance for 9ft 6in containers

# Freight traffic is now all in full trains loads, therefore there is little reliance on marshalling yards

- As most of the freight traffic is in full train loads there has been no need to retain marshalling yards
- Marshalling yards are traditionally retained if operators still shunt wagons and make up trains of (in many cases) single loads of cargo going to multiple areas
- Marshalling yards exist in North Wall (Dublin), Ballina, Westport and Waterford
- In the Cork area:
  - Mallow Freight Depot was closed in 2004 but is still in IÉ ownership
  - The rail connection to Cork's existing container terminal at Tivoli Docks has not been used since the 1990s and is no longer intact
  - The North Esk Freight Yard, Little Island, Cork, is no longer used by Iarnród Éireann and was disconnected from the network in November 2008 as part of the recent track and signalling upgrading on the Cork-Cobh line. IÉ confirmed that the depot can be re-connected at any stage in the future if viable rail freight traffic arises.

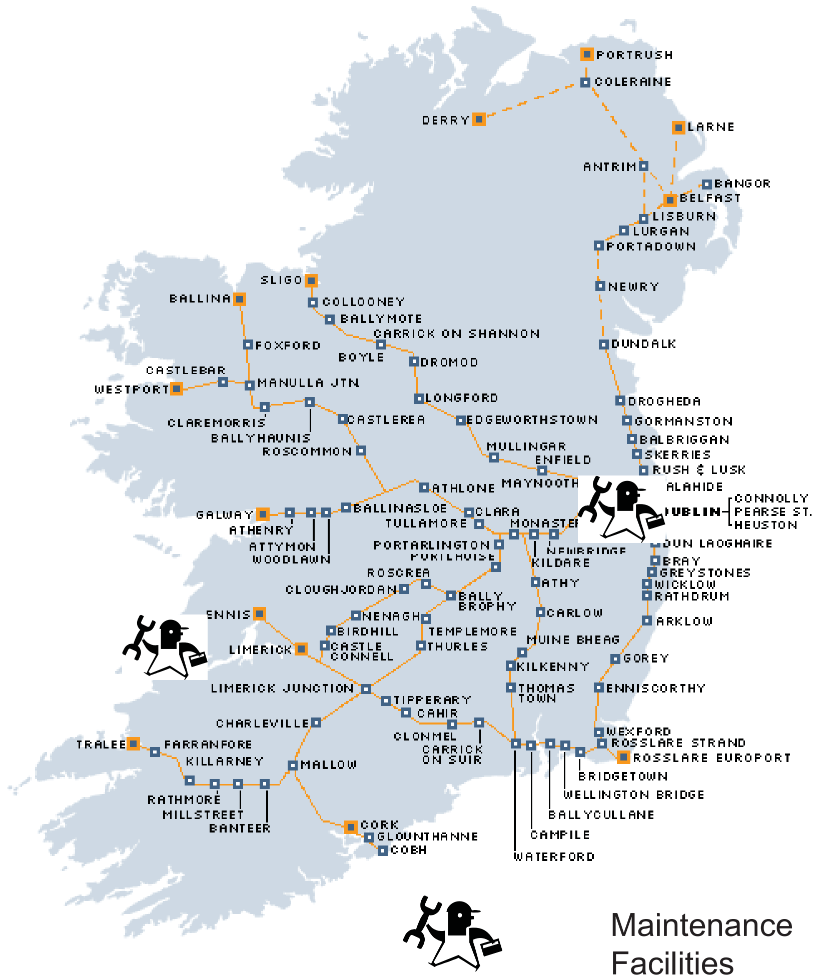


# The ability to maintain freight rolling stock is located primarily in Dublin and in Limerick

- Freight maintenance capabilities are concentrated in Dublin (Inchicore and North Wall) and to a lesser extent in Limerick

- Rolling stock for any future freight services in Cork would need to travel a distance to be maintained, be that planned maintenance or unplanned maintenance. This would have cost and operational implications.

- As the fleet has only about 10 years remaining life, planned regular maintenance will be important and it is likely that unplanned maintenance will need to happen on a more regular basis



# IÉ has rolling stock available, but estimates that this fleet has only 10 years remaining life, so new rolling stock would be needed

## Overview of current rolling stock use

| Current Fleet | Likely demand on current freight services | Remaining fleet availability |
|---|---|---|
| 12X50T Bulk cement wagons | Cement (Drogheda - Tullamore) | Captive? |
| 27X54T ore wagons | Shale/Tara Mines | Captive? |
| 26X39T ore wagons | Shale/Tara Mines | Captive? |
| ▪200X42ft 9 in long container flats<br>▪60X47ft 9 inch long container flats<br>▪40X 60ft long container flats<br>▪Total 300 wagons | ▪Waterford – Ballina container service<br>–18 TEU<br>–Max. required is two rakes of 12 Container flats = 24 Container flats<br><br>▪Ballina/ Westport – Waterford timber service<br>–Assume same, 24 Container Flats | Remaining capacity 250 Container flats |

Comparing this data with the Strategic Rail Review (2003), there has been a 66% decrease in rolling stock from 2002 to 2009

- IÉ reported at the recent Rail Freight Meeting on 17th April that investment in new wagons would be needed for the proposed Ballina-Waterford service if the business proved to be sustainable

# IÉ anticipates that existing locomotives will be available for the foreseeable future but that additional drivers would be needed

- IÉ has a fleet of 32 recently refurbished Class 201 locomotives which were bought in 1994. These should last until at least 2014, although further refitting and refurbishment will be needed in future
- Of these, IÉ require 10 for passenger operations on the Dublin-Cork service and 3 for the Dublin-Belfast service
- The number of locomotives that would be available and the performance of this fleet would affect the cost of operations
- IÉ has advised that it would not have sufficient driver resources for a new rail freight service, proposals should allow for driver costs.
- IÉ's restrictions on Class 201 locomotives do would not appear to prevent their use for freight

**Refurbished Class 201 Locomotives**
In use on Dublin-Cork Line

# IÉ's proposal to remove the loop line at Kent Station would prevent freight operating through the station in future

- At Kent station, a loop line just outside the south wall of the existing passenger station allows through trains to bypass the passenger platforms, where passenger trains are often standing for substantial periods.
- The loop line also provides access to a number of operational areas which currently lie on the railway land to the south of the station area.
- The development plans for the station involve the transfer of all the land to the south of the loop line to a private developer.
- The development proposals allow for new facilities to be provided for through running of suburban passenger services between Mallow and Cobh.
- Iarnród Éireann has confirmed, while they do not have a property development partner at present, the loop line will be removed  to develop the site. This would make freight operations through Kent Station difficult, if not impossible, as the other lines would be busy with passenger operations

**Existing Loop Line at Kent Station**

# In summary, there are many infrastructure and rolling stock constraints for rail freight operations in the Cork area

**Summary of Infrastructure and Rolling Stock Issues**

| | Status/Description | Implications |
|---|---|---|
| ▪ Railway network coverage at sites being considered | ▪ Marino Point site is adjacent to Cork - Cobh Line, which connects to Cork - Dublin Line at Kent Stn<br>▪ Ringaskiddy is remote from railway | ▪ Connecting Marino Point to the railway would be reasonably straightforward. A Ringaskiddy connection would involve a major infrastructure project |
| ▪ Network connectivity | ▪ IÉ plan to remove the loop line at Kent Station, preventing future through running for freight | ▪ The loop line exists at present. There may be a case for its safe-guarding, despite IÉ's proposals to remove it. |
| ▪ Track and signalling | ▪ Good quality twin track on Cork - Cobh line with recent investment in track and signalling<br>▪ Cork - Dublin line is due for renewal | ▪ Cobh line is a valuable asset - freight may be an opportunity realise its full potential<br>▪ Existing track condition may be a constraint on Dublin line |
| ▪ Height clearance | ▪ Clearance for 9' containers only at Cork Rail Tunnel | ▪ Potentially expensive to clear for 9'6" containers<br>▪ Could possibly be resolved with new rolling stock |
| ▪ Weight and length clearance | ▪ 15.75 tonne axle weight limit - equivalent to 36 TEU maximum train length | ▪ It appears that in practice this limit could be increased significantly with new rolling stock. |
| ▪ IÉ freight yards | ▪ North Esk Freight Depot disused and disconnected<br>▪ Mallow Freight Yard closed | ▪ Reactivation of North Esk is possible, albeit with investment. There may be a case for its safe-guarding<br>▪ No other obvious sites for freight depots of any description |
| ▪ Customer connectivity | ▪ Network covers little of the Port's hinterland<br>▪ No customers have railheads | ▪ Grants to provide railheads for customers near rail<br>▪ Distribution centre could serve a regional concentration |
| ▪ Rolling stock | ▪ IE's existing freight wagons near life-expired<br>▪ Locomotives available but no drivers | ▪ IE advise that proposals should allow for wagons and drivers but that locomotives are available |

# There are other obstacles to developing a rail freight business, the most significant being the highly competitive road freight market

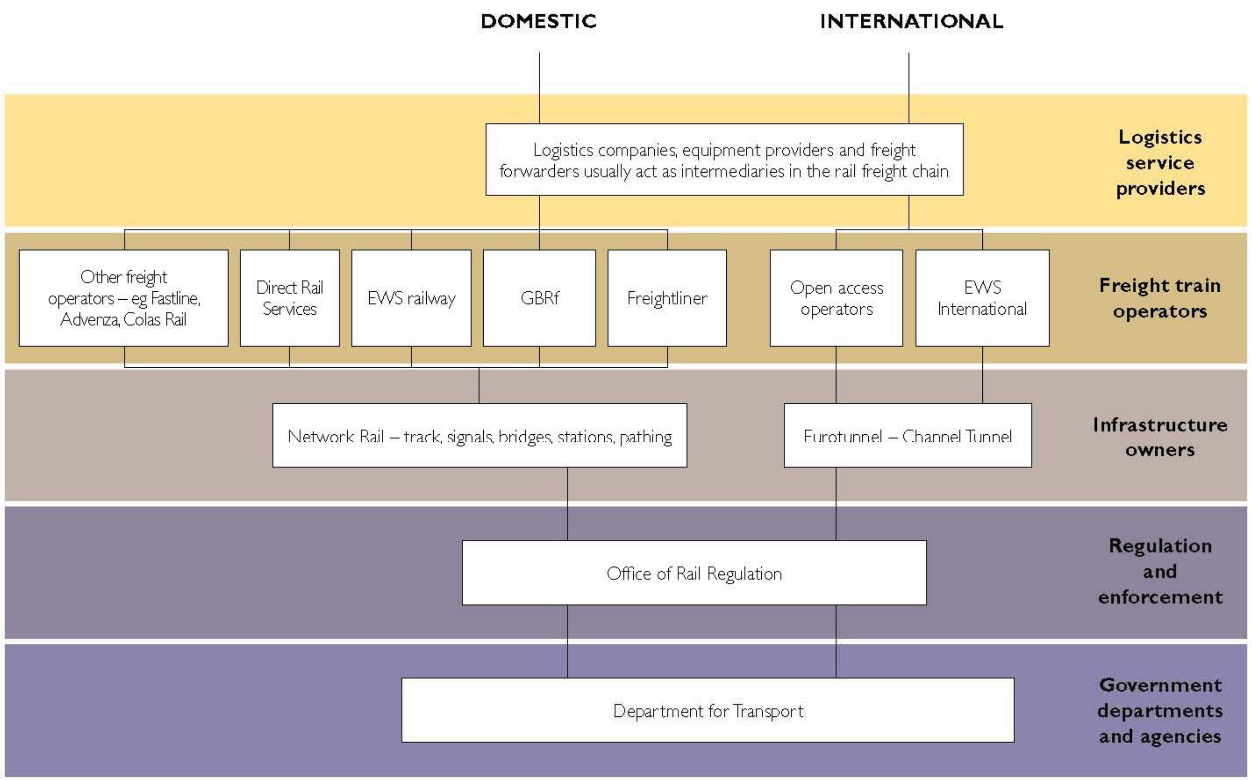
| Potential Obstacles | Considerations in Overcoming | |
|---|---|---|
| ▪ Daunting competitive landscape:<br>– Good road network, generally free to use<br>– Highly competitive road haulage sector | ▪ A package of incentives and penalties could shift traffic from road to rail but there would be very significant issues about acceptability, practicability and cost<br>▪ The benefit of shifting from road to rail would depend on the level of congestion on the road network | Difficult to see rail competing with road in the Cork area for the foreseeable future |
| ▪ Fixed ideas which may or may not apply:<br>– Rail freight only suited to large low cost bulk goods carried over long distances<br>– Rail freight costs more than road | ▪ Regular, frequent rail operations over short distances can also work<br>▪ Containerised rail freight has overtaken bulk commodities in the UK<br>▪ In congested road conditions, rail can be cheaper and more reliable than road transport | Road congestion not expected to the extent that would advantage rail |
| ▪ Current railways arrangements (besides infrastructure and rolling stock):<br>– Iarnród Éireann focus on passenger operations<br>– Whilst the railway market is in theory open to competition, in practice Iarnród Éireann has a monopoly | ▪ The Department of Transport confirms that by 2011 it will have a revised legal and institutional framework in place such that private specialist rail freight operators could enter the market<br>▪ Whether the private operators would be attracted is uncertain as yet - no market testing has been undertaken | Emerging IÉ/Port/Freight Forwarder partnerships may be more likely model |

# Some of these obstacles have been overcome in recent years in the UK

## Recent Growth in UK Rail Freight

- In the UK, rail freight declined in use between the 1950s and the mid-1990s, but since then there has been 66% increase
- FTA/Rail Freight Group are forecasting that rail freight use will double by 2030
- Rail freight is a commercial service operated by private freight train operating companies for private freight customers, sometimes through intermediary logistics services providers
- Government grants exist for:
  - Building infrastructure (Freight Facilities Grant)
  - Ongoing running costs (Rail Benefits Procurement Scheme)

The structure of the rail freight industry in Great Britain

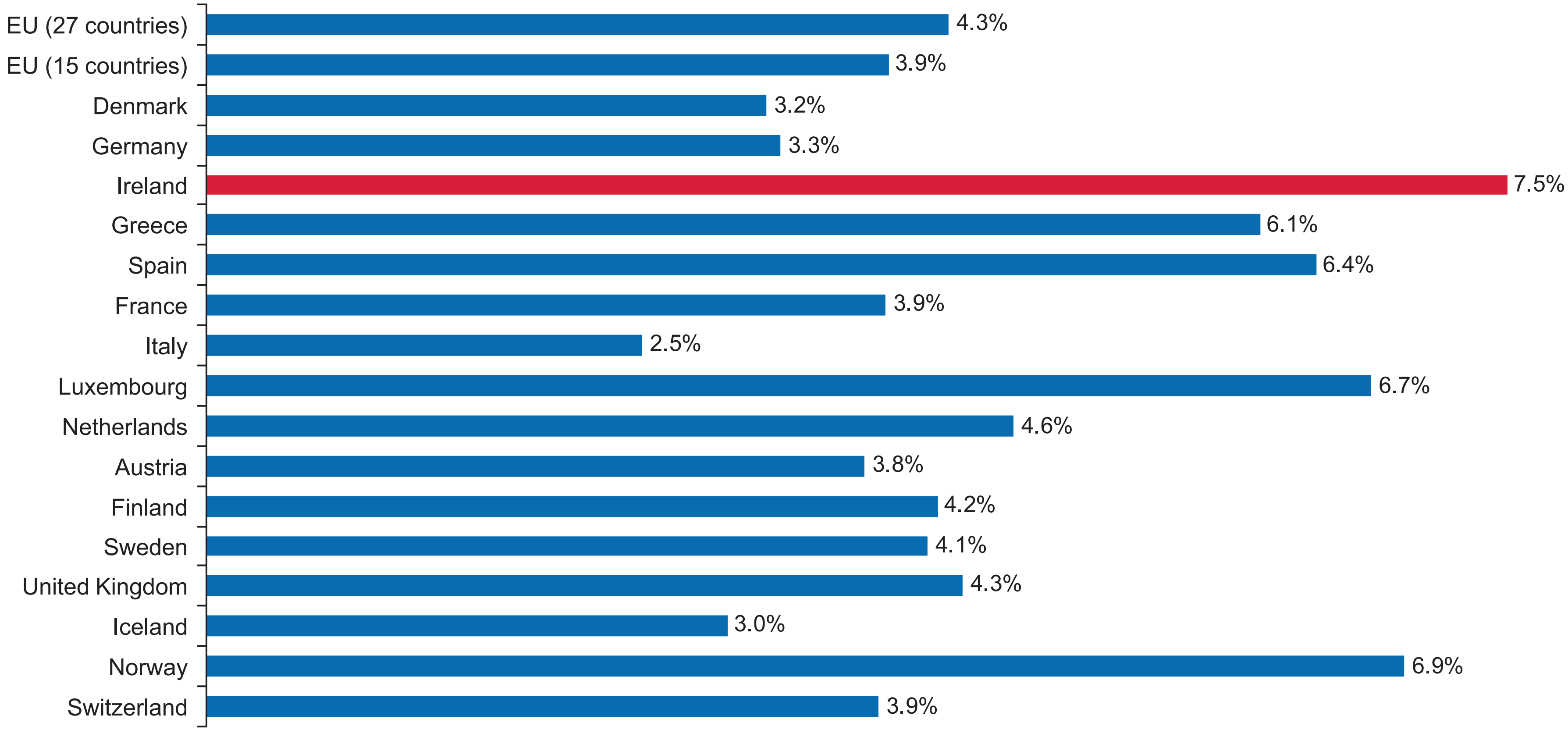



Source: "Marking use of rail - a guide for shippers", Freight Transport Association, February 2009

| | |
|---|---|
| Chapter 1 | Context |
| Chapter 2 | Policy Background |
| Chapter 3 | Rail Freight Baseline |
| **Chapter 4** | **Demand to Transport by Rail** |
| Chapter 5 | Future Scenario with Rail |
| Chapter 6 | Rail Connection Options |
| Chapter 7 | Socio Economic Evaluation |
| Chapter 8 | Other Options |
| Chapter 9 | Conclusions and Next Steps |

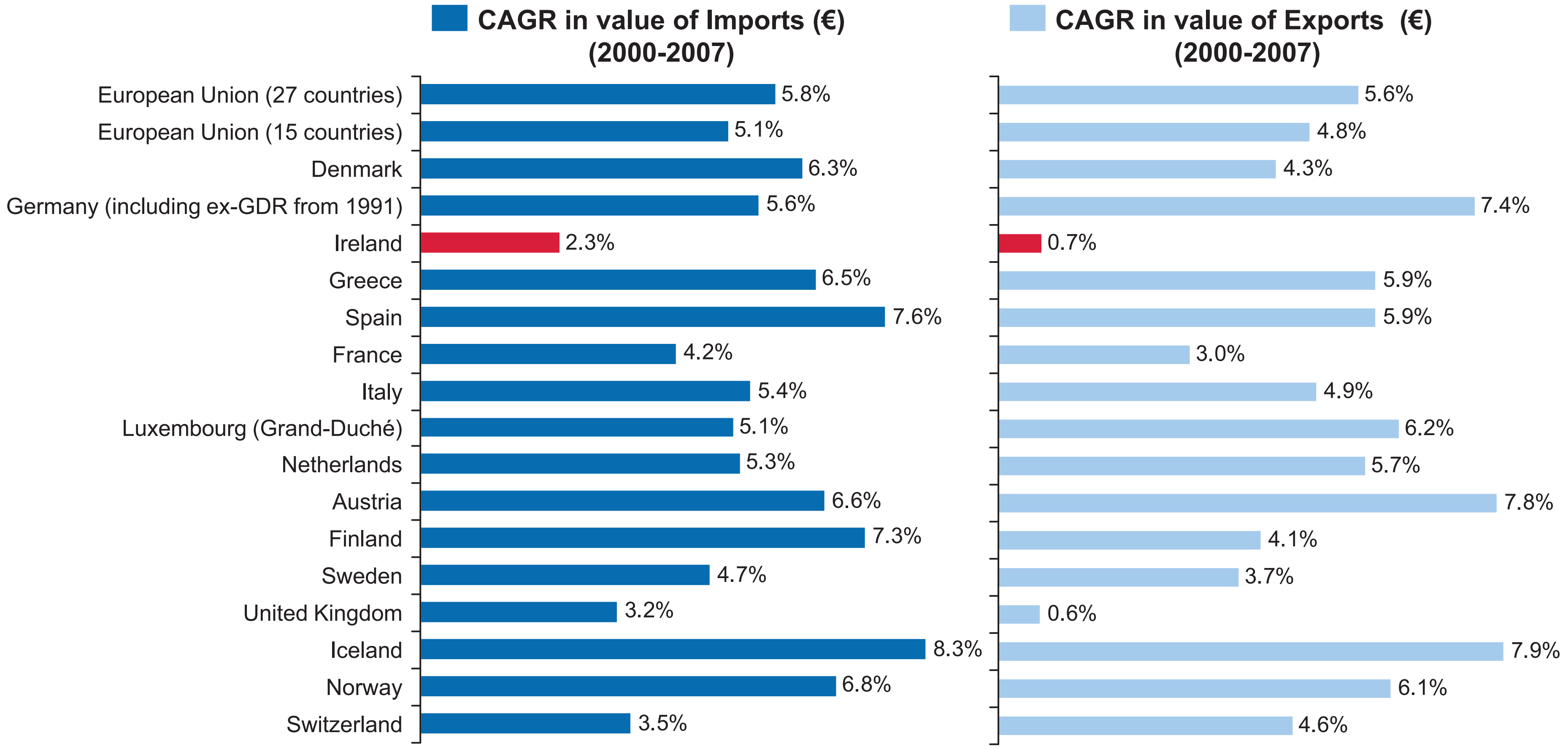
# Ireland has experienced one of the highest GDP growth rates of the developed countries in Europe over the past decade

**Compound Average Growth Rate in Purchasing Power Standard (1999-2007)**




Source: Booz & Company analysis based on Eurostat data. Available online at http://www.epp.eurostat.ec.europa.eu

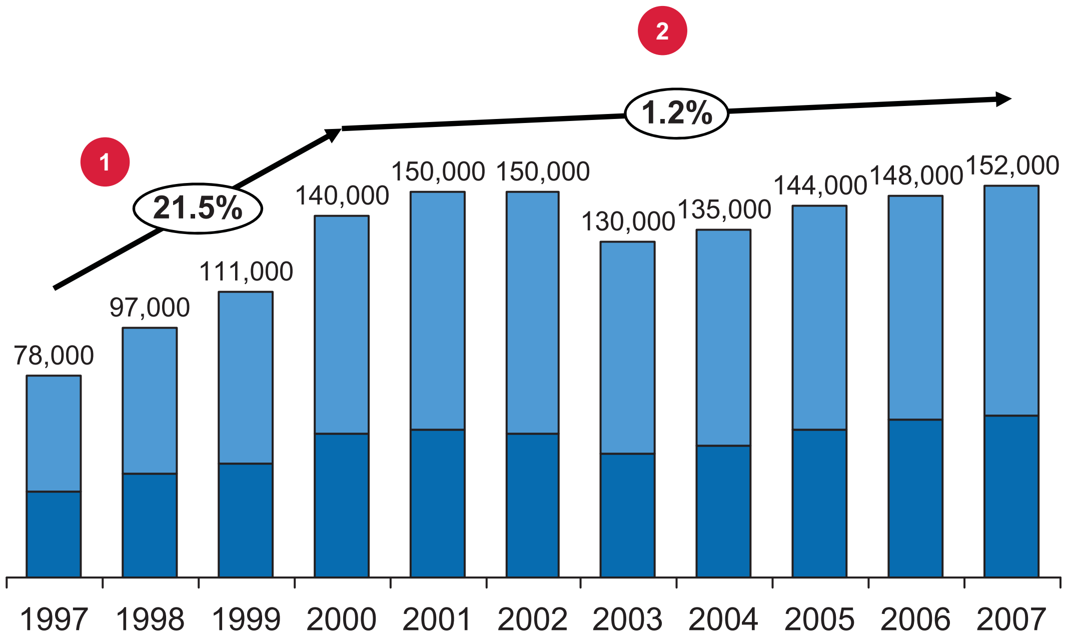
# However, the growth in Ireland's import & exported goods, by value, is amongst the lowest of the developed countries in Europe




Source: Booz & Company analysis based on Eurostat data. Available online at http://www.epp.eurostat.ec.europa.eu

# The value of Irish imports & exports has not increased significantly since 2001

**Value of Imports and Exports in Ireland 1997-2007 (€m)**




Exports
Imports

1. From 1997-2000 Ireland experienced significant import/export growth
2. However, from 2000 to 2007, Ireland experienced a relatively low increase in the value of imports and exports

**Key Points**

- In 2007, Ireland had a trade surplus of €26,000m
- Which has been in a state of slow decline since 1997
- Total import and export trade in 2007 was €152,000m
  - Exports accounted for € 89,000m
  - Imports accounted for € 63,000m

**Main Exports (by value)**

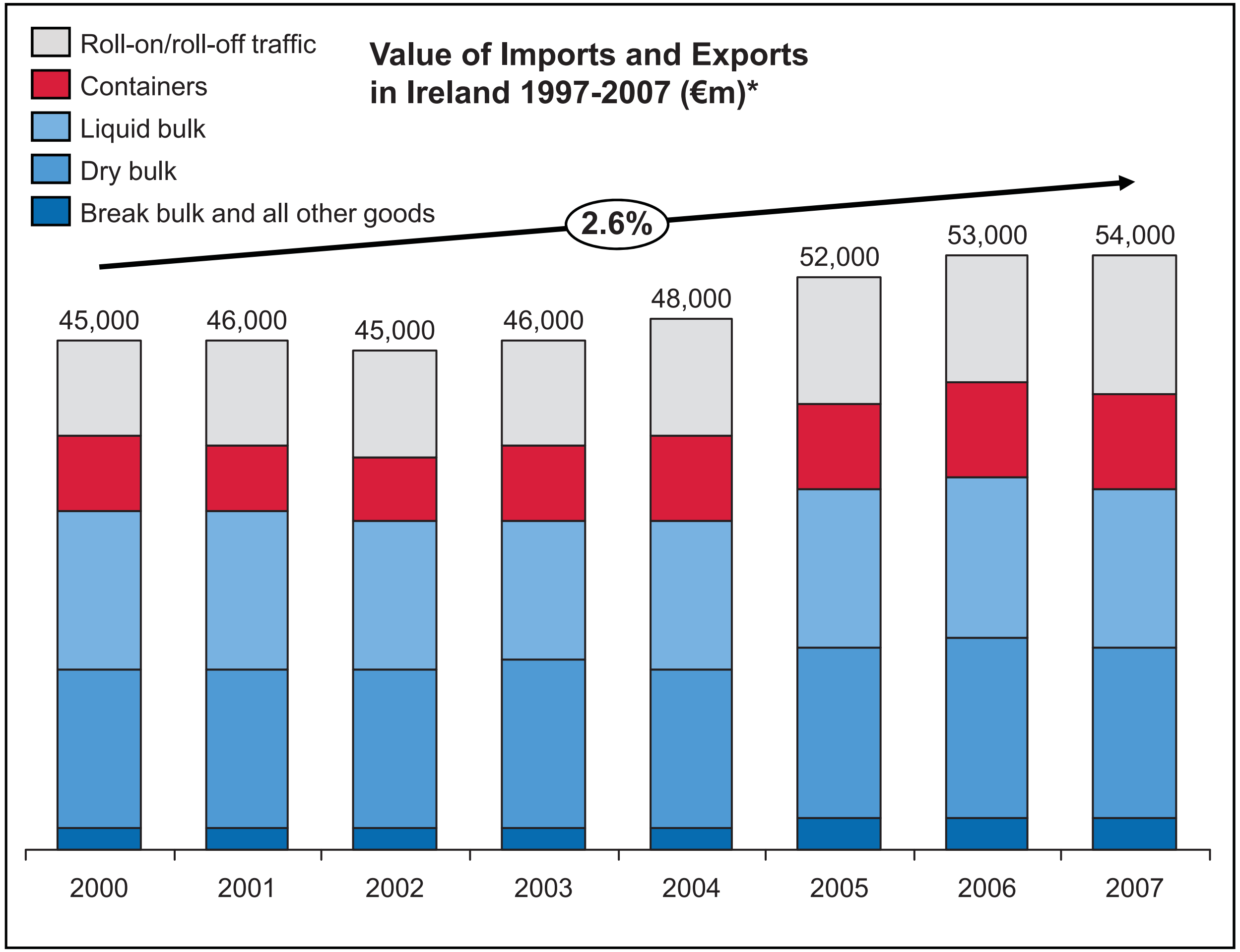
- Chemicals
- Machinery
- Other manufactured goods

**Main Imports (by value)**

- Machinery
- Chemicals
- Other manufactured goods

Source: Booz & Company analysis based on http://www.cso.ie

# Despite the low value growth, in tonnage terms, Ireland's imports & exports grew at 2.6%pa since 2000, driven by containerised cargo



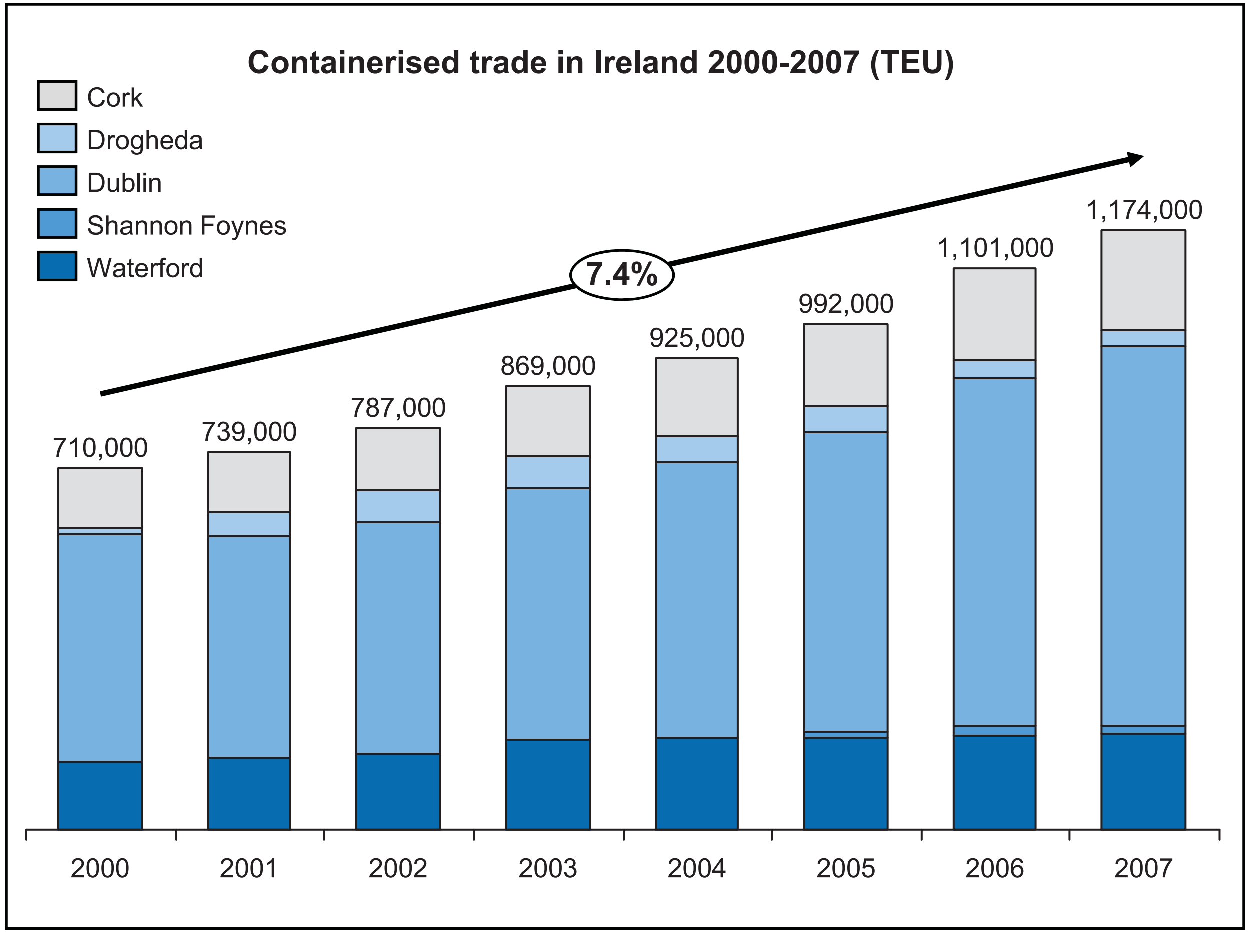

**Compound Annual Growth Rate (CAGR) of tonnage in Ireland's imports and exports (%)**

| | |
|---|---|
| ▪ Containerised tonnage | 7.4% |
| ▪ Ro-Ro tonnage | 4.9% |
| ▪ Liquid bulk tonnage | 0.3% |
| ▪ Dry bulk tonnage | 1.3% |
| ▪ Break bulk tonnage** | 6.9% |

* Source: Booz & Company analysis based on http://www.cso.ie

**: Although break bulk tonnage has the highest CAGR of cargo types, its growth is off a low base and comparative to total volume, it remains small.

# Containerised trade has grown at 7.4% per annum in Ireland since 2000, driven primarily by growth at the Ports of Dublin & Cork




**Cork is Ireland's second largest container port**

- In 2007, Dublin, Ireland's largest port, shipped 744,000 TEU in containers, Cork shipped 196,000 TEU and Waterford 185,000 TEU
- The CAGR at Dublin over the period 2000-2007 was 7.4% (roughly equal to the average growth)
- The CAGR at Cork over the same period was 7.2% (slightly lower than the average)

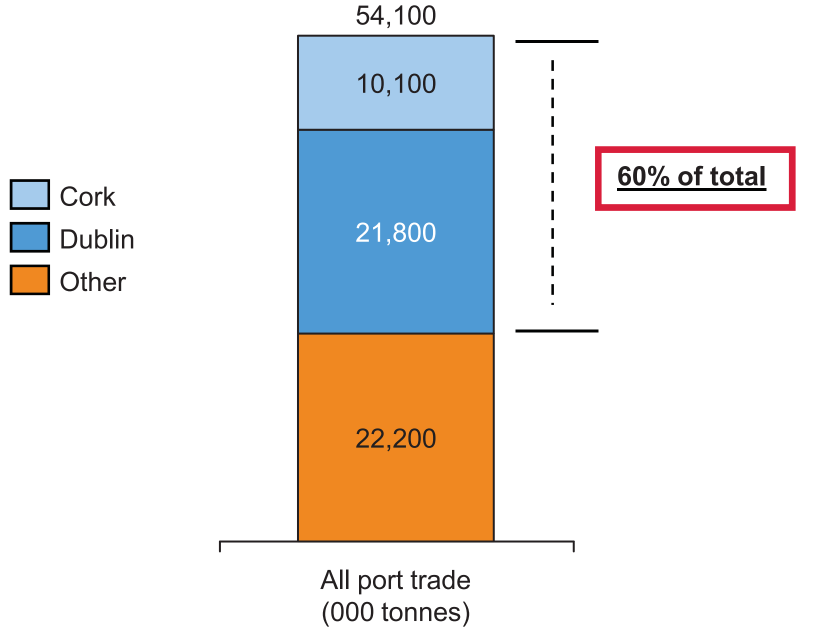
**Ports have focused on natural growth**

- The market share of the major ports has remained relatively static over the period 2000-2007. With less than 1% change in market share between Dublin and Cork over the period 2000-2007

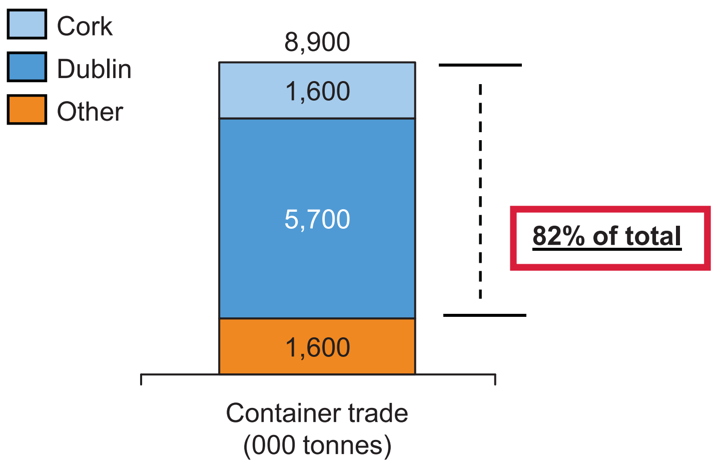
Source: Booz & Company analysis based on http://www.cso.ie

# Dublin Port and Port of Cork are the largest ports in Ireland, by tonnage. Together, they accounted for 60% of total tonnage in 2007

**Total tonnage at ports of Republic of Ireland, all cargoes 2007 - (000 tonnes)**

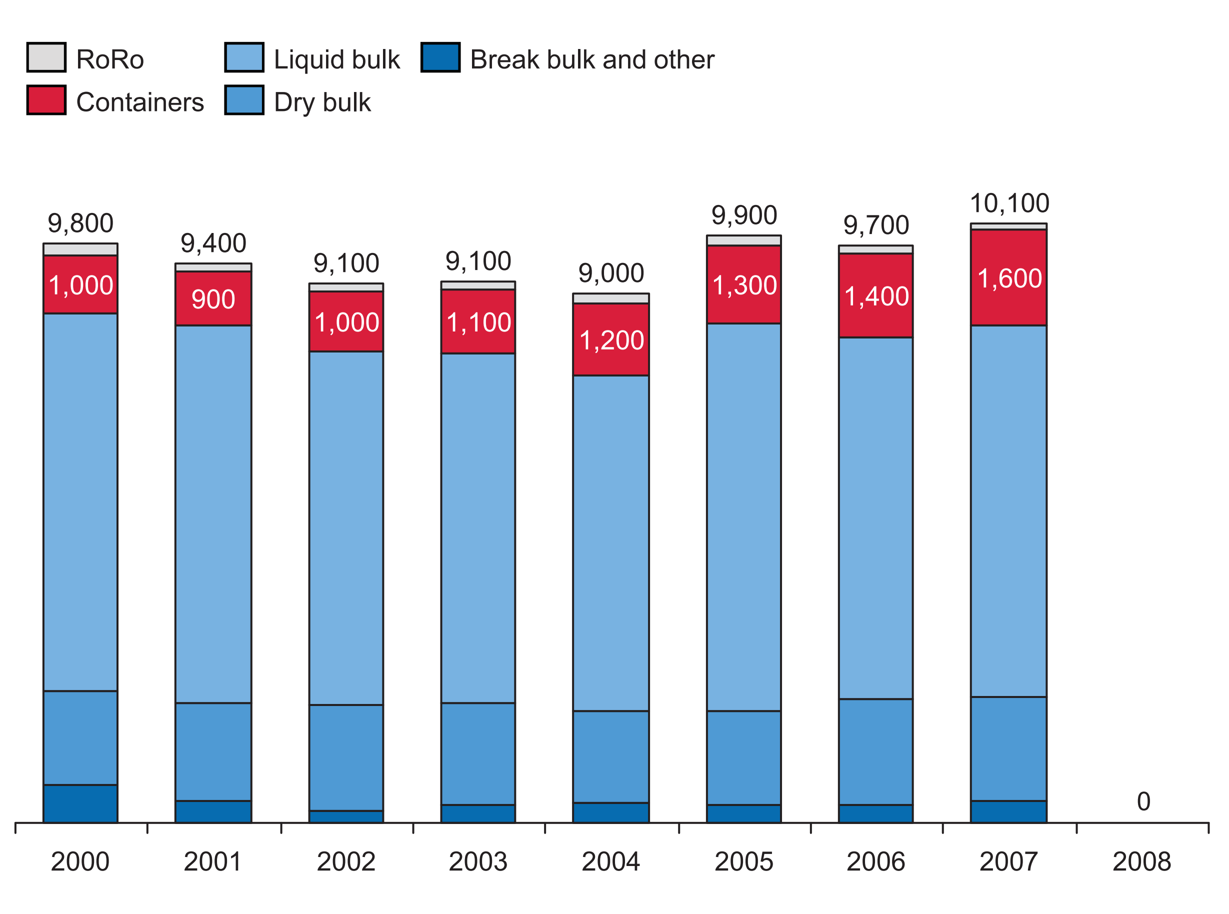



**Total tonnage at ports of Republic of Ireland, containerised cargoes 2007 - (000 tonnes)**




* Source: Inter TradeIreland, 2007, Freight Transport Report for the Island of Ireland

# The Port of Cork's growth has primarily been driven by growth in containers and liquid bulk




## CAGR

- CAGR of Containers over the period (2000-2007) was 6.9%
- Liquid bulk declined slightly in volume over the period 200-2007;however, since 2004, it has grown at a rate of 3.2%

## Main Cargoes at Cork

Ranked imports by tonnage:

- Crude and refined oil, animal feedstuff, fertiliser, and timber

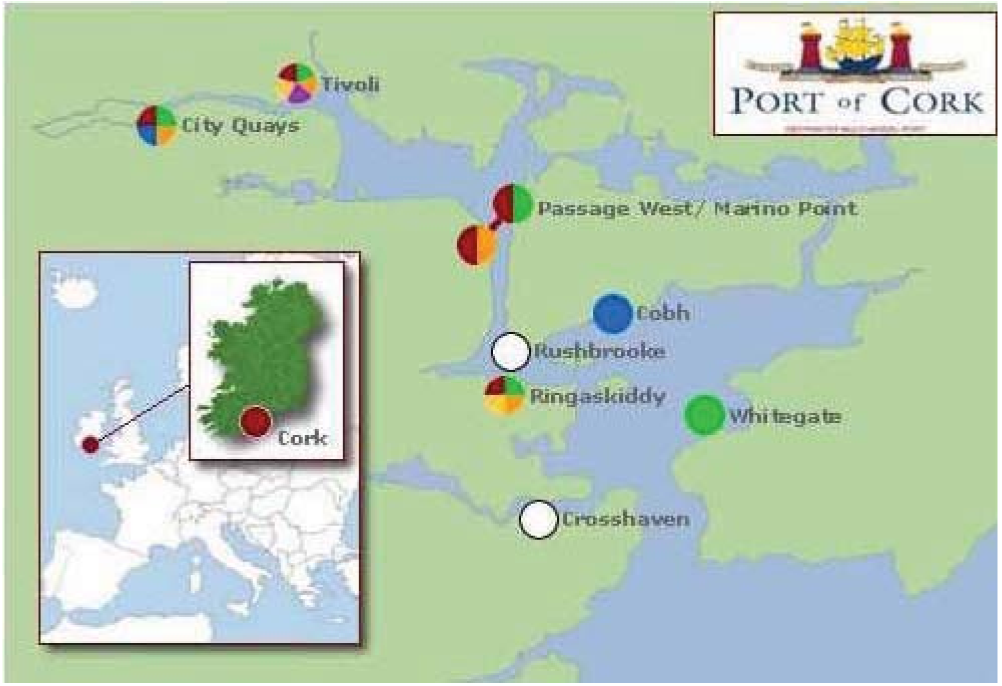
Ranked exports by tonnage

- Refined oil, containers, milk powder

Source: Booz & Company analysis based on http://www.cso.ie

# The Port of Cork is made up of a number of terminals/facilities at different locations in the harbour. Each terminal imports and exports a varying amount and type of cargoes

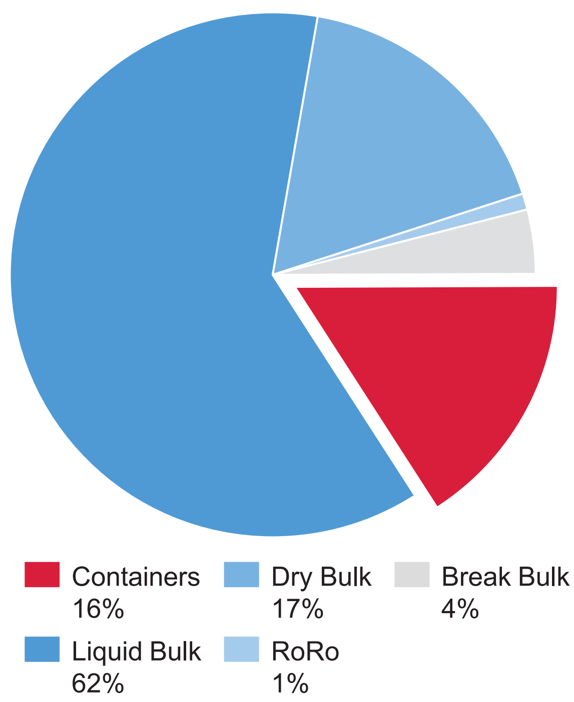
**Overview of facilities at Port of Cork, by cargo type**

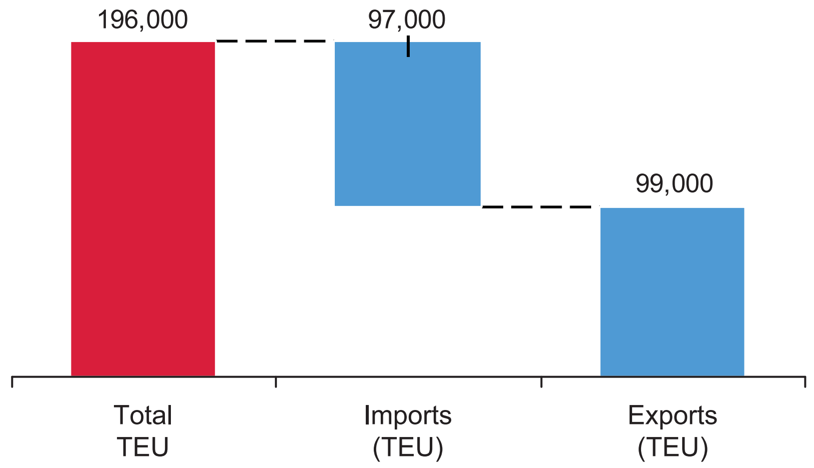




Source: Port of Cork website http://www.portofcork.ie/:

# Containerised cargo (2nd largest cargo[1]) at Tivoli Docks accounted for 16% of total port tonnage, or 196,000 TEU, in 2007



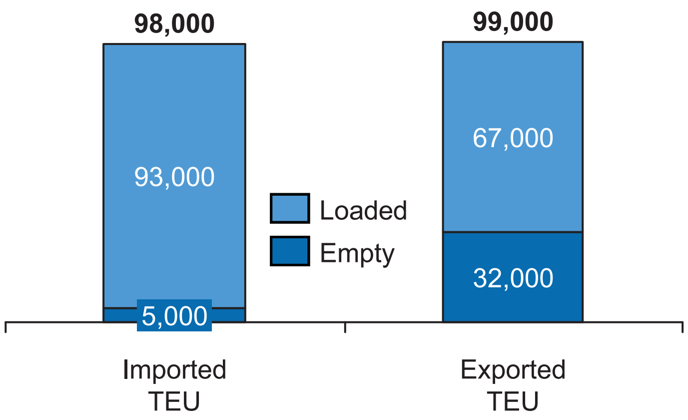

**Approximately:**

- 3770 TEU per week (total)
- 1870 TEU per week (imported)
- 1900 TEU per week (exported)

Source: Booz & Company analysis based on http://www.cso.ie
** Notes:
1 Liquid bulk to/from Whitegate Refinery accounts for 62% of exports& imports at the Port of Cork and is therefore the largest cargo
2. The number of containers entering and leaving port of cork are roughly matched; however, there is a significant difference in total weight of containers imported/export: due to empty imbalance and type of goods being imported versus type of goods being exported (see overleaf)

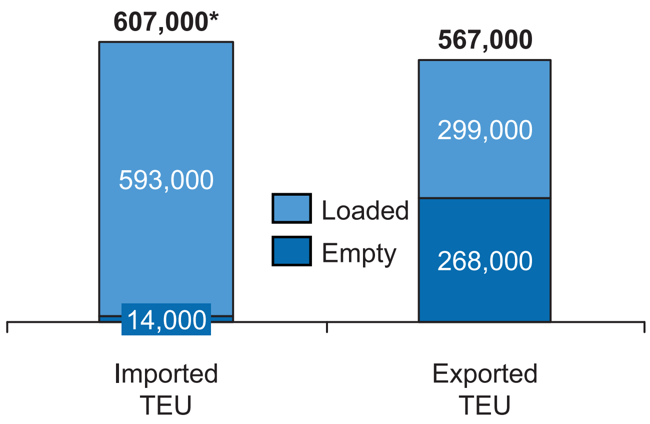
# The trade imbalance of containers at Cork is lower than the Irish average - an attractive proposition for shipping companies

**Imported and Exported TEU at Port of Cork (2007) - by loaded and empty**




1 **Trade imbalance of full imports to full exports of 1.4 : 1.0**

**Imported and Exported TEU in total Ireland (2007) - by loaded and empty**




2 **Trade imbalance of full imports to full exports of 2.0 : 1.0 (primarily driven by Port of Dublin)**

**The lower trade imbalance of full import versus full export containers at Port of Cork presents itself as an attractive commercial proposition for shipping lines, which generally receive higher revenue for loaded containers.**

Source: Booz & Company analysis based on http://www.cso.ie

# In 2007, the main containerised exports were dairy products and waste paper. The main imports were for the building industry

## Main Containerised Exports in 2007

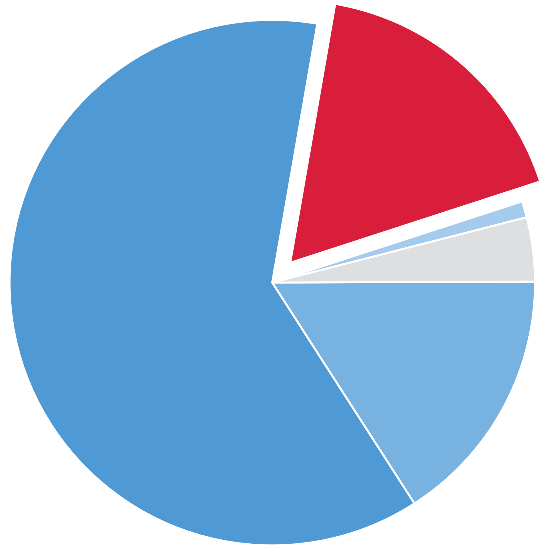
| | Tonnes |
|---|---|
| **Meat** | 24,000 |
| **Dairy** | 126,000 |
| **Drinks** | 92,000 |
| **Chemicals** | 53,000 |
| **Plastics** | 23,000 |
| **Caesin and other chemicals** | 29,000 |
| **Waste Paper for Recycling** | 152,000 |
| **Refractory Materials, glass bottles** | 47,000 |

## Main Containerised Imports in 2007

| | Tonnes |
|---|---|
| **Sugar** | 33,000 |
| **Drinks** | 80,000 |
| **Computers and machinery** | 84,000 |
| **Chemicals** | 79,000 |
| **Timber and timber products for building** | 130,000 |
| **Salts, minerals, stones etc** | 37,000 |
| **Furniture** | 33,000 |
| **Tiles, etc** | 76,000 |
| **Metal Products** | 33,000 |
| **Plastics** | 34,000 |

# In 2007, dry bulk at Port of Cork accounted for 17% of port tonnage, comprising timber, agricultural products & zinc ores

**Percentage of total tonnage, by category, at Port of Cork - 2007**

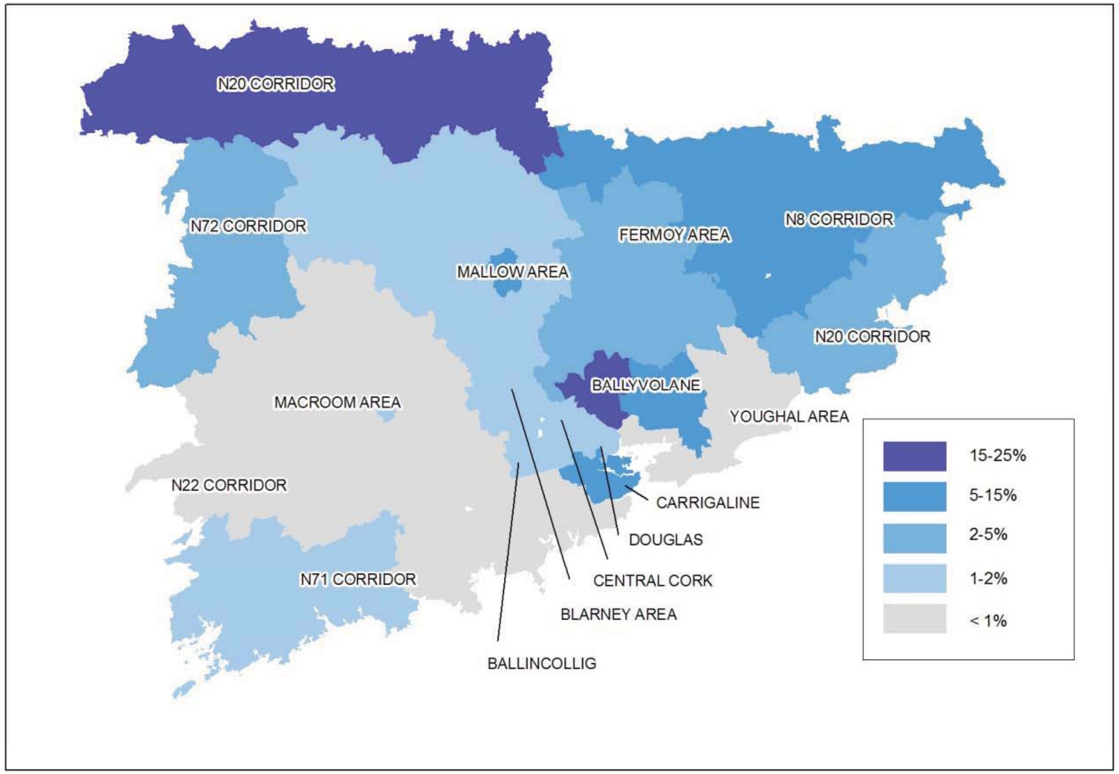



**Main bulk products at Port of Cork**

| | Tonnes |
|---|---|
| **Imports** | |
| ▪ Timber | 230,000 |
| ▪ Agricultural products & supplies | 580,000 |
| ▪ Coal | 58,000 |
| ▪ Cereal | 170,000 |
| **Exports** | |
| ▪ Timber | 14.000 |
| ▪ Ore from Lisheen Mine | 370,000 |
| ▪ Scrap metal | 120,000 |

Source: Booz & Company analysis based on http://www.cso.ie
* Note: 'Other' accounts for more than 50% of total exported tonnage at Port of Cork. However, it is unclear from published data what this category includes.

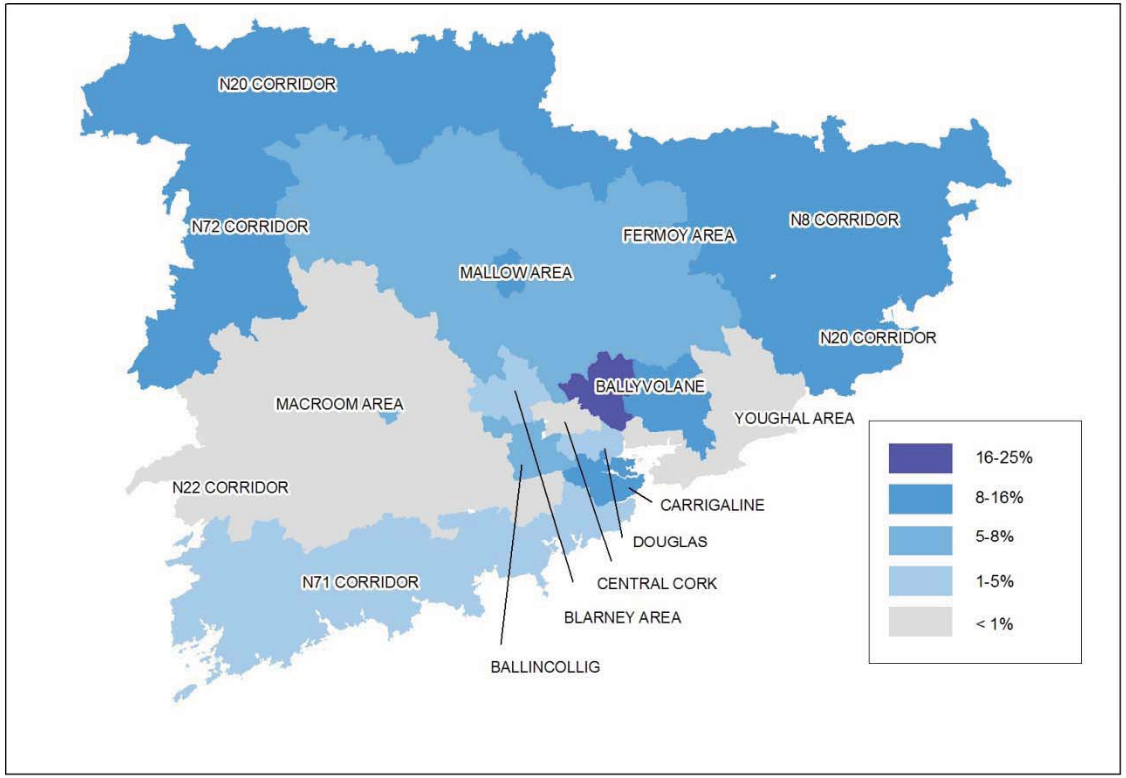
# All imported containers at Cork are carried by road, most of which have destinations in the N20 Corridor and north of the City




Source: Proposed Development at Oyster Bank Environmental Impact Statement.
Notes:
1. The data presented within the Oyster Bank EIS was compiled from general truck surveys. The data was recorded at a high level and this map is therefore to be used for illustrative purposes only.
2. The Oyster Bank EIS, noted that drivers to/from Kerry and Tivoli or Ringaskiddy favour the N20 and N72 routes, rather than the N22 which is usually regarded as the main route to Kerry. This accounts for the low showings for Macroom and N22 Corridor
3. The destination refers to the first point of deconsolidation

| Area | % Truck Departures from Tivoli |
|---|---|
| Cork City | 11% |
| Douglas | 2% |
| Midleton | 5% |
| Carrigaline | 8% |
| Ballincollig | 2% |
| Blarney | 2% |
| Ballyvolane | 15% |
| Youghal | 0% |
| Bandon | 1% |
| Kinsale | 1% |
| Macroom | 1% |
| Mallow | 7% |
| Fermoy | 5% |
| Cork Harbour | 0% |
| N71 Corridor | 1% |
| N22 Corridor | 0% |
| N20 Corridor | 23% |
| N8 Corridor | 8% |
| N25 Corridor | 4% |
| N72 Corridor | 4% |
| | 100% |

# Similar to imports, exported containers at Cork are carried by road, and are primarily sourced from the N20 Corridor/North City

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3. The destination refers to the first point of consolidation

| Area | % Arrivals at Tivoli |
|---|---|
| Cork City | 8% |
| Douglas | 1% |
| Midleton | 5% |
| Carrigaline | 7% |
| Ballincollig | 2% |
| Blarney | 1% |
| Ballyvolane | 15% |
| Youghal | 0% |
| Bandon | 0% |
| Kinsale | 1% |
| Macroom | 3% |
| Mallow | 7% |
| Fermoy | 6% |
| Cork Harbour | 0% |
| N71 Corridor | 1% |
| N22 Corridor | 0% |
| N20 Corridor | 22% |
| N8 Corridor | 8% |
| N25 Corridor | 8% |
| N72 Corridor | 5% |
| | 100% |

# In summary, the Port of Cork's role is regional, it does not handle goods coming/going long-distance across the country….

| Assumed Origin/Destination | Arrivals (%) | Departures (%) | All Trips (%) |
|---|---|---|---|
| South 'West | 63.7 | 65.9 | 64.8 |
| Mid West Region | 29 | 30.1 | 29.5 |
| South East Region | 7.3 | 4 | 5.7 |
| Total | 100 | 100 | 100 |

Source: Goodbody Economic Consultants, Statement to Oysterbank Oral Hearing, April 2008

**Surveys carried out in 2009 have confirmed that the 2005 findings still apply**

- Some 65% of all trips to or from Port of Cork are from the South West Region
- Nearly 95% of all trips are to or from the South West or Mid-West Region
- In other words, the Port's trade is drawn from its immediate hinterland and there is very little competition with the Port of Waterford, its nearest competitor
- Although there are no hard and fast rules about the distances over which rail freight is a viable option[1], the distances within the Port of Cork's hinterland are rather short

[1] Monitoring Development of the Rail Network - COM(2007) 609 suggests rail compete with road on cost grounds at distances over 150k, however, while the financial cost of shipping by rail may be greater than by road, there may still be a socio-economic benefit

# …. and, at first sight, transfer of any of the Port's main trades to rail is unlikely

Although price is typically the driver of mode choice decisions, there are a number of key factors that influence a shipper's mode choice decision:


**9 factors applied to the Port of Cork**

- **Price:** this is always the main determinant. All containerised and dry bulk traffic currently is transported by road to and from the Port of Cork. Road haulage costs are highly competitive in Ireland and the road network is dense and high quality, so rail will not compete on price without government support.
- **Volume:** with a few exceptions, volumes are rather low in the normal context of rail transport
- **Density/co-location of customers:** customers are dispersed but concentrated regionally
- **Inter-year demand:** rail freight needs demand which is stable from year to year, to justify the capital and operational investment
- **Intra-year demand:** Similarly, highly seasonal trades do not provide the steady demand required
- **Length of haul:** no hard rules, but the most of the customers are well within 150km of the port. EC research shows road transport will cost less over these distances (see Page 15 of this report).
- **Estimated life of rolling stock:** IÉ has some locomotives available but wagons are nearly life-expired
- **Access to rail infrastructure:** At present, there is no working rail freight terminal at Tivoli, Ringaskiddy and Cork's other terminals, and none of the customers are rail connected.
- **Length of haulage contract:** because of the level of investment required, the rail operator would need a reasonably long contract - we understand that the road haulage industry does not enjoy this security
- **Speed of road v rail:** rail can be faster and more reliable than road in congested urban networks

# However, this does not preclude an analysis of what cargoes are more suited than others to rail transport at the Port of Cork

- A high level analysis of the Port of Cork's larger cargoes was undertaken to asses if any would be suited to rail transport if a working rail terminal were to be constructed at Ringaskiddy or Marino Point.

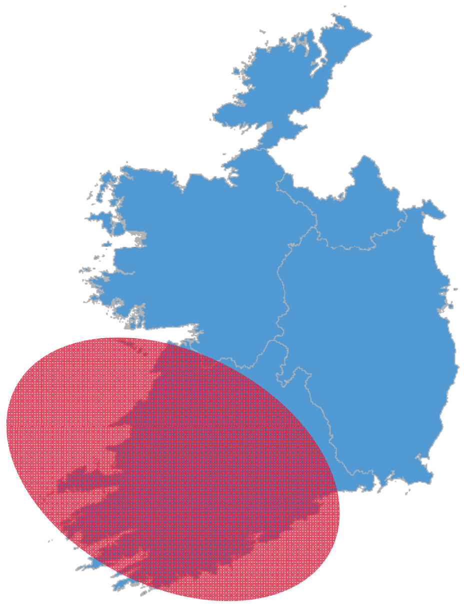
- The following slides in this section analyse the main containerised and non-liquid bulk cargo flows at the Port of Cork against the criteria on the previous page. This is done in order to determine the attractiveness of rail to transport each cargo to and from the port (compared to road).

# Imported animal feedstuff is not suited to rail transport given its dispersed customer base and unstable volumes

| | |
|---|---|
| **Cargo type** | Animal feed |
| **Haulage type** | Bulk |
| **Current mode** | Road |
| **Import / export** | Imported to locations throughout the South-West region |
| **Main customer** | Coops in North, East and West Cork and in Kerry |

| Indicator | Road | | Rail |
|---|---|---|---|
| High volume | M | | M |
| High density | L | | H |
| Inter-year demand | H | | L |
| Intra-year demand | M | | M |
| Length of haul | H | | L |
| Estimated remaining life of rail rollingstock | H | | L |
| Access to current rail infrastructure | H | | L |
| Length of haulage contract | H | | L |
| Road versus rail speed | H | | L |
| **Overall** | **H** | | **L** |

**Illustration of traffic flow:**



**Comments:**

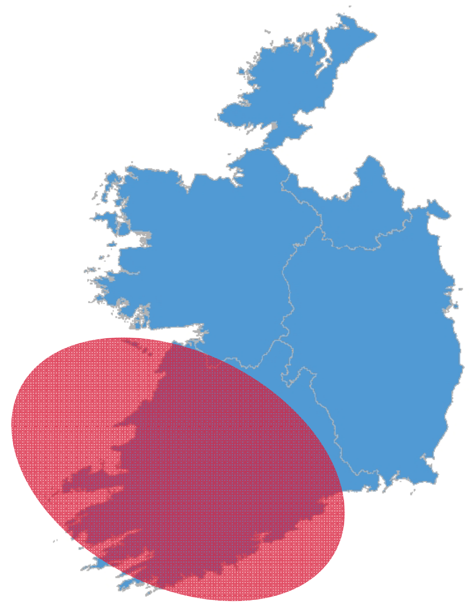
- Given the variability in volume of imported animal feedstuffs over the past few years, and the dispersed customer base, it is unlikely, in the absence of a central distribution facility that animal feedstuff would be suited for rail transport.

# Timber is imported in large volumes but is not suited to rail transport given its dispersed customer base and unstable volumes

| | |
|---|---|
| **Cargo type** | Timber |
| **Haulage type** | Bulk and containers |
| **Current mode** | Road |
| **Import / export** | Imported to locations throughout the South-West region |
| **Main customer** | Builders and builders' suppliers in North, East, West Cork and Kerry |

| Indicator | Road | | Rail |
|---|---|---|---|
| High volume | M | | M |
| High density | L | | H |
| Inter-year demand | H | | L |
| Intra-year demand | M | | M |
| Length of haul | H | | L |
| Estimated remaining life of rail rollingstock | H | | L |
| Access to current rail infrastructure | H | | L |
| Length of haulage contract | H | | L |
| Road versus rail speed | H | | L |
| **Overall** | **H** | | **L** |

**Illustration of traffic flow:**



**Comments:**

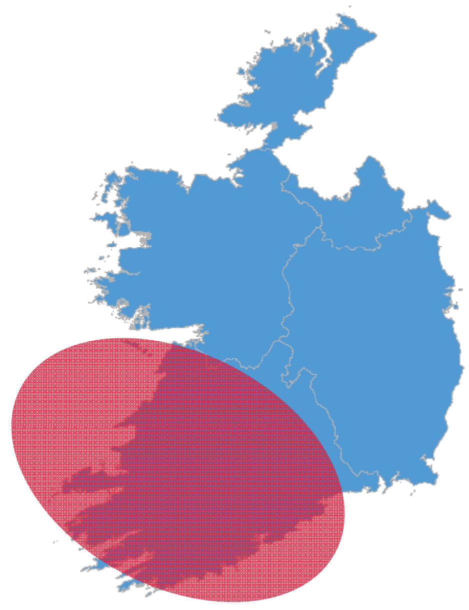
- Given the variability in demand for building materials, and the dispersed customer base, it is unlikely, in the absence of a central distribution facility that timber would be suited for rail transport.

# Grain imported in large volumes but is not suited to rail transport given its dispersed customer base and seasonal nature volumes

| | |
|---|---|
| **Cargo type** | Grain |
| **Haulage type** | Mainly bulk |
| **Current mode** | Road |
| **Import / export** | Imported to locations throughout the South-West region |
| **Main customer** | Oldums, breweries, various mills throughout the region |

| Indicator | Road | | Rail |
|---|---|---|---|
| High volume | M | | M |
| High density | L | | H |
| Inter-year demand | H | | L |
| Intra-year demand | M | | M |
| Length of haul | H | | L |
| Estimated remaining life of rail rollingstock | H | | L |
| Access to current rail infrastructure | H | | L |
| Length of haulage contract | H | | L |
| Road versus rail speed | H | | L |
| **Overall** | **H** | | **L** |

**Illustration of traffic flow:**



**Comments:**

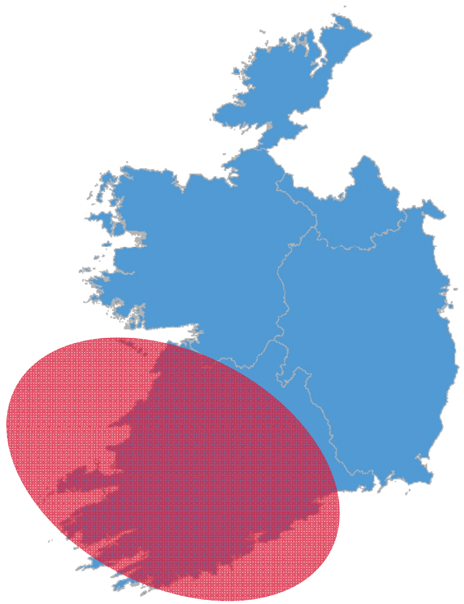
- Demand is not sufficiently well concentrated to suit rail operations

# Drinks products are imported and exported in reasonably large volumes but through numerous companies each relatively small

| | |
|---|---|
| **Cargo type** | Drinks - |
| **Haulage type** | Containers |
| **Current mode** | Road |
| **Import / export** | Both |
| **Main customer** | Numerous exporters and importers |

| Indicator | Road | | Rail |
|---|---|---|---|
| High volume | M | | M |
| High density | L | | H |
| Inter-year demand | H | | L |
| Intra-year demand | M | | M |
| Length of haul | H | | L |
| Estimated remaining life of rail rollingstock | H | | L |
| Access to current rail infrastructure | H | | L |
| Length of haulage contract | H | | L |
| Road versus rail speed | H | | L |
| **Overall** | **H** | | **L** |

**Illustration of traffic flow:**



**Comments:**

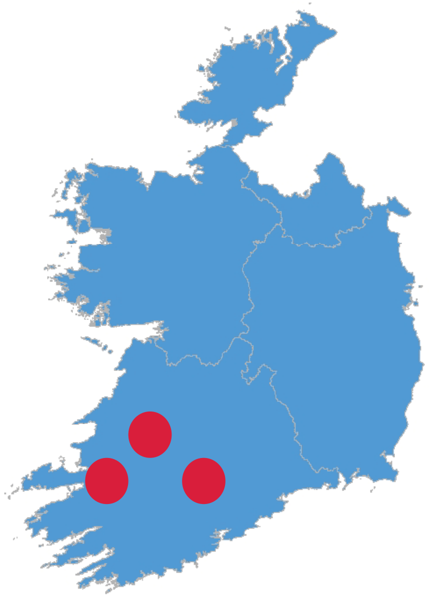
- Although the overall volumes of drinks imported and exported are reasonably large, there are numerous customers. Exporters include the local breweries, Irish Distiller in Midleton, Clonmel drinks producers, spring water producers. Importers are also distributed around the region, dealing in beers, spirits, spring waters, soft drinks etc.

# Exported milk powder is suited for rail transport given its stable demand base but the customers are not on the network

| | |
|---|---|
| **Cargo type** | Milk Powder |
| **Haulage type** | Bulk |
| **Current mode** | Road |
| **Import / export** | Exported from Limerick (Askeaton), Kerry (Listowel) and North Cork (Mallow/Mitchelstown) |
| **Main customer** | Wyeth (Baby food), Kerry Group and Dairygold |

| Indicator | Road | | Rail |
|---|---|---|---|
| High volume | M | | M |
| High density | L | | H |
| Inter-year demand | M/H | | L/M |
| Intra-year demand | L | | H |
| Length of haul | M | | M |
| Estimated remaining life of rail rollingstock | M/H | | H |
| Access to current rail infrastructure | H | | L |
| Length of haulage contract | M/L | | M/H |
| Road versus rail speed | M/H | | L/M |
| **Overall** | **M** | | **M** |

**Illustration of traffic flow:**



**Comments:**

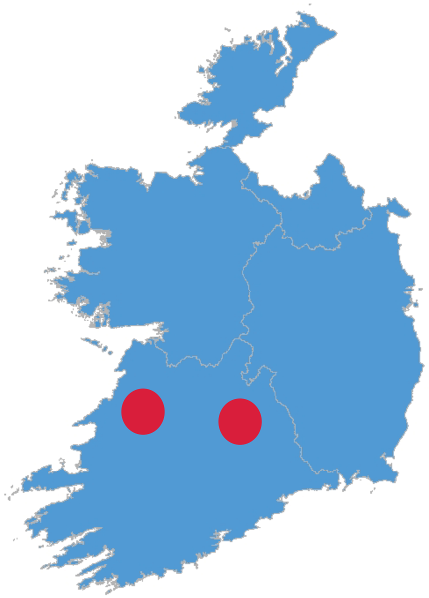
- Milk powder is an ideal candidate for rail transport given its relatively stable intra-year demand, if it could be consolidated into viable train loads. However, currently road is the more attractive option due to the lack of rail facilities at production centres and port and relatively small volumes.

# Exported dairy products are not suited to rail transport given the distance of producers from railheads

| | |
|---|---|
| **Cargo type** | Butter |
| **Haulage type** | Bulk |
| **Current mode** | Road |
| **Import / export** | Exported from Kerry and Cork |
| **Main customer** | Dairygold (Mallow, Mitchelstown), Kerry Group (Listowel) |

| Indicator | Road | | Rail |
|---|---|---|---|
| High volume | H | | L |
| High density | L | | L |
| Inter-year demand | M | | M |
| Intra-year demand | M | | M |
| Length of haul | H | | L |
| Estimated remaining life of rail rollingstock | H | | L |
| Access to current rail infrastructure | H | | L |
| Length of haulage contract | M/H | | L/M |
| Road versus rail speed | H | | L |
| **Overall** | **H** | | **L** |

**Illustration of traffic flow:**



**Comments:**

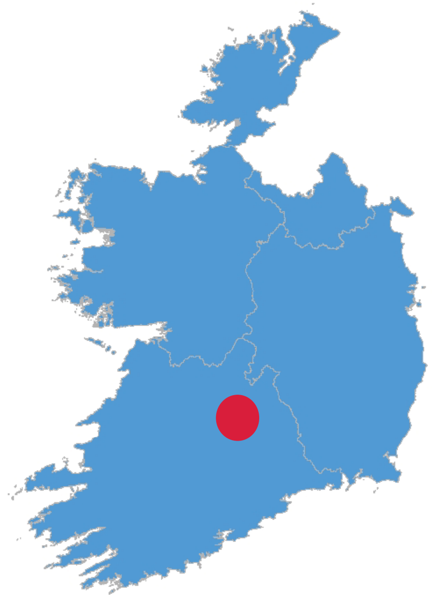
- There are three main butter flows: (1) The Kerry Group are located in Listowel, and are not located near a rail head. Dairygold are located in two places: (2) Mallow (which is on rail) and (3) Mitchelstown (which is not on rail).
- Given the relatively low volumes and close proximity of the exporter in (2), it is unlikely that this freight task is suited to rail. Also, given that (1) + (3) are not located near a railhead, it is unlikely that this product would be suited for rail.

# Exported zinc would be an ideal candidate for rail transport if incentives for rail facilities were provided at the mine

| | |
|---|---|
| **Cargo type** | Zinc |
| **Haulage type** | Bulk |
| **Current mode** | Road |
| **Import / export** | Exported from Lisheen Mines through Port of Cork |
| **Main customer** | Lisheen mines |

| Indicator | Road | | Rail |
|---|---|---|---|
| High volume | L | | H |
| High density | L | | H |
| Inter-year demand | M/H | | L/M |
| Intra-year demand | L/M | | M/H |
| Length of haul | L/M | | H |
| Estimated remaining life of rail rollingstock | H | | L |
| Access to current rail infrastructure | H | | L/M |
| Length of haulage contract | M | | M |
| Road versus rail speed | M | | M |
| **Overall** | **L/M** | | **M/H** |

**Illustration of traffic flow:**



**Comments:**

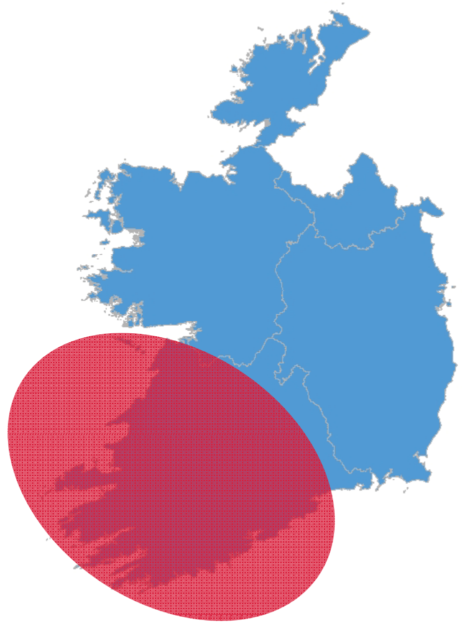
- If rail facilities were operational at both port and mine-site, exported zinc is likely to be a candidate for rail transport given its comparatively high volumes and single point of origin/destination. However, the large variability in year to year demand and the short life left at Lisheen Mines (due to be exhausted by 2014) make investment in rail unattractive at this stage but if a similar opportunity arose at a new mine, for example, Pallas Green, it probably could be served by rail.

# Exported waste paper for recycling meets many criteria but the trade is too fragmented to suit rail

| | |
|---|---|
| **Cargo type** | Waste paper |
| **Haulage type** | container |
| **Current mode** | Road |
| **Import / export** | Exported from all major towns throughout the South-West Region |
| **Main customer** | Various waste disposal companies and shippers |

| Indicator | Road | | Rail |
|---|---|---|---|
| High volume | M/H | | L/M |
| High density | H | | L |
| Inter-year demand | L/M | | M/H |
| Intra-year demand | H | | L |
| Length of haul | H | | L |
| Estimated remaining life of rail rollingstock | H | | L |
| Access to current rail infrastructure | H | | L |
| Length of haulage contract | H | | L |
| Road versus rail speed | M | | M |
| **Overall** | **H/M** | | **L** |

**Illustration of traffic flow:**



**Comments:**

- Export of waste paper is a major cargo at Port of Cork, but it is fragmented across the various shipping lines and waste disposal companies, all of which tend to consolidate at the big towns in the region and not centrally.

# In conclusion, none of the existing trades are suitable for transfer to rail for various reasons. Above all, they are not rail-connected

**Summary of Reasons why the Existing Market is hard to serve by Rail**

- None of the customers are rail connected i.e. the do not have rail access into their sites and many of them are remote from the railway network
- Most of the customers do not generate sufficient volumes to run full train loads
- Customers are dispersed throughout the region, not concentrated
- Most of the customers are well within the distance where road is more cost effective than rail
- Road haulage companies provide a competitive service

- Any solution will need to overcome these problems

| | |
|---|---|
| Chapter 1 | Context |
| Chapter 2 | Policy Background |
| Chapter 3 | Rail Freight Baseline |
| Chapter 4 | Demand to Transport by Rail |
| **Chapter 5** | **Future Scenario with Rail** |
| Chapter 6 | Rail Connection Options |
| Chapter 7 | Socio Economic Evaluation |
| Chapter 8 | Other Options |
| Chapter 9 | Conclusions and Next Steps |

# The most obvious possibility for a radical change in the situation would be if Cork took significant business from other ports

**Major Growth Scenario**

- Port of Cork Company pursues an active strategy to take significant volumes of traffic away from competing ports such that its business grows by a factor of two or three (say), giving it the “critical mass” for a rail operation
- This could be successful in the case of:
  - Other ports down-sizing or no longer being competitive for some reason (e.g. rising costs, industrial unrest, traffic congestion, etc.); and/or
  - Cork is somehow designated a leading national port and receives State support to develop accordingly; and/or
  - Some other unforeseen situation

**Disadvantages of this Scenario**

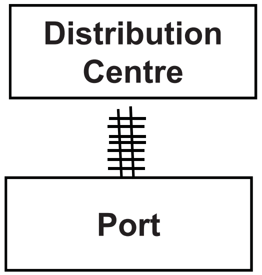
- No realistic prospect of the competitive position of the other ports changing to this extent as the State favours a competitive ports regime. This is unlikely to change
- No environmental benefit in goods currently going by ship (i.e. straight into Dublin Port) being transferred to rail (although it would be better than road), making the case for this scenario difficult to construct
- Does not help identify a specific demand around which to construct a case
- Situation remains where customers have no railheads and national rail freight infrastructure is lacking and to assess the national infrastructure needed would be a big task

**This does not produce a Best Case Scenario upon which to develop and assess rail connection options**

# Distribution Centres overcome the need for customer railheads and provide the scale needed to justify rail operations

## Distribution Centre - How it could work

- recognises that, except for certain bulk trades, few traffics can complete their entire journey by rail alone
- can serve a twofold purpose when import and export volumes are well balanced, as they are in Cork
- exports from all over the region would be taken by road and then gathered into full train loads before being taken by train to the port.
- imports would be taken from the port to the distribution centre before being taken by truck to individual destinations throughout the region.
- operated by a logistics company who can provide an end to end service for their clients regardless of the mode (i.e. whilst a container may be picked up by a truck, put on rail and then collected by a truck at the other end the customer must not feel this) and other services e.g. container power supply or management of bonded cargoes
- Distribution activities (i.e number of staff, train time arrivals etc.) would be focussed around when customers want their goods, normally between 0700-0900 in the morning


## Pros and Cons

- Pros
  - Overcomes argument that customers are small, dispersed and without railheads
  - Provides sufficient density to justify rail operations
  - Contains capital investment requirements locally and to extent which can be roughly quantified
  - Takes significant numbers of trucks of the roads
  - Commonplace and successful internationally
  - Efficient, integrated, operator can transport containers by the most effective mode
- Cons
  - Double-handling, resulting in additional costs
  - Reduced flexibility/speed
  - The level of Government capital and revenue support funding needed to encourage/incentivise its use might be large

**Hypothesis**

A Distribution Centre located to the North-West of the City with a shuttle rail freight service linking to the port is the Best Possible Scenario upon which to build a case.

If there is no case under this scenario, there is no point in looking further.

# The Distribution Centre concept lends itself well to the Cork situation and will form the basis for our options

- Underlying the concept of shifting containers to rail is the idea that a Distribution Centre will be established somewhere near or slightly north of Mallow (No site has been identified.  IÉ has land at Mallow station, the potential of which would need to be clarified but which is not likely to be sufficient)
- This concept has underpinned our assumptions discussed previously as we have identified all traffic going north from the container terminal (wherever that might be) to be transferred to rail
- This Distribution Centre would:

  - Receive all export containers which will be forwarded on rail to the point they are loaded onto a ship

  - Receive all imported containers which will be transferred from rail onto road and distributed to customers.
- Appendix A contains information on how distribution centres work in New Zealand


# As a long term aspiration, the Distribution Centre concept could be extended beyond the Cork area/South West Region

- Cork could position themselves to be the "Port of Choice" on the east coast and establish a Distribution Centre near Dublin
- This would allow goods to be distributed in and around Dublin, relying on rail to line-haul the products and road to finish the final leg
- The site would best be located outside of the immediate city area
- Close to the strategic road network and connected into rail, the site would best be in a relatively low density area
- Ideally the site would be located close to the industrial area of Dublin, where large retailers have their own distribution centres
- There is no such site currently in railway ownership
- It would be difficult to identify benefits arising from the situation where If freight currently taken into Dublin by ship were to be taken to Cork instead and taken by rail to Dublin

**Indicative Distribution Centre location**

# There would be no financial reason to transport via a Distribution Centre at present or in the foreseeable future - subsidy required

## Direct Road v. Distribution Centre

- We examined the cost of transporting containers by rail to three locations where the port has customers of a reasonable size[1]
  - Askeaton, Co. Limerick
  - Listowel, Co. Kerry
  - Mitchelstown, Co. Cork
- Trucks to Listowel were assumed to route on the N20, as indicated by the 2005 surveys
- Costs by rail to North Kerry/Limerick are 25-30% or around €70/container higher than by road
- Costs to Mitchelstown are estimated to be over 70% higher, or €100/container, by rail
- Obviously, the customer would not choose to transport via the Distribution Centre (DC) unless the costs and overall service were comparable with a direct road service.
- It is envisaged that the DC would be run by a private sector operator and part funded by the State on the basis that there is value in doing so. IE or another operator would run the trains.
- Chapter 7 evaluates whether there would be sufficient value in the proposition to justify support

[1] These customers do not generate sufficient volumes for full train loads. There could be delays associated with the assembly and disassembly of trainloads, and with waiting for trains to arrive/depart. However, it can be assumed that an integrated logistics provider would send time-critical containers by the most appropriate mode, be it road or rail

| | Askeaton | Listowel | Mitchelstown |
|---|---|---|---|
| Distance from Port - Distribution Centre (km) | 50 | 50 | 50 |
| Distribution Centre - Customer (km) | 75 | 130 | 30 |
| Customer - Port (km) | 130 | 180 | 60 |
| **Distribution Centre Option** | | | |
| Lift from ship to rail | 729 | 729 | 729 |
| Rail fixed cost | 2000 | 2000 | 2000 |
| Rail variable cost | 493 | 493 | 493 |
| Lift from rail to truck | 324 | 324 | 324 |
| Road haulage costs | 1755 | 3042 | 702 |
| Total per train load (18 x 40ft or 45ft containers) | 5301 | 6588 | 4248 |
| Cost per container | 295 | 366 | 236 |
| **Direct Road Option** | | | |
| Lift from ship to quayside | 729 | 729 | 729 |
| Lift from quayside to truck | 324 | 324 | 324 |
| Road haulage costs | 3042 | 4212 | 1404 |
| Total per train load (18 x 40ft or 45ft containers) | 4095 | 5265 | 2457 |
| Cost per container | 228 | 293 | 137 |
| Increase in cost | 67 | 74 | 100 |
| % increase in cost | 29% | 25% | 73% |

Source: Cost data from Goodbody Economic Consultants, June 09 (not validated against Booz cost model) Booz & Company analysis

# To understand how much traffic could go by rail from any site, the existing container terminal traffic distribution was examined

- Existing Container Terminal Traffic Distribution

Source: Origin destination surveys undertaken by Port of Cork in November 2005 and presented in Oysterbank EIS. Surveys undertaken in 2009, subsequent to this analysis, indicated that the distribution remains the same as in 2005.

Note that imports and exports appear well balanced

| Area | % HGV Arrivals | % HGV Departures | % HGV Total |
|---|---|---|---|
| Cork City | 8% | 11% | 9% |
| Douglas | 1% | 2% | 1% |
| Midleton | 5% | 5% | 5% |
| Carrigaline | 7% | 8% | 8% |
| Ballincollig | 2% | 2% | 2% |
| Blarney | 1% | 2% | 2% |
| Ballyvolane | 15% | 15% | 15% |
| Youghal | 0% | 0% | 0% |
| Bandon | 0% | 1% | 0% |
| Kinsale | 1% | 1% | 1% |
| Macroom | 3% | 1% | 2% |
| Mallow | 7% | 7% | 7% |
| Fermoy | 6% | 5% | 6% |
| Cork Harbour | 0% | 0% | 0% |
| N71 Corridor | 1% | 1% | 1% |
| N22 Corridor | 0% | 0% | 0% |
| N20 Corridor | 22% | 23% | 22% |
| N8 Corridor | 8% | 8% | 8% |
| N25 Corridor | 8% | 4% | 6% |
| N72 Corridor | 5% | 4% | 5% |
| | | | 100% |

Source: RPS O-D Surveys, November 2005

**Distribution of Trucks to/from Tivoli**

Detailed zones aggregated

| Area | | % Total HGV |
|---|---|---|
| Cork City | | 9% |
| Ballyvolane | | 15% |
| Blarney | | 2% |
| Ballincollig | | 2% |
| South | *Douglas, Carrigaline, Bandon, N71, Kinsale* | 11% |
| East | *Midleton, Youghal, N25* | 11% |
| West | *Macroom, N22* | 2% |
| North West | *Mallow, N20, N72* | 34% |
| North | *Fermoy, N8* | 14% |
| | | 100% |

- Assumes imports and exports balanced

# Assumptions were then made about which traffic is best suited for possible transfer to rail

## Assumptions

- Containers to/from Cork City and areas to the east and south would not use a distribution centre in the Mallow area
- Some traffic from the Ballyvolane, Blarney and Ballincollig areas may use it
- A Distribution Centre in the Mallow area would be most attractive for traffic to/from the west, northwest and, at the margins, to/from the north
- In keeping with our agreed approach to consider the best possible scenario under which Port of Cork could be rail connected, an assessment was made based on the maximum possible transfer of 50%
- An assessment was also undertaken assuming 25% of the port's traffic went via the DC. Although more realistic, this would still mean a major change in behaviour and it would be a challenging target.

| **Area** | | **% Total HGV** | **Use DC at Mallow?** | **What proportion?** |
|---|---|---|---|---|
| Cork City | | 9% | No | 0% |
| Ballyvolane | | 15% | Maybe | 25% |
| Blarney | | 2% | Maybe | 50% |
| Ballincollig | | 2% | Maybe | 25% |
| South | *Douglas, Carrigaline, Bandon, N71, Kinsale* | 11% | No | 0% |
| East | *Midleton, Youghal, N25* | 11% | No | 0% |
| West | *Macroom, N22* | 2% | Yes | 90% |
| North West | *Mallow, N20, N72* | 34% | Yes | 90% |
| North | *Fermoy, N8* | 14% | Yes | 90% |
| **Absolute maximum to use Distribution Centre** | | | | **50%** |
| **Target to use Distribution Centre** | | | | **25%** |

Source: RPS O-D Surveys, November 2005, Booz Analysis. Surveys undertaken in 2009, subsequent to this analysis, indicated that the distribution remains the same as in 2005.

# As proposed, the Distribution Centre implies an inherently efficient railway operation

- The railway operation would be a shuttle service operating continuously between the port and the Distribution Centre, 6 days a week, during business hours, roughly
- Drivers, locomotives and freight wagons would therefore be fully utilised and never idle
- Full train lengths are assumed i.e. the Distribution Centre operator would charter 18-wagon trains from IÉ (or possibly another train operator in future, if that is an option) and take the risk for filling them
- Additional trainsets (locomotive and wagons) would not be purchased unless worthwhile, even if that meant some freight had to go by road
- As the trips are short and local, there is no need for trains and drivers to spend nights away from their base, which removes the need for accommodation elsewhere which is a feature of long haul freight operations
- Our assessment captures these efficiencies. If the Distribution Centre does not have sufficient "critical mass", these would be lost. We estimate that around 25% of total port traffic (see page 78) is required to go through the DC for a single trainset and crew to operate efficiently.

# Potential TEUs to be carried by rail were then calculated for each phase of the container terminal development

## Potential TEUs to be carried by Rail

| | | Phase 1 | Phase 2 | Phase 3 | Longer Term |
|---|---|---|---|---|---|
| Capacity (TEU per annum) | | 250,000 | 300,000 | 400,000 | 600,000 |
| Load factor | 85% | | | | |
| Total TEU per annum | | 212,500 | 255,000 | 340,000 | 510,000 |
| Total TEU by rail | 50% | 106,250 | 127,500 | 170,000 | 255,000 |
| | 25% | 53,125 | 63,750 | 85,000 | 127,500 |

Notes
1) TEU for each phase as described in Oysterbank Financial and Economic Appraisal, Goodbdy, 2007
2) Booz & Co. have not adjusted capacity requirements in line with recent economic downturn
3) 85% load factor Booz & Co. assumption

## Container Flat Wagon

- Containers would be carried on Container Flat Wagons (CFT) similar to that shown above.
- Each CFT can accommodate two 20ft containers or one 40ft or 45ft containers
- IÉ currently only operate full train loads of 18 container flat wagons and have a limit of 36 TEU per train.
- IÉ have advised that the weight limit could be increased with new rolling stock

# Understanding the container carrying capacity of rolling stock and the length of trains is another important consideration

## Considerations in Rail Freight Operations

- One of the biggest considerations in a rail freight environment is the capacity of a single train
- That capacity defines the:
  - number of TEU that can be transported in one trip
  - infrastructure needed i.e. signalling and passing loops
  - horsepower of the locomotives needed for each train.
- Our assumed container size split is based on conversations with shipping companies.
- IÉ's theoretical limit is 36 TEU/18 CFT per train. In discussions, they noted that 40ft and 45ft containers are both treated as 2 TEU, so our figure of 38.25 TEU is not a problem. Furthermore, the limits are set by the existing rolling stock and would not apply if new rolling stock were bought, which would be the case.

**Train Makeup**

Container flat wagons and carrying capability

| | Container size split | No. CFT per train carrying each size container | TEU for each container size | Containers on each CFT | TEU per train | Containers per train |
|---|---|---|---|---|---|---|
| 45ft containers | 50% | 9 | 2.25 | 1 | 20.25 | 9 |
| 40ft containers | 30% | 5 | 2 | 1 | 10.80 | 5 |
| 20ft Containers | 20% | 4 | 1 | 2 | 7.20 | 7 |

| | |
|---|---|
| Total CFT per train (IE limit) | 18 |
| Total TEU per train | 38.25 |
| Total Containers per train | 22 |

# Train frequency then is defined by the number of CFTs and subsequent containers the train can carry

**Train frequency**
For a 18 CFT Train

| | | Phase 1 | Phase 2 | Phase 3 | Long term |
|---|---|---|---|---|---|
| **50% to rail** | TEU to rail | 106250 | 127500 | 170000 | 255000 |
| | TEU each train | 38 | 38 | 38 | 38 |
| | Trains per annum | 2778 | 3333 | 4444 | 6667 |
| | Trains per week (48 weeks) | 58 | 69 | 93 | 139 |
| | Trains per day (6 days) | 10 | 12 | 15 | 23 |
| **25% to rail** | TEU to rail | 53125 | 63750 | 85000 | 127500 |
| | TEU each train | 38 | 38 | 38 | 38 |
| | Trains per annum | 1389 | 1667 | 2222 | 3333 |
| | Trains per week (48 weeks) | 29 | 35 | 46 | 69 |
| | Trains per day (6 days) | 5 | 6 | 8 | 12 |

| | |
|---|---|
| Chapter 1 | Context |
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| Chapter 5 | Future Scenario with Rail |
| **Chapter 6** | **Rail Connection Options** |
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| Chapter 9 | Conclusions and Next Steps |

# A container terminal at Ringaskiddy or Marino Point could be directly or indirectly connected to the rail network

**Direct and Indirect Connections from Marino Point* and Ringaskiddy* to Rail Network**

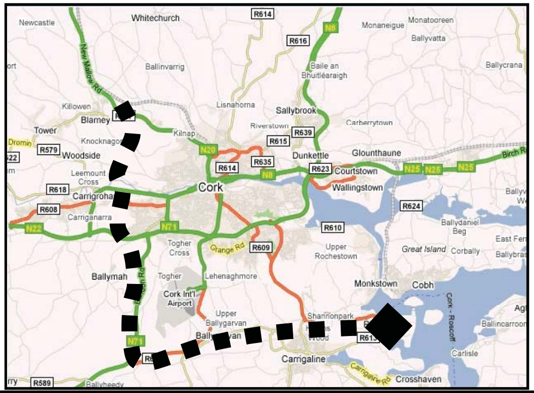
| | Site | Option for Connection | Initial Assessment |
|---|---|---|---|
| **Direct** | **Marino Point** | ▪ Spur to adjacent Cork-Cobh line | ▪ Although not the preferred location for a container terminal, it has a direct connection<br>▪ Worth investigation |
| | **Ringaskiddy** | ▪ Bridge to Cork-Cobh line | ▪ The shortest link to the network but difficult given the gradients and the need to cross the West Passage<br>▪ Highly unlikely but needs to be scoped out and assessed |
| | | ▪ New link to Cork - Dublin line | ▪ A considerably longer link but over easier terrain and avoiding issues at Kent station<br>▪ Highly unlikely but needs to be scoped out and assessed |
| | | ▪ New link to Kent Station | ▪ Would have to be in tunnel and therefore even more difficult than the above options.<br>▪ Not worth further consideration at this stage. |
| **Indirect** | **Marino Point** | ▪ By road to an existing railhead (North Esk) | ▪ Short distance, minimal investment<br>▪ Suitable option for niche customers that can provide railheads and full trainloads<br>▪ A useful option if Marino Point is developed by Port of Cork, whether for a container terminal or another facility |
| | **Ringaskiddy** | ▪ By road/ferry/barge to an existing railhead | ▪ Long distance from Ringaskiddy to any railhead, say in the Rathpeacon area, makes this unattractive but not impossible if a customer materialised with large volumes<br>▪ Not worth further consideration |
| | | ▪ By ferry/barge to a new spur at Marino Point | ▪ Major barging operation between Ringaskiddy/Oysterbank and Marino Point would interfere with port operations, so suited for a small or occasional operation<br>▪ Worth considering if Marino Point is developed |

* This analysis is considering these two sites only

# Three Distribution Centre-based options for a direct connection to the railway network were evaluated

**Summary of the Three Infrastructure Options Evaluated**

Considered at a conceptual level appropriate for a high level socio-economic evaluation, each would require substantial feasibility work

| Option 1 | Option 2 | Option 3 |
| --- | --- | --- |
| ▪ Containers are unloaded from ships at Marino Point<br>▪ A railhead at Marino Point is constructed<br>▪ A distribution centre is built near Mallow.<br>▪ Height clearance at Cork Rail Tunnel is obtained.<br>▪ Kent Stn bypass retained.<br> | ▪ Containers are unloaded from ships at Ringaskiddy.<br>▪ A railhead is built at Ringaskiddy<br>▪ 10.5km of new railway is built to Marino Point to connect to the existing railway, via a substantial bridge over the estuary.<br>▪ A distribution centre is built near Mallow.<br>▪ Height clearance at Cork Rail Tunnel is obtained.<br>▪ Kent Station Bypass is retained.<br> | ▪ Containers are unloaded from ships at Ringaskiddy.<br>▪ A railhead is built at Ringaskiddy<br>▪ 30km of new railway is built by-passing the Cork metropolitan area to the south and west, joining the existing railway to the NW of Cork City.<br>▪ A distribution centre is built near Mallow.<br>▪ Height clearance on the existing railway between the connection point and the distribution centre is not an issue.<br> |

# All the direct options involve some significant "end of the line assumptions"

- The underlying premise is that all container traffic goes to a Distribution Centre (DC) and is distributed from there.
- The DC would require a site:
  – capable of handling up to 500,000 TEU
  – located around or north of Mallow
  – approximately 40 hectares in area to accommodate growth
- The DC would need to operate 24 hours a day, 6 days a week
- At Kent Station:
  – The Loop Line would need to be retained
  – Height clearance gained at the tunnel either through infrastructure work or investment in new freight wagons
- With the increase in traffic on this line there may also be a need for increased signalling
- Maintenance activities may also need to change because increased train frequency will increase the wear and tear on the infrastructure and also reduce opportunities to take track possession for maintenance purposes

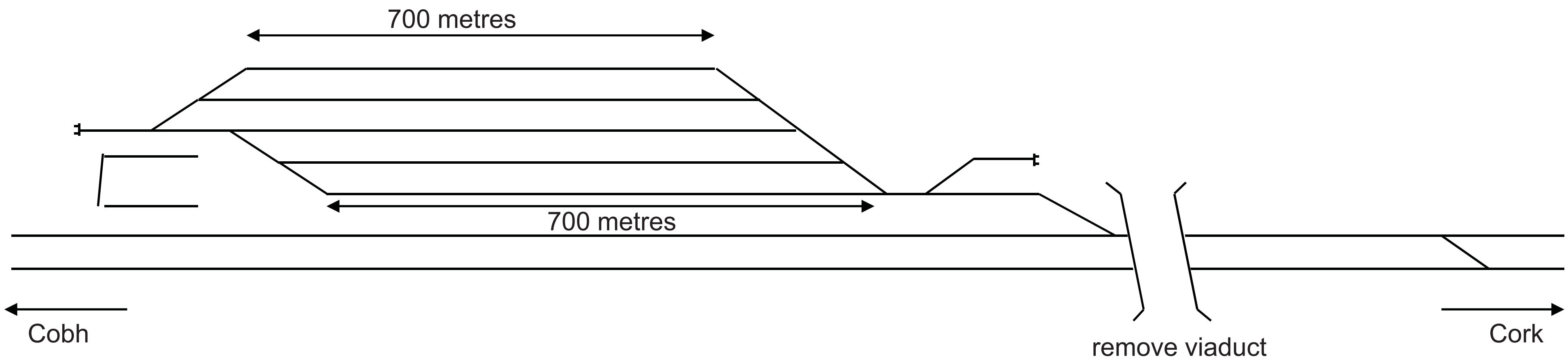
**Rail Tunnel North of Kent Station**
Line cleared for 9' at present

**Kent Station**
Through running is essential for the DC operation

# A rail spur and freight yard would be needed at the container terminal and the Distribution Centre

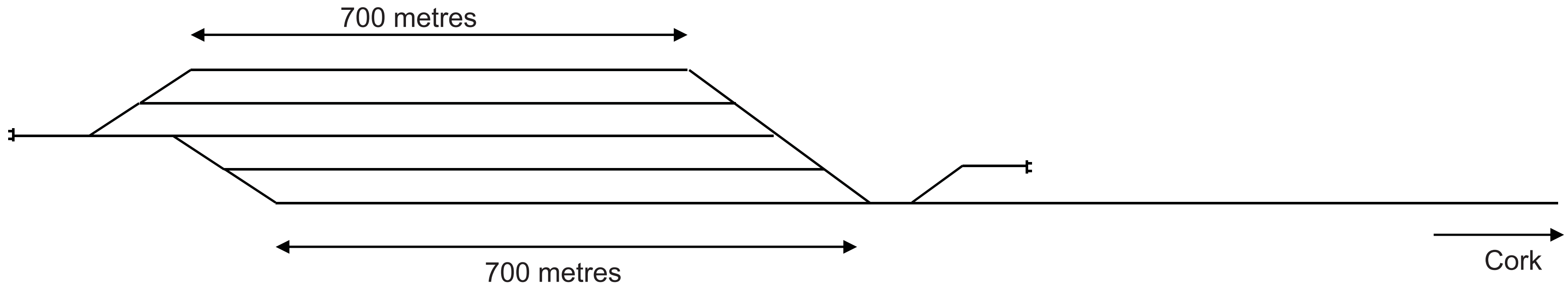
**Yard at Marino Point (Option 1)**

five tracks (track width 8.12m) with an effective length of 700 m plus two loco tracks




**Yard at Ringaskiddy (Option 2 and 3)**

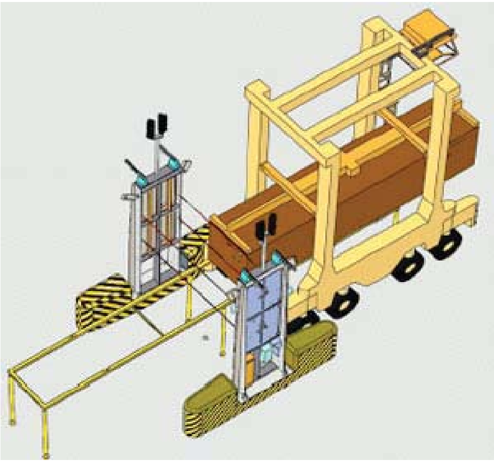
five tracks (track width 8.12m) with an effective length of 700 m plus two loco tracks



# Managing trains into and out of container yards would largely be controlled by technology

- Signaling should allow trains off and onto the mainline from and within the Container Yard
- If there are likely to be any movements (i.e push backs) within the Container Yard a pilot will be necessary (i.e someone who can guide the train)
- The train berths on the line
- The loco is uncoupled and is run round onto another rake of wagons (if one is ready)
- The rake of wagons is unloaded, containers are grounded and gridded
- Loading is a more complex operation, because train assembly needs to take into account where the containers are going, even if they are all going to the same Distribution Centre. Cargo assembly is therefore a key aspect of yard planning

# How the terminal operates will depend on the moveable infrastructure adopted



- If straddle carriers are adopted consideration will need to be given to the vertical spacing on the railway lines so the straddle carriers can run over a rake of wagons.

**The rail terminal would need to have a loading/unloading rate for rail comparable to a road setup so as not to compromise terminal efficiency. It must be competitive against road.**

The space required between and around the rail will depend on method of operation and the moveable infrastructure

- Conversely, something like a reachstaker will run parallel to a rake of wagons, reachstakers can typically pick containers up to two rakes deep (i.e reach over a container on a railway line and get the one behind it)

# Container storage would not differ greatly for a rail based rather than road based transport system

- Typically a freight train comes into a container terminal and containers are grounded and gridded according to shipping schedules
- Once the ship is in the harbour the containers are transferred to the ship
- In some cases rail can go wharfside i.e. onto the wharf allowing more direct rail ship loading
- While rail unloading occurs in generally the same manner as truck unloading, loading is more complex as it involves assembling a train full of containers, rather than just 1 truck.
- Train assembly needs to consider where the cargo goes (does it all end up at the same place in one Distribution Centre?).

Or perhaps the planned container terminal is envisaged to be loading much more directly onto the vessel e.g. with trucks coming with exports and unloading directly onto a vessel and coming to pick up import containers being loaded directly from the vessel onto the truck.

How operations are envisaged at the new container terminal is still an open question

1

Spur to existing line from Marino Point to Cork (Cobh Line)

# Having vessels call at Marino Point offers a significant rail opportunity

- The Marino Point site was served by rail freight until 2002
- If it were selected as a suitable site for a container terminal, a spur to the existing Cork-Cobh line could be provided and containers loaded onto freight trains
- With investment for bulk handling facilities, break bulk could also be managed at Marino Point

## Option 1 - Rail Connection

1

Use existing line from Marino Point to Cork (Cobh Line)

# There is an double track line adjacent to Marino Point, but the spur is now gone

**Rail Line at Marino Point**
Looking north from Overbridge

**Rail Line at Marino Point**
Looking South from Overbridge

**Rail line at Marino Point**
Looking north from old Marshalling Yard

**Rail Line at Marino Point**
Looking South from old Freight Yard

1 Use existing line from Marino Point to Cork (Cobh Line)

# Port of Cork envisage Marino Point as a general cargo facility but use as a container terminal is being re-examined

- Port of Cork envisage the City Quays functions being relocated to a new general cargo facility at Marino Point.
- Under this vision, the Marino Point facility would be capable of handling occasional container ships.
- Since the planning decision, Port of Cork is reviewing the suitability of Marino Point for a container terminal.
- As reported in PoC's previous site selection process, Marino Point has many other disadvantages which suggest that gaining planning approval for a container terminal would not be straightforward.
- Road access to Marino Point is currently poor. It would be improved by the County Council plan's for a new road to Great Island and Cobh. These plans are as yet uncommitted.

**Existing Jetty at Marino Point**

- The analysis of Option 1 assumes that the container terminal is located at Marino Point. The aim is to assess if there is a case for a rail operation under this scenario. Bulk operations have not been considered.

1

Use existing line from Marino Point to Cork (Cobh Line)

# Although Marino Point was rail connected until recently, capital investment would be needed

## Overview of Option 1 Capital Investment

| Rail Infrastructure | Rolling stock and terminal facilities |
|---|---|
| Capital investment necessary to establish a rail link between the existing Cobh – Cork line and the terminal at Marino Point<br>The location of the previous spur is not optimal | Marino Point will require terminal facilities necessary for the handling of containers and possibly break bulk.<br>There may be opportunities to relocate terminal equipment from Tivoli. |
| Existing tunnel will need to be cleared for 9’6” containers either by infrastructure work or investment in new freight wagons | Given the short remaining life of IÉ’s fleet, there will need to be investment in more CFT’s. this may enable the tunnel problem to be overcome without infrastructure work |
| Additional signalling will need to be added to the new rail spur and the current rail infrastructure between Marino Point and Cork | There may be an opportunity to use some of the Class 201 locomotives from IÉ’s fleet. However it is likely there will need to be further locomotive expenditure. Between 3-4 Locomotives will be required. In a push-pull operation between 6-8 would be necessary. |
| Additional signalling on the Cork – Cobh line will be required and this is discussed later | |

1

Use existing line from Marino Point to Cork (Cobh Line)

# The rail operation itself will require significant operating and maintenance resources

### Overview of Option 1 Operating and Maintenance Costs

| Operations and Maintenance |
|---|
| Maintenance activities will need to be increased on the existing rail network due to the increased frequency of traffic |
| Additional staff will be required to drive and shunt trains. |
| Additional staff will be required to maintain the rolling stock (locomotives and wagons). Given the volume of traffic it may be necessary to have some form of maintenance depot close to Cork. |
| It may be foreseeable that Terminal staff would simply relocate from Tivoli where they are currently located |

*25 additional CFT with stanchions  capable of carrying timber if this import traffic is transferred to rail

2

Bridge from Ringaskiddy to Marino Point

# Option 2 requires some 10km of new track, including a bridge over the West Passage

- Option 2 assumes the container terminal is located at Ringaskiddy
- Freight would be put on rail at Ringaskiddy
- Operationally, Option 2 is similar to Option 1
- The rail line would include a bridge over the West Passage
- The rail line would join the Cork-Cobh line at some point near to Marino Point
- The site at Marino Point would not necessarily be required, but land in the area would be needed
- If Option 2 were to be examined in detail in future, use of the new rail link for passenger services and/or the inclusion of a road crossing with the railway bridge may be worth consideration

## Option 2 - Rail Connection

2 Bridge from Ringaskiddy to Marino Point

# A high level assessment of the capital works required was undertaken

Substantial feasibility work would be needed in event of this scheme being promoted

## Overview of Option 2 Capital investment

| Rail Infrastructure | Rolling stock and terminal facilities |
|---|---|
| Capital investment necessary to build 10.5km of new rail line to the east of the West Passage linking the new line as close as is practical to Marino Point<br><br>The new line would include a bridge, which would allow for navigation.<br><br>Derailment provision will need to be considered for the bridge. | Assuming Ringaskiddy's current terminal facilities are a given, the trains would be fully loaded and would simply join to Cobh – Cork line. |
| Existing tunnel will need to be cleared for 9'6" containers either by infrastructure work or investment in new freight wagons | Given the short remaining life of IÉ's fleet, there will need to be investment in more CFT's. this may enable the tunnel problem to be overcome without infrastructure work |
| Crossings will need to be established over the Mavian Tce, N28, R610, near Ballymot, between Monkstown and Rathanker and possibly at the R624 once the bridge gets to the other side of the passage | There may be an opportunity to use some of the Class 201 locomotives from IÉ's fleet. However it is likely there will need to be further locomotive expenditure. |

*25 additional CFT with stanchions capable of carrying timber if this import traffic is transferred to rail

2

Bridge from Ringaskiddy to Marino Point

# Rail operations for Option 2 would be similar to Option 1

## Overview of Option 1 Operations

| Operations and Maintenance |
|---|
| As this is a new railway line it may be that IE will need additional staff to maintain it. Maintenance activities will need to be increased on the existing rail network due to the increased frequency of traffic |
| Additional staff will be required to drive and shunt trains. |
| Additional staff will be required to maintain the rolling stock (locomotives and wagons). Given the volume of traffic it may be necessary to have some form of maintenance depot close to Cork. |

*25 additional CFT with stanchions capable of carrying timber if this import traffic is transferred to rail

# Signalling opportunities need to be considered for any options which use the rail line at Marino Point (Options 1 and 2)

| Cork - Cobh | Cobh - Cork |
|---|---|
| 05:20 | 05:50 |
| 06:30 | 07:00 |
| 07:00 | 07:30 |
| 07:30 x Mallow | 08:00 |
| 07:55 x Mallow | 08:25 |
| 08:30 | 09:00 |
| 09:00 x Mallow | 09:30 |
| 10:00 | 10:30 |
| 11:00 | 11:30 |
| 12:00 | 12:30 |
| 13:00 | 13:30 |
| 14:00 | 14:30 |
| 15:00 | 15:30 |
| 16:00 | 16:30 |
| 16:30 | 17:00 |
| 17:00 x Mallow | 17:30 |
| 17:30 | 18:00 |
| 18:00 X Mallow | 18:30 |
| 18:30 | 19:00 |
| 20:00 | 20:30 |
| 21:30 | 22:00 |
| 22:30 | 23:00 |

Source: IE timetables

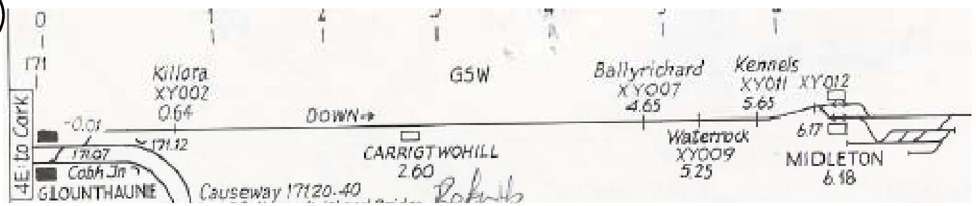
PEAK HOURS

This is the current timetable. Our analysis allows for the future Cork - Midleton service

- The Cork – Cobh is double line, but the section from Glounthaune Junction to Cobh is a single block section (i.e one train at a time). This will need to be signaled to allow for freight trains from Marino Point

- With regard to the Glouthane Junction – Cork section of the railway line, signalling spacing should reflect the Cobh – Cork and planned Midleton – Cork service

- The timetable between Cobh and Glounthaune with the appropriate signalling certainly suggests capacity for freight trains although consideration may need to be given to keeping them out of the peak hours.



# For Options 1 and 2, safety considerations need to be taken into account when mixing passenger and freight traffic on Cork-Cobh

- Current arrangements allow for mixed passenger and freight operations, but given that there is very little mixed traffic on the existing network, the Railway Safety Commission and/or Iarnród Éireann and/or a third party operator might need to consider some of the issues which are often raised in mixed traffic operations, if rail freight volumes increased substantially

- The Railway Safety Act 2005 obliges any railway undertaking to submit a safety case, this is typically required for new lines and/or changes to the method of operation on existing lines. Introducing new rolling stock and new signalling technology are two examples of how an operation has changed and that their must be a supporting safety assessment of the change.

- Typically a major effort is needed to re-write rules and regulations for a new line or changed method of operation, and to gather evidence on safety targets such as mean time between failure of the new system or sub-systems.

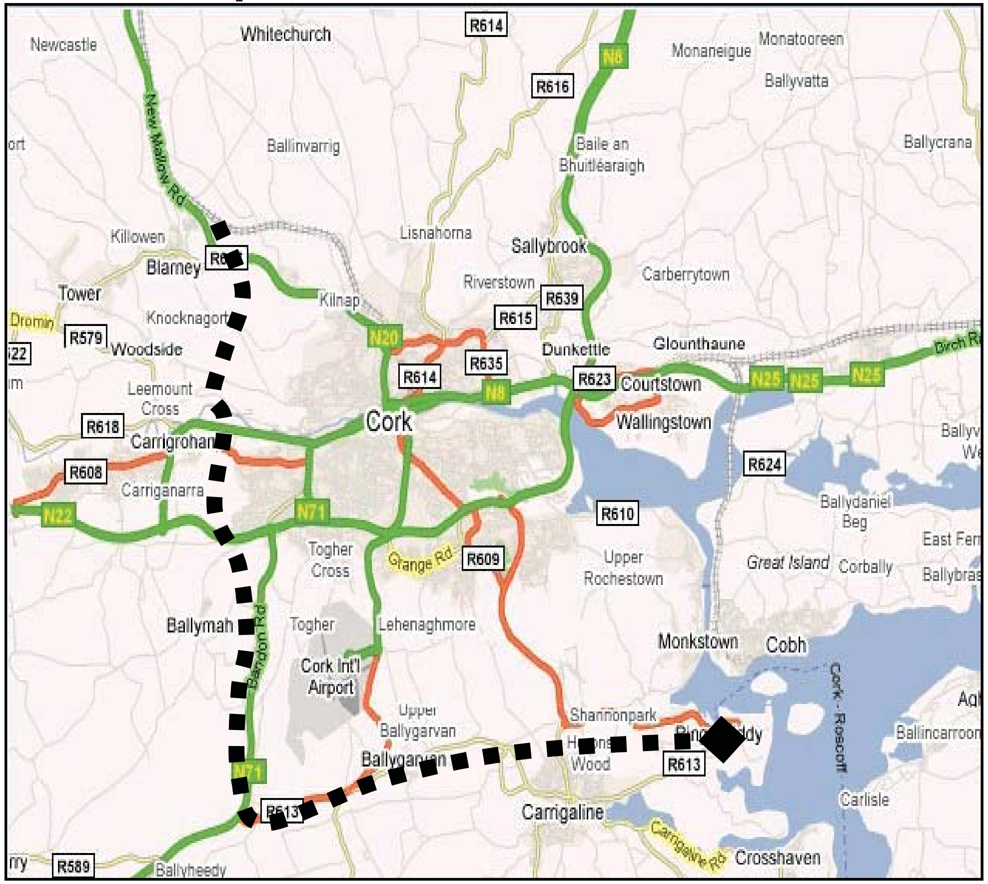
3

New Line from Ringaskiddy to Cork-Dublin Line

# Option 3 would involve a completely new rail line some 30km in length

- Option 3 assumes that the container terminal would be located at Ringaskiddy
- Freight would put on rail at Ringaskiddy
- Operationally, Option 3 is not significantly different from Options 1 and 2
- The new line would join the Dublin-Cork line somewhere north of the city, possibly in the Blarney area
- It is envisaged as a purely freight line with no stations, single track, low speed
- It has the merit of avoiding Kent Station and the tunnel
- The alignment does not offer much, if any, potential for passenger services to be developed later

## Option 3 - Rail Connection



3 New Line from Ringaskiddy to Cork-Dublin Line

# Although longer than the bridge, a completely new freight line may cost less

Substantial feasibility work would be needed in event of this scheme being promoted

| Rail Infrastructure | Rolling stock and terminal facilities |
|---|---|
| Capital investment necessary to build 30km of new rail line which will link it into the network north of Cork. This line should be single track with at least two passing loops. | Ringaskiddy will need terminal facilities, lifting cranes, establishment of an area which can hold containers etc - these are assumed to be existing or included in future proposals |
| The new line will be designed for 9'6" containers | Given the short remaining life of IÉ 's fleet, there will need to be investment in more CFT's. |
| 10 crossings will need to be established over the N28, N27, N71, N22, N20, R617, R608, besides minor roads | There may be an opportunity to use some of the Class 201 locomotives from IÉ's fleet. However it is likely there will need to be further locomotive expenditure. |
| Where the N22 and the River Lee meet there will need to be a substantial bridge. | |

*25 additional CFT with stanchions capable of carrying timber if this import traffic is transferred to rail

3

New Line from Ringaskiddy to Cork-Dublin Line

# Further considerations for this new line offer challenges and opportunities

- In the safety case guidelines The Railway Safety Act 2005 states that "*. With some railway operations, very simple forms of train operation and signalling systems may be satisfactory. Where the railway operates at a relatively low speed and safety of operation can be ensured by a system of driving on-sight, no signalling system, as such, may be required*"* This means that if the line is initially constructed as freight only then the signalling system can be fairly basic.

- Passing loops should be designed to optimum length, typically 1500m is considered the minimum length. The total length of the train under the much less than this, but passing loops must be long enough to enable trains to keep as close as possible to line-speed at exit and entry.

* RSC-G-005 4.1.1.4

# Capital cost estimates were calculated for the three options

## Capital Cost Assumptions

- Options were costed using unit costs from the Booz railway cost database and uplifted to allow for design costs, detailed design costs, project management costs, contingency, provision of work sites, client organisation costs and contractor profit.
- The total costs estimated were validated against the cost of IÉ projects underway or planned, and shown to be within range.
- Cost includes, for the new railway sections and the freight yards, trackwork, structures, signalling, CTC, land, height clearance on existing track.
- Costs do not allow for lifting equipment and other non-railway infrastructure at the freight yards in the container terminal
- Rolling stock costs have been included as lease costs within the railway operations costs, not as capital costs

**Central Cost Estimate**
€m, 2009 prices

| Option | Infrastructure | Distribution Centre | Total |
|---|---|---|---|
| 1 | 15 | 10 | 25 |
| 2 | 510 | 10 | 510 |
| 3 | 250 | 10 | 260 |

**Capital Cost Range**
€m, 2009 prices

| Option | Capital Cost Range |
|---|---|
| 1 | € 25m to €40m* |
| 2 | €250 to €750** |
| 3 | €150 to €400** |

* Allows for work to Cork Rail Tunnel
** +/- 50% on Central Cost Estimate

Note: All costs in € million, 2009 prices
Source: Booz & Company analysis

| | |
|---|---|
| Chapter 1 | Context |
| Chapter 2 | Policy Background |
| Chapter 3 | Rail Freight Baseline |
| Chapter 4 | Demand to Transport by Rail |
| Chapter 5 | Best Possible Scenario Rail |
| Chapter 6 | Connection Options |
| **Chapter 7** | **Socio Economic Evaluation** |
| Chapter 8 | Other Options |
| Chapter 9 | Conclusions and Next Steps |

# A socio-economic evaluation of the 3 options under the Best Possible Scenario was undertaken

**Benefits**

- Benefits of removing trucks from the road network:
  - Reduction in accidents
  - Reduction in noise
  - Reduction in air pollution
  - Reduction in road wear and tear
  - Reduction in traffic congestion
  - Improved reliability and reduced journey times
  - Better conditions for walking and cycling
- Truck operating cost savings

**Capital Costs**

- Trackwork
- Structures
- Signalling

**On-going Costs**

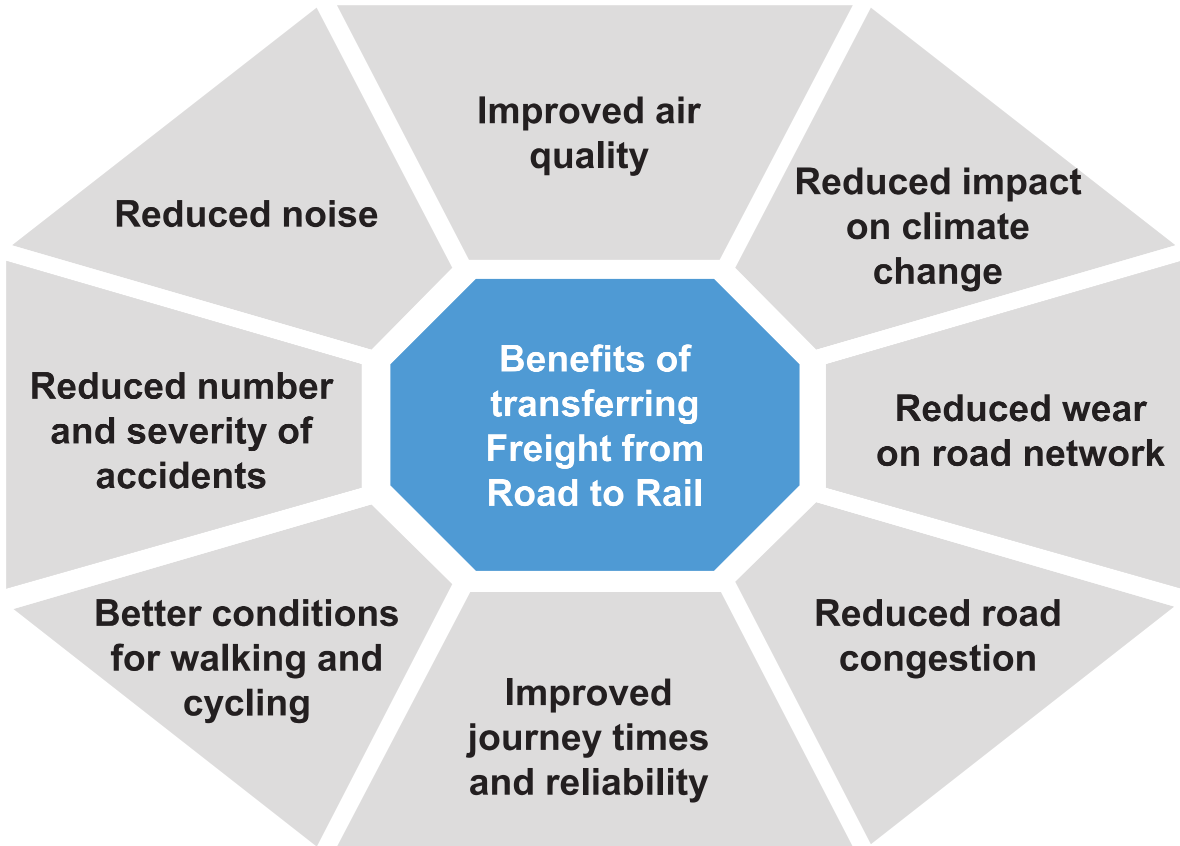
- Railway operating costs
- Infrastructure maintenance costs
- Rolling Stock Costs

- Benefit / Cost Ratio

# The benefits associated with rail freight result from the removal of trucks from the road network

- There is global benefit in reducing vehicle-km irrespective of local problems
- Some benefits may only be locally significant in networks where one or more of the following problems exist:
  - HGV-related accidents are a problem
  - Air quality is poor
  - Noise is a problem
  - The road network is congested
  - Businesses/hauliers are seeking to improve the speed and reliability of deliveries
  - The environment for walking and cycling is poor due to the presence of HGVs
- The UK "Sensitive Lorry Miles" approach addresses this issue and is the basis for the evaluation of proposals for rail freight schemes, to assess eligibility for the Freight Facilities Grant (capital costs) and/or the Rail Benefits Procurement Scheme (running costs)

**Benefits of Rail Freight**



# Benefits were calculated using the Sensitive Lorry Miles approach which is used to evaluate rail freight proposals in the UK[1]

## Sensitive Lorry Miles Values

| Category | p/mile[2] |
|---|---|
| Accidents | 3.8 |
| Noise | 2 |
| Pollution | 3.9 |
| Climate Change | 2.4 |
| Infrastructure costs | 11.2 |
| Road Congestion | 45.8 |
| Unquantified[3] | 21.5 |
| Taxation[4] | -29 |
| Rail costs[5] | -8.8 |
| Total | 52.8 |

**Socio-Economic Benefits of Removal of Lorries from Roads between Port and Distribution Centre**
€ m per annum (2009 prices)

| | Phase 1 | Phase 2 | Phase 3 | Longer Term |
|---|---|---|---|---|
| **50% on rail** | 3.0 | 3.6 | 4.8 | 7.2 |
| **25% on rail** | 1.5 | 1.8 | 2.4 | 3.6 |

1) Sensitive Lorry Miles, Strategic Rail Authority, 2003, http://www.dft.gov.uk/pgr/freight/railfreight/slmp
2) Values are available for several categories of road. Some categories such as motorways and roads in major conurbations have sub-categories for different levels of congestion. The “Rural and Urban Truck and Principe Road category is the most appropriate for the Cork Area network Values are given in GBP 2003, and were converted to Euros 2003 and rolled forward to 2009 at Irsih GDP
3) Represents benefits such as reduction in driver frustration/stress, fear of accidents, restrictions on cycling and walking, upstream and downstream effects, community severance and visual intrusion
4) Fuel and vehicle excise duty are subtracted from the benefits (this is UK Appraisal practice)
5) Rail freight also has negative impacts on society including noise, pollution and climate change. These are lower per unit of freight than road, hence the social benefits of the modal transfer.

# The evaluation was based on the container terminal demand forecasts/phasing proposals for the Oysterbank scheme

**Container Terminal Phasing and Capacity Assumptions**

| | Phase 1 | Phase 2 | Phase 3 | Longer Term |
|---|---|---|---|---|
| **Timing under low economic growth** | 2011 to 2014 | 2014 to 2019 | 2019 to 2029 | Post 2029 |
| **Timing under medium economic growth** | 2011 to 2013 | 2013 to 2017 | 2017 to 2024 | Post 2024 |
| **Capacity in terms of Total TEU per annum (import + export)** | 250,000 | 300,000 | 400,000 | 600,000 |
| **For purpose of this study, assume on average over each Phase, port operating at 85% of capacity Total TEU per annum** | 212,500 | 255,000 | 340,000 | 510,000 |

**The cost benefit analysis has assumed low economic growth, nevertheless the 2007 projections will be optimistic given the economic downturn. Port of Cork will revise its capacity projections in due course**

Note: Appendix A contains more detailed information on the cost benefit analyses assumptions
Source: Oysterback Financial and Economic Appraisal, Goodbody, 2007, Booz & Company analysis

# All options are based on a “best-case” operational and demand concept of a railway shuttle to and from a Distribution Centre

## Operational Assumptions

| | Phase 1 | Phase 2 | Phase 3 | Longer Term |
|---|---|---|---|---|
| 50% of Containers to rail (TEU) | 106,250 | 127,500 | 170,000 | 255,000 |
| Optimum trains per day | 10 | 12 | 15 | 23 |
| Train-sets required | 2 | 3 | 4 | 6 |
| 25% of Containers to rail (TEU) | 53,125 | 63,750 | 85,000 | 127,500 |
| Optimum trains per day | 5 | 6 | 8 | 12 |
| Train-sets required | 1 | 1 | 2 | 3 |

- To provide a rationale for moving container traffic by rail, and sufficient density to justify operation, our base assumption is that part of the container traffic of the port will be moved by rail to and from a new container distribution centre, which can be located on the existing railway line near Mallow, with good road access. This will be a suitable location for the majority of container traffic that travels beyond the Cork city area.
- It will be served by a shuttle service. Shuttle trains will comprise a locomotive and 18 CFT wagons carrying either one 40ft or 45ft container or two 20ft containers.
- The port is assumed to operate at 85% load factor across each of the growth phases. Rail is assumed to take a 50% share of the container freight market, the rest either being local, or else delivered to a direction not suited to the distribution centre.
- Volumes of containers going to rail are assumed to be balanced, with equal quantities going to the depot and returning to the port. We assume a train has 6 days of operation and 48 weeks of operation, the remaining time being allowed for maintenance. No spare trains are kept. A train can do 4 trips per day. The table shows the number of trainsets that would be used. In some cases, an additional train is not worth purchasing and some trips will be shed (this happens in Phase 1 in the described scenario).

# Annual operating and maintenance costs were estimated for each option for each year of the appraisal period

## Phase 1 Annual Costs

€ million per annum, 2009 prices

| | | Railway Operating Costs[1,2] | Rolling Stock Hire Costs[3] | Infrastructure Maintenance Costs[4] | Truck Operating Costs Saved[5] | Total |
|---|---|---|---|---|---|---|
| 50% by Rail | Option 1 | 7.1 | 0.8 | 1.9 | -4.1 | 5.6 |
| | Option 2 | 7.5 | 0.8 | 2.1 | -4.1 | 6.2 |
| | Option 3 | 7.8 | 0.8 | 2.3 | -4.1 | 6.7 |
| 25% by Rail | Option 1 | 4.4 | 0.4 | 0.9 | -2.0 | 3.7 |
| | Option 2 | 4.5 | 0.4 | 1.1 | -2.0 | 4.0 |
| | Option 3 | 4.7 | 0.4 | 1.2 | -2.0 | 4.2 |

1) Based on Booz IE Freight Operating Cost Model, derived for Strategic Rail Review, 2003, updated to 2009
2) Distribution Centre and port rail freight operations estimated at €1.5 million per annum
3) Although Iarnród Éireann buys rolling stock and does not hire it, use of rolling stock hire costs most accurately captures the rolling stock life-cycle costs for the purpose of this appraisal
4) Based on IÉ infrastructure maintenance cost model derived for Strategic Rail Review in 2003 and updated to 2009
5) Truck operating costs (fuel and non-fuel) derived from DoT Capital Appraisal Guidelines (May 2007)

Source: Booz & Company models, Strategic Rail Review, Project Appraisal Guidelines (DoT May 2007)

# A cost benefit analysis was undertaken for several scenarios

## List of Tests Undertaken

| | Title | Comments |
|---|---|---|
| 1 | Central Case | Most likely cost estimates<br>"Realistic" but ambitious target for rail use (25%) |
| 2 | 50% by rail | Most likely cost estimates.<br>Best possible rail demand scenario |
| 3 | +50% in capital costs | Cork Rail Tunnel is a risk - height clearance should be achieved through new rolling stock but infrastructure work may be needed. For Options 2 and 3, +/- 50% applies to the capital cost. |
| 4 | +25% in rail running costs | A 25% increase in forecast operating costs would not be unreasonable |
| 5 | - 25% in rail running costs | With greater involvement of private logistics operators and possibly train operators, cost efficiencies would be expected; however the envisaged operation as modelled is already a highly efficient one |
| 6 | +25% in road operating costs | Road operating costs will increase as congestion grows, which is likely in the long term. |
| 7 | -15% in road operating costs | Road operating costs are already very competitive and it is difficult to envisage further reductions; however a sensitivity test with a 15% reduction was considered. |
| 8 | Best operating scenario | -25% rail operating costs, +25% road operating costs |
| 9 | Best demand and operating scenario | 50% by rail, -25% rail operating costs, +25% road operating costs |

# Comparing the present value of costs and benefits over 30 years and 60 years under the Central Case shows no case for any option

## Test 1: Central Case

Central Estimates, 25% by Rail via Distribution Centre

| **Option** | **1** | **2** | **3** | | **1** | **2** | **3** | | **1** | **2** | **3** | | **1** | **2** | **3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Scenario | Low | Low | Low | | Medium | Medium | Medium | | Low | Low | Low | | Medium | Medium | Medium |
| Appraisal Period (years) | 30 | 30 | 30 | | 30 | 30 | 30 | | 60 | 60 | 60 | | 60 | 60 | 60 |
| Capital Cost | (13) | (295) | (153) | | (13) | (295) | (153) | | (14) | (330) | (172) | | (14) | (330) | (172) |
| Rail Operating Costs | (58) | (60) | (62) | | (61) | (63) | (65) | | (79) | (82) | (85) | | (81) | (85) | (88) |
| Rolling Stock Hire | (10) | (10) | (10) | | (11) | (11) | (11) | | (13) | (13) | (13) | | (13) | (13) | (13) |
| Infrastructure Maintenance | (13) | (15) | (16) | | (14) | (16) | (17) | | (18) | (20) | (22) | | (18) | (21) | (23) |
| Truck Operating Costs Avoided | 34 | 34 | 34 | | 37 | 37 | 37 | | 47 | 47 | 47 | | 50 | 50 | 50 |
| **Present Value of Costs** | (60) | (346) | (208) | | (60) | (347) | (209) | | (76) | (398) | (244) | | (77) | (399) | (245) |
| **Present value of Benefits** | 36 | 36 | 36 | | 40 | 40 | 40 | | 61 | 61 | 61 | | 64 | 64 | 64 |
| **BCR** | 60% | 10% | 17% | | 66% | 11% | 19% | | 79% | 15% | 25% | | 84% | 16% | 26% |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PV Costs exc. Capital | (47) | (51) | (55) | | (48) | (52) | (56) | | (62) | (68) | (73) | | (63) | (69) | (74) |
| BCR exc. Capital | 77% | 70% | 66% | | 83% | 76% | 71% | | 97% | 90% | 84% | | 102% | 94% | 87% |

- Even over a 60 year appraisal period, no option has a BCR greater than one, so there is no case for any option
- With medium growth, Option 1 might cover its running costs over a 60 year period

# If 50% of containers went via the Distribution Centre, there is a weak case for Option 1 over a 60 year period

**Test 2: 50% by Rail**

Central Estimates, 50% by Rail

| **Option** | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Scenario | Low | Low | Low | Medium | Medium | Medium | Low | Low | Low | Medium | Medium | Medium |
| Appraisal Period (years) | 30 | 30 | 30 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 60 |
| Capital Cost | (13) | (295) | (153) | (13) | (295) | (153) | (14) | (330) | (172) | (14) | (330) | (172) |
| Rail Operating Costs | (97) | (102) | (106) | (103) | (108) | (112) | (133) | (140) | (145) | (139) | (145) | (151) |
| Rolling Stock Hire | (16) | (16) | (16) | (18) | (18) | (18) | (21) | (21) | (21) | (23) | (23) | (23) |
| Infrastructure Maintenance | (26) | (29) | (32) | (28) | (31) | (35) | (35) | (40) | (44) | (37) | (42) | (46) |
| Truck Operating Costs Avoided | 68 | 68 | 68 | 75 | 75 | 75 | 94 | 94 | 94 | 101 | 101 | 101 |
| **Present Value of Costs** | (84) | (374) | (240) | (86) | (377) | (243) | (110) | (437) | (288) | (112) | (440) | (291) |
| **Present value of Benefits** | 72 | 72 | 72 | 80 | 80 | 80 | 121 | 121 | 121 | 129 | 129 | 129 |
| **BCR** | 86% | 19% | 30% | 92% | 21% | 33% | 110% | 28% | 42% | 115% | 29% | 44% |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PV Costs exc. Capital | (71) | (80) | (87) | (73) | (82) | (90) | (96) | (107) | (116) | (98) | (109) | (119) |
| BCR exc. Capital | 101% | 91% | 83% | 108% | 97% | 89% | 127% | 114% | 104% | 132% | 118% | 108% |

- Over 60 years, Option 1 has a BCR slightly greater than one, so there would be a weak case, if 50% to rail were achieved
- Over 60 years, all Options would cover their running costs, and Option 1 might over 30 years.

# A 50% increase in capital costs only slightly further weakens the case, suggesting the case is not highly sensitive to capital cost

**Test 3: +50% on Capital Costs**
Central Estimates, +50% on Capital, 25% by Rail

| **Option** | **1** | **2** | **3** | | **1** | **2** | **3** | | **1** | **2** | **3** | | **1** | **2** | **3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Scenario | Low | Low | Low | | Medium | Medium | Medium | | Low | Low | Low | | Medium | Medium | Medium |
| Appraisal Period (years) | 30 | 30 | 30 | | 30 | 30 | 30 | | 60 | 60 | 60 | | 60 | 60 | 60 |
| **Increase in capital costs** | **50%** | | | | | | | | | | | | | | |
| Present Value of Costs | -66 | -493 | -285 | | -67 | -494 | -286 | | -84 | -563 | -330 | | -84 | -564 | -331 |
| Present Value of Benefits | 36 | 36 | 36 | | 40 | 40 | 40 | | 61 | 61 | 61 | | 64 | 64 | 64 |
| Benefit Cost Ratio (BCR) | 55% | 7% | 13% | | 60% | 8% | 14% | | 73% | 11% | 18% | | 76% | 11% | 19% |

- There is no case for any of the Options if capital costs increase.

# The case is sensitive to changes in rail operating costs - if they were 25% less, Option 1 appears viable in the long term

**Tests 4 & 5: +/- 25% on Rail Operating Costs**

Central Estimates, +/- 25% on Rail Operating Costs, 25% by Rail

| Option | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Scenario | Low | Low | Low | Medium | Medium | Medium | Low | Low | Low | Medium | Medium | Medium |
| Appraisal Period (years) | 30 | 30 | 30 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 60 |
| **Increase in rail current costs.** | **25%** | | | | | | | | | | | |
| **Present Value of Costs** | -80 | -367 | -230 | -82 | -369 | -233 | -104 | -427 | -274 | -105 | -429 | -276 |
| **Present value of Benefits** | 36 | 36 | 36 | 40 | 40 | 40 | 61 | 61 | 61 | 64 | 64 | 64 |
| **BCR** | 45% | 10% | 16% | 49% | 11% | 17% | 59% | 14% | 22% | 61% | 15% | 23% |
| **Decrease in rail current costs** | **-25%** | | | | | | | | | | | |
| **Present Value of Costs** | -40 | -325 | -186 | -39 | -325 | -186 | -49 | -369 | -214 | -49 | -369 | -214 |
| **Present value of Benefits** | 36 | 36 | 36 | 40 | 40 | 40 | 61 | 61 | 61 | 64 | 64 | 64 |
| **BCR** | 91% | 11% | 19% | 102% | 12% | 21% | 123% | 16% | 28% | 132% | 17% | 30% |

- If operating costs increase by 25%, which is reasonably likely situation, the BCR for all options is significantly reduced.
- If operating costs were 25% lower, perhaps by finding greater efficiencies, Option 1 appears viable over a 60 year period.

# A 25% increase in truck operating costs would bring Option 1 close to having a case in the long term

### Tests 6 & 7: + 25%/ -15% on Road Operating Costs

Central Estimates, + 25%/ - 15% on Truck Operating Costs, 25% by Rail

| **Option** | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Scenario | Low | Low | Low | Medium | Medium | Medium | Low | Low | Low | Medium | Medium | Medium |
| Appraisal Period (years) | 30 | 30 | 30 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 60 |
| **Increase in truck operating costs.** | **25%** | | | | | | | | | | | |
| **Present Value of Costs** | -51 | -338 | -200 | -51 | -338 | -200 | -65 | -386 | -233 | -64 | -386 | -233 |
| **Present value of Benefits** | 36 | 36 | 36 | 40 | 40 | 40 | 61 | 61 | 61 | 64 | 64 | 64 |
| **BCR** | 70% | 11% | 18% | 78% | 12% | 20% | 94% | 16% | 26% | 100% | 17% | 28% |
| **Decrease in truck operating costs** | **-15%** | | | | | | | | | | | |
| **Present Value of Costs** | -65 | -351 | -213 | -66 | -353 | -215 | -84 | -405 | -251 | -85 | -406 | -253 |
| **Present value of Benefits** | 36 | 36 | 36 | 40 | 40 | 40 | 61 | 61 | 61 | 64 | 64 | 64 |
| **BCR** | 56% | 10% | 17% | 60% | 11% | 19% | 73% | 15% | 24% | 76% | 16% | 25% |

- If truck operating costs increase by 25%, perhaps through congestion or taxes, the BCR for all options is significantly improved.
- If operating costs were 15% lower, although they are already very competitive, BCR is significantly reduced for all options.

# If rail operating costs came down and road costs increased, the case for Option 1 begins to look robust, at least in the longer term

**Test 8: -25% on Rail Operating Costs and +25% on Road Operating Costs**

Central Estimates, -25% on Rail Operations, +25% on Road Operations, 25% by Rail

| **Option** | **1** | **2** | **3** | | **1** | **2** | **3** | | **1** | **2** | **3** | | **1** | **2** | **3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Scenario | Low | Low | Low | | Medium | Medium | Medium | | Low | Low | Low | | Medium | Medium | Medium |
| Appraisal Period (years) | 30 | 30 | 30 | | 30 | 30 | 30 | | 60 | 60 | 60 | | 60 | 60 | 60 |
| **Best operating cost scenario:** | | | | | | | | | | | | | | | |
| Decrease in rail current costs | -25% | | | | | | | | | | | | | | |
| Increase in truck costs | 25% | | | | | | | | | | | | | | |
| **Present Value of Costs** | -31 | -316 | -178 | | -30 | -315 | -177 | | -37 | -358 | -203 | | -36 | -356 | -202 |
| **Present value of Benefits** | 36 | 36 | 36 | | 40 | 40 | 40 | | 61 | 61 | 61 | | 64 | 64 | 64 |
| **BCR** | 116% | 11% | 20% | | 134% | 13% | 23% | | 162% | 17% | 30% | | 178% | 18% | 32% |

- It is not inconceivable that, in the long term, road congestion would increase such that the costs of road operations increase significantly.
- It is also possible that, in the long term, road user charges would be placed upon trucks to encourage modal shift and recover costs
- It is also possible that, with a bigger and more competitive rail freight industry, efficiencies would be realised, despite the fact that whoever operates the service will need to buy/lease rolling stock.

# In the Best Possible Scenario with 50% by rail, reduced rail costs and increased truck costs, there is a robust case for Option 1 only

**Test 9: Best Possible Demand and Operating Scenario**

Central Estimates, -25% on Rail Operations, +25% on Road Operations, 50% by Rail

| **Option** | 1 | 2 | 3 | | 1 | 2 | 3 | | 1 | 2 | 3 | | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Scenario | Low | Low | Low | | Medium | Medium | Medium | | Low | Low | Low | | Medium | Medium | Medium |
| Appraisal Period (years) | 30 | 30 | 30 | | 30 | 30 | 30 | | 60 | 60 | 60 | | 60 | 60 | 60 |
| **Best possible demand and operating scenario:** | | | | | | | | | | | | | | | |
| Decrease in rail current costs | -25% | | | | | | | | | | | | | | |
| Increase in truck costs | 25% | | | | | | | | | | | | | | |
| 50% by rail | | | | | | | | | | | | | | | |
| **Present Value of Costs** | -32 | -321 | -184 | | -30 | -319 | -183 | | -39 | -364 | -212 | | -37 | -362 | -211 |
| **Present value of Benefits** | 72 | 72 | 72 | | 80 | 80 | 80 | | 121 | 121 | 121 | | 129 | 129 | 129 |
| **BCR** | 223% | 23% | 39% | | 263% | 25% | 43% | | 310% | 33% | 57% | | 347% | 36% | 61% |

- It is difficult to imagine the circumstances where the Distribution Centre would be so heavily used

# In summary, under expected circumstances there is no socio-economic case for any of the three options

- Options 2 and 3 are too costly to build. Costs would far exceed benefits.
- The capital costs for Option 1 are modest by comparison but the total costs of Option 1 outweigh its benefits in the Central Case. There is no socio-economic case for its development under our central estimates or nearly all of the sensitivity tests undertaken. There is a set of circumstances under which there could be a socio-economic case to develop Option 1, as follows:
  - The growth of the Port took place broadly in line with the forecasts made for the Oysterbank proposal.

    New port forecasts are beyond the scope of this assessment; however, given the economic downturn, the pace of growth might be slower than previously forecast
  - The container terminal were located at Marino Point.

    While Port of Cork is reassessing the suitability of this site, previous work has shown this is not the preferred location for a container terminal, for numerous reasons beyond the scope of this assessment.
  - At least 25% of containers travelled by rail between the port and a distribution centre in the Mallow area

    Incentives would be required to make this happen
  - Significant cost efficiencies in rail freight operations occur, beyond which are currently envisaged

    The distribution centre concept envisaged is already efficient, operating costs are as likely to rise as to reduce
  - Truck operating costs increase significantly, through congestion and/or pricing interventions

    Significant road congestion in the Cork Area is not currently forecast. There are no plans to introduce charges on trucks or other traffic in the Cork Area or elsewhere in Ireland. In the long term, this might change but policies which may disadvantage one region against another are unlikely to be introduced.
  - The Loop Line at Kent Station is retained

    IE currently plan to dispose of this facility when it sells part of the site for redevelopment

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# It may be possible for a container terminal located at either Marino Point or Ringaskiddy to be indirectly connected to the railway

**Indirect compared with Direct Options**

- Options 1 to 3 all assume that rail freight is actively promoted by the provision of a Distribution Centre and associated policies
  - These assumptions enable a rail freight operation to be designed at a high level for the purpose of identifying issues and costing
  - The Distribution Centre model overcomes the inherent problems with the port's market (small dispersed customer base with no rail connections) and uses its opportunities (customers are all within the region, mainly to the north west)
- The indirect options consider a passive provision for rail where goods can get to and from a railway and thereafter the issues lie with the customer or operator
  - they cannot be assessed in the same way as the direct options which are based on an entirely new vision
  - They are valuable options nevertheless
- There is an existing example at Waterford where timber is taken by rail from Coillte at Ballina to Sally Park (a distance of over 200km) and onward by truck to Belview, a distance of some 4 km

| Site | Option for Connection | Initial Assessment |
|---|---|---|
| **Marino Point** | ▪ By road to an existing railhead (North Esk) | ▪ Short distance, minimal investment<br>▪ Suitable option for niche customers that can provide railhead and full trainloads<br>▪ A useful option if Marino Point is developed by Port of Cork, whether for a container terminal or another facility |
| **Ringaskiddy** | ▪ By road/ferry/barge to a railhead | ▪ Long distance from Ringaskiddy to any railhead makes this unattractive but not impossible if a customer materialised with large volumes |
| | ▪ By ferry/barge to a new spur at Marino Point | ▪ Major barging operation between Ringaskiddy/Oysterbank and Marino Point would interfere with port operations, so suited for a small or occasional operation<br>▪ Worth considering if Marino Point is developed |

# In the case of Ringaskiddy, Rathpeacon may be a suitable location for a rail head for containers

**Indirect Concept for Ringaskiddy**

- Import containers are put on trucks at Ringaskiddy and taken to a railhead at Rathpeacon and then put on a train in full trainloads to go to a customer railhead.
- Export containers are taken from a customer railhead by rail in full trainloads to Rathpeacon where they are put on trucks and taken to Ringaskiddy.
- Customer meets IÉ's requirements for 18 CFT minimum train load/length; and has a railhead

**Advantages**

- Provides an option for containers to be taken by rail;
- No need to build any new railway line;
- Avoids any possible issues with the Cork Rail Tunnel;
- Avoids the need to retain the Bypass Loop at Kent Station;
- Avoids the Distribution Centre concept – it is based on assumption that customer would have a rail connection; and
- Could provide a easier entry into the rail market, providing a basis for further investment in future if it were successful.

**Disadvantages**

- Does not remove trucks from the road network in the vicinity of the port ;
- Does not alter the port's dependency on road;
- There is currently no customer or concentration of customers that has a railhead and sufficient demand. Without a specific customer, this concept is difficult to scope and assess; and
- Capital investment to establish railhead at Rathpeacon (and at the customer end).

# Evaluation of the indirect option via Rathpeacon for a hypothetical customer in the outer parts of the Port's catchment showed no case

## Assumptions

- For purpose of concept testing, the customer, or concentration of customers, is based in the Tralee area which is reasonably near rail and a reasonable distance from the Port. (There is no evidence that such a customer or concentration of customers exists in this area).
- Freight trains can be operated between the Cork and Tralee lines through Mallow. (There is no chord for this movement, so this will involve some operations which are less than ideal. The existing track, switches and signalling have not been assessed and we cannot judge what work may be required. No cost has been assumed for work at Mallow).
- Railhead and yard will be provided at Rathpeacon and similarly at the customer. It is assumed both are feasible, although no locations are identified. A cost has been allowed, similar to the cost for the railworks at the port and distribution centre in the other options examined.
- Work may be required to obtain height clearance for 9ft 6inch containers. There are around 42 bridges crossing the line between Rathpeacon and Tralee. It has been assumed that these need no work, but this would need confirmation.
- One train in each direction would operate per day, 5 days a week, 46 weeks a year. In the longer term (Phase 4), this would rise to two trains per day, per direction.
- Rail operating costs, maintenance costs and infrastructure maintenance costs have been assessed as for the other options.
- Truck operating costs saved and the benefits of removal of trucks from the roads have been assessed as for the other options.

## Outcome of Evaluation

- Costs exceed benefits with benefit/cost ratios in the region of 50%-75%
- Sensitivity tests around costs do not change the outcome
- North Esk option would not perform any better (see next page)

# In the case of Marino Point, North Esk may be a suitable location for a rail head for containers

**Indirect Concept for Marino Point**

- Import containers are put on trucks at Marino Point and taken to a railhead at North Esk and then put on a train in full trainloads to go to a customer railhead.
- Export containers are taken from a customer railhead in full trainloads by rail to North Esk where they are put on trucks and taken to Marino Point.
- Customer meets IÉ's requirements for 18 CFT minimum train load/length; and has a railhead

**Advantages**

- Provides an option for containers to be taken by rail
- IÉ report that North Esk could readily be reconnected to the rail network
- North Esk is very close to Marino Point, so trucks would be removed from parts of the strategic network where traffic congestion may be an issue.
- Goes some way towards reducing the port's dependency on road
- Avoids the Distribution Centre concept – it is based on assumption that customer would have a rail connection; and
- Could provide a easier entry into the rail market, providing a basis for further investment in future if it were successful.

**Disadvantages**

- Does not remove trucks from the road network in the immediate vicinity of the port
- There is currently no customer or concentration of customers that has a railhead and sufficient demand. Without a specific customer, this concept is difficult to scope and assess; and
- New rolling stock would be required to the necessary height clearance through the Cork Rail Tunnel
- The Kent Station Bypass Loop would need to be retained.

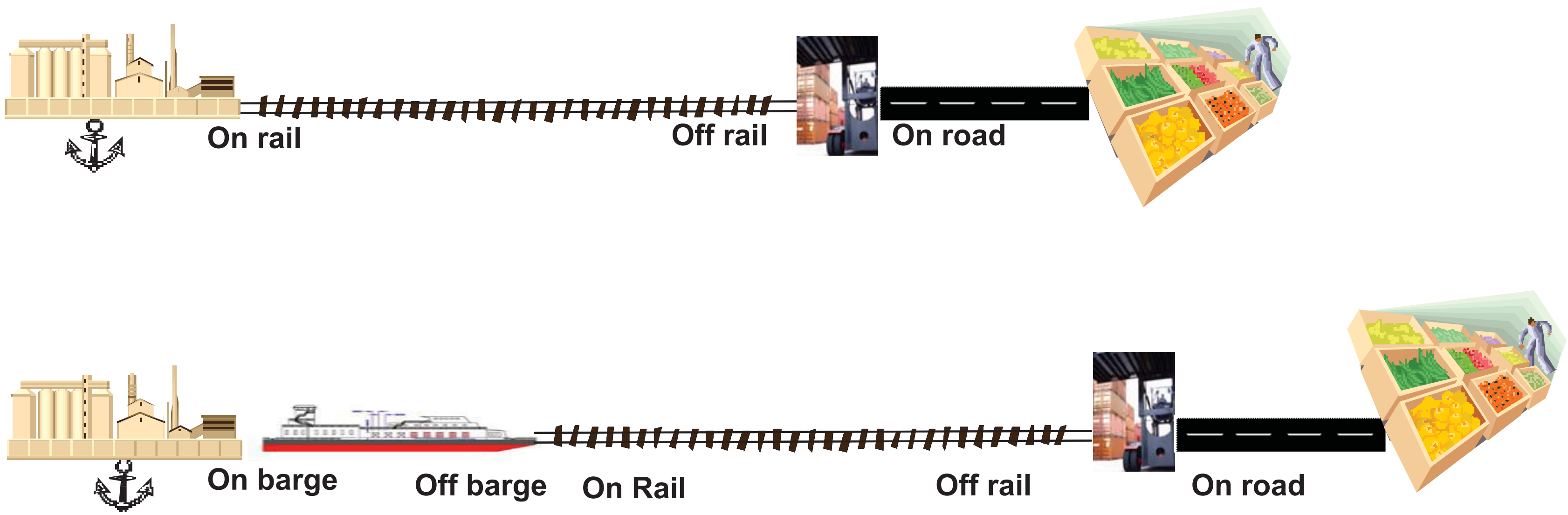
# A barge could provide indirect access between the deep water facilities at Ringaskiddy and Marino Point

- Containers would be barged from the container terminal at Ringaskiddy to a rail facility at Marino Point
- The rail capital investment and operations would be the same as direct option Option 1
- Additional investment in the barging operation would be required
- Barging sub-options are:
  - Load on/load off the barge at each end
  - Roll on/roll off using Mafi type carriers which can take 2 containers at a time
  - Roll on/roll off using regular trucks (which could then drive to any rail head, but only Marino Point is being considered for the purpose of this exercise)
- The Port of Cork would not favour any barging activity that was big enough to interfere with operations

**Barge route from Ringaskiddy to Marino Point**

# The extra handling associated with the barging option and possible impact on port operations makes it unappealing

- The risk lies in potential delays and handling damage due to the increased complexity and number of times the product is handled
- Road/rail transfers clearly introduce risks too which are only countered if the overall multi-modal trip is less risky than a trip solely on the road, which may be the case in heavily congested road networks or those with measures to restrict HGV movement
- The barging option is unattractive as a strategy, but a helpful fall-back option for occasional use



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# The proposed rail options are high cost, which outweigh any benefits. Circumstances where it may be feasible are unlikely

**Market**

- Poor market conditions: none of the customers are rail-connected and they are dispersed throughout the region. The volumes shipped are generally low and the distances relatively short for a rail operation.

**Best Possible Market Scenario for Rail**

- A distribution centre or “inland port” located to the northwest of the City, connected by a rail shuttle to the container terminal, would provide sufficient density to justify rail operations and allow containers to travel by road between it and the customers.

**Rail connection options**

- Marino Point would require a spur off the existing Cork-Cobh line, signalling, rolling stock and the retention of the existing Loop Line. Estimated capital cost €25m - €40m (excluding rolling stock).
- Ringaskiddy would be best served by a new freight only line connecting to the Dublin - Cork line in the Blarney area. Estimated capital cost €260m ± 50%

**Evaluation**

- A socio-economic evaluation and series of sensitivity tests show that, for both options, the life-cycle costs of the scheme outweigh the benefits, even over 60 years
- The emerging policy landscape suggests no policy objectives that would justify curtailment of the port’s development on the basis of not having the ability to connect to rail

**Under what circumstances would a rail connection be feasible?**

- Rail to a container terminal at Marino Point would be viable, in socio-economic terms, if an inland port operation was established with a distribution centre and rail shuttle, run by a commercial logistics provider and subsidised by government. The distribution centre would need to handle at least 25% of all the port’s containers, preferably more. The rail operating costs would need to be significantly lower than forecast while road haulage costs would need to rise above forecasts. At Kent Station, a height clearance issue at the tunnel would need to be solved without capital works and the Loop Line would need to be retained.

**Other options**

- One option is to take containers by road to a railhead at North Esk or elsewhere and onwards by rail. Costs would include height clearance, railheads, other infrastructure and operating costs. Assessment of costs for a hypothetical customer in the Tralee area showed they would outweigh benefits.
- If Marino Point were to operate as a general cargo terminal, and the right bulk customer emerged, for example, one like the current Lisheen Mines, it might be worth serving it by rail.

# Polices are developing to support the Port of Cork's relocation to Ringskiddy and to close out the rail issue

- Many of the parties have already moved to express a more definitive position on the relocation of the Port of Cork's container terminal, and others are in the process of doing so. So far, none have a priority policy that looks for the Port of Cork's container terminal to have a rail connection.

- In most urban areas, if there were a push for a rail connection, it would probably come from the local authorities wishing to reduce the amount of lorries on the roads, but in this case their priorities are around retaining a viable and competitive port in Cork and relocating the port from the City Quays and Tivoli to release land for redevelopment. Issues with excessive truck movement resulting from the port are not being articulated in local policies.

- National sustainable transport policy prioritises reducing the demand for passenger travel, which accounts for most of transport-related emissions. Freight-related emissions are less and there is much to be done to reduce them through management measures before there would be investment in rail. Although there is no sign of it now, it is not unreasonable to conjecture that at some future point, Government may consider moving from the current position of not funding rail freight to a policy to part-fund rail freight proposals that have a justifying socio-economic case; however, affordability and prioritisation with respect to other proposals would also need to be taken into account. In this case, there is no socio-economic case. Even if there were, affordability is a major issue at present. Also, a new rail scheme would not be prioritised ahead of those already in planning.

# In summary, an evaluation of latest policies does not show any policy objective to support a rail connection to the Port of Cork

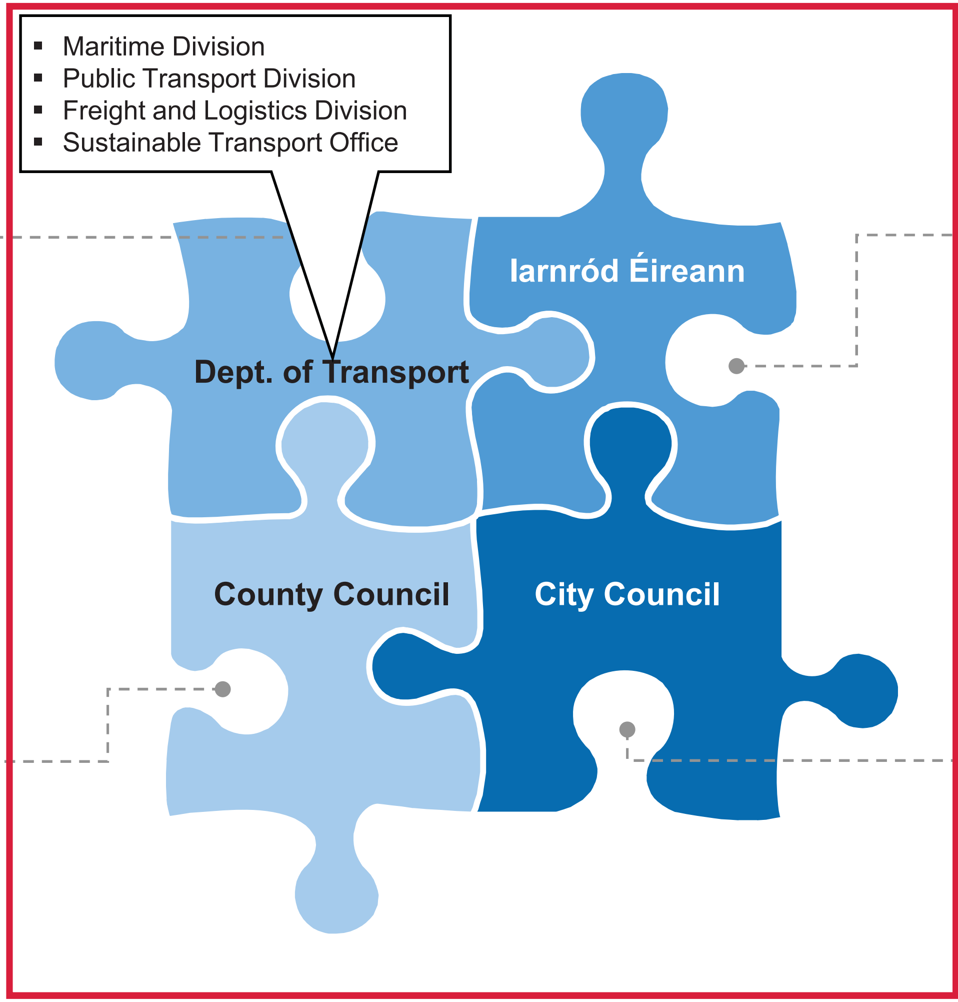
| Policy Level | Main Interests |
|---|---|
| **Local & Regional Authorities** | •Viable local/regional port<br>•Efficiently operating road network<br>•Best possible local environment<br>•Specifically, the City and County Development Plans:<br>    •Support the redevelopment of Docklands/relocation of port<br>    •Support a container terminal at Ringaskiddy<br>    •Contain no stated objective to get trucks off the roads in the Cork City area<br>•Forthcoming Regional Planning Guidelines expected to align with Development Plans<br>•Forthcoming local area plans provide an opportunity to state specific policies for the two sites under consideration |
| **National Government** | •Sound socio-economic case for State investment (DoT/DoF)<br>•Affordability (DoT/DoF)<br>•Efficient provision of transport services (DoT/DoF)<br>•Despite the recommendations of the Strategic Rail Review and the National Spatial Strategy, no specific rail freight policy has been developed (DoT/DoE)<br>•*Smarter Travel : A New Transport Policy for Ireland 2009 - 2020* commits to addressing the national deficit in freight policy, has no explicit objective to shift freight from road to rail but commits to exploring the realistic potential for rail freight (DoT)<br>•Support for the container terminal to relocate to Ringaskiddy (Forfas, Jan 2009) |
| **EU** | •Shift of freight from road to rail desirable but policy should optimise the potential of each mode. Competitive transport markets are key<br>•Irish Government usually granted derogations in relation to EU rail policy |

- Local and National Policy has developed since the ABP decision against the Oysterbank proposal
- Local policies support the relocation of the container terminal at Ringaskiddy
- National policies support the relocation to Ringsaskiddy
- Explicit support for rail freight has yet to emerge nationally or regionally

# A round of stakeholder engagement showed no disagreement with the study findings

- Study findings recognised
- Strong regional and local policies are needed to support the port's development

- Need for integrated policies recognised




- Study findings and assumptions broadly accepted
- No plans to remove loop line

- Study findings recognised
- Retaining the Loop Line still enables the Vision for Docklands to be met.

# In conclusion, for optimal future sustainability, local and regional policies need to support the Port's future development

- The Kent Station Loop Line must be retained or an alternative provided when site developed. Discussions with Iarnród Éireann indicated that this would not be a problem as there is no longer a plan to remove it. The City Council are aware of this and recognise it will be taken into account in plans to redevelop the station to turn to face the river

- If the Port is not allowed to develop its container handling capability, it will become increasingly uncompetitive. More goods will be taken to and from the Port of Cork's catchment via other ports. The result will be longer truck trips than at present with a subsequent increase in negative impacts

- Having a competitive regional port will therefore provide for a sustainable future for the region. It follows that the port should relocate to the site which best meets its business needs, providing the best competitive advantage

- This study shows that there is no socio-economic case for a rail operation to the Port of Cork under expected circumstances. Even at the Marino Point site, which is close to the railway, there is no robust case for a rail operation for transporting containers. The circumstances under which the railway opportunity might be taken up are unlikely

- Given these findings, whether or not the site for a future container terminal is near to a railway should not be given undue weighting in decision making. It would be undesirable and ultimately unsustainable to encourage the port to select a railway-oriented site if it does not make business, operations, economic or environmental sense and if the limitations of that site constrained the port's potential competitive advantage

- The Regional Planning Guidelines, in expressing objectives in relation to the region's port, should clarify the strategic regional development, competitiveness and sustainability issues

- The Local Area Plans that cover the Ringaskiddy and Marino Point sites should support the Port's Strategic Development Plan

# Appendix 1

# Distribution Centres in New Zealand

# Distribution Centres overcome the need for customer railheads, recognising that few freight journeys can be by rail alone

- Distribution Centres
  - recognise that, except for certain bulk trades, few traffics can complete their entire journey by rail alone
  - are widely used in New Zealand and can serve a twofold purpose when import and export volumes are well balanced
  - work best when services can provide an end to end service for their clients regardless of the mode (i.e. whilst a container may be picked up by a truck, put on rail and then collected by a truck at the other end the customer must not feel this)

**Port of Christchurch Example**

Well balanced import and export volumes

**Imports**

- Imports are taken by rail into Christchurch Distribution centre from Ports (in Christchurch) and further south and north
- Imports are be grounded before being picked up by road to be taken on their final leg of the journey to the customer
- Distribution Centre activities (i.e number of staff, train time arrivals etc.) are focussed around when customers want their goods, normally between 0700-0900 in the morning

**Exports**

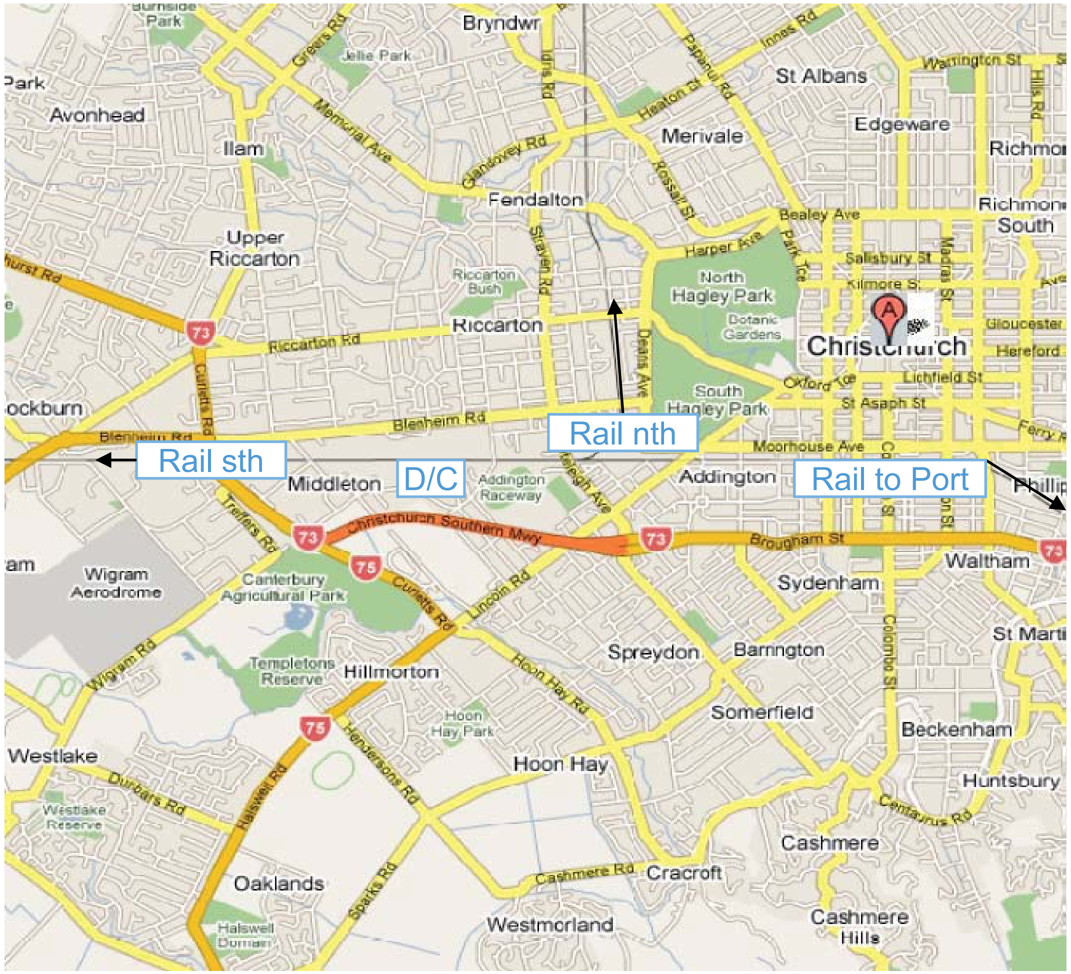
- Export traffic (mainly diary and meat) is taken by rail into the Christchurch Distribution Centre from a factory or abattoir (1)
- From here these containers are forwarded by rail to Ports further north or to the Port in Christchurch
- Other value services are offered such as under-bond cargo management and power supply for containers
- Return trips from the Port of Christchurch bring empty containers which are then taken to container parks for repositioning

1) Refrigerated containers that need to be on power are powered by a generator attached to the train. This traffic is generally long distance i.e between the South and North Island where exports are being taken to a different Port apart from Christchurch. Christchurch serves a rich export hinterland and most frozen product does not need to be on power whilst it is in transit. They can then be powered up again before being railed to the Port, railed directly to the Port to go on power there.

# Christchurch Distribution Centre is well suited in terms of location to rail and road and its proximity to the Port

Key Facts about Christchurch

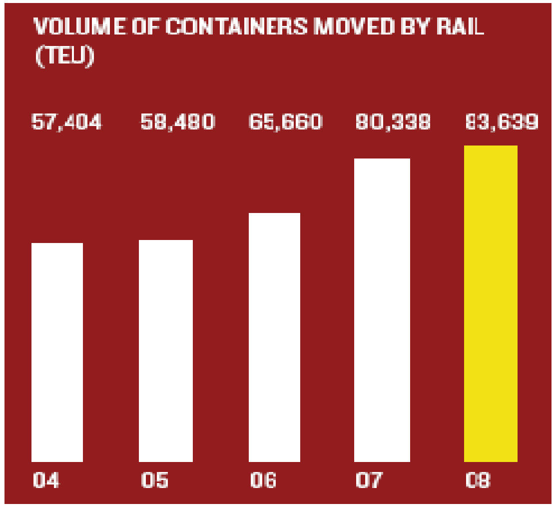
- Christchurch population 331,400
- Distribution Centre located close to the industrial area of Christchurch and within a few km of Christchurch centre
- Distribution centre well located in terms of rail (north, south and east) and road access
- The distance from the Distribution Centre to the Port is 15km
- The benefits of the Distribution Centre are:
  – Improved journey times and reliability as a result of avoiding road congestion
  – Reduced HGV traffic on roads and associated environmental benefits
  – Reduced case for road building

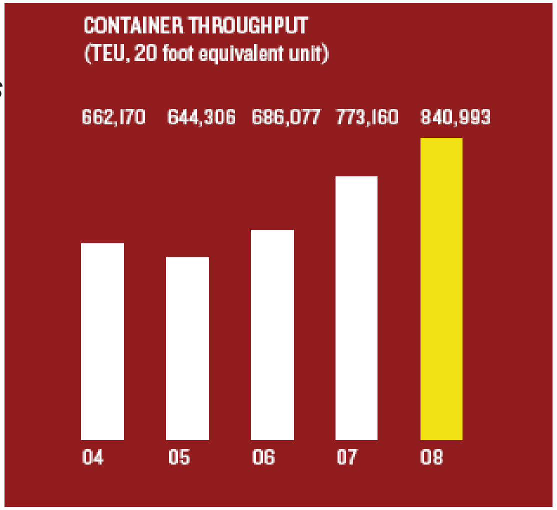


# Recognizing the benefits of rail, Ports of Auckland are developing a new inland port at Wiri, 25 km from Auckland Central

*Ports of Auckland recognizes that efficiency is just as important outside the Port gates as it is inside. The development of a short-haul rail service between the Auckland seaport and Wiri Inland Port in South Auckland is one mechanism the Company is pursuing to improve Auckland's supply chain. The solution is a prime example of an integrated, multi-modal approach to transport planning, where road, rail and sea transport all work together to create a leaner and greener supply chain. The project includes an upgrade of the rail sidings and the construction of a hardstand adjacent to the Company's Wiri Inland Port, which borders the North Island Main Trunk Line. The resulting service will enable a large portion of Auckland's import containers to be moved by rail to Wiri, and then trucked to local businesses. We plan to have the rail service up and running midway through 2009. Once up to speed it is forecast to save 100,000 truck trips in and out of Auckland's CBD per annum – or up to 2.5 million truck kilometers per year.*

Taken from the Ports Of Auckland 2008 annual review




## Policy to shift from Road to Rail

- Auckland (pop 1.2m) has two competing international seaports: Auckland and Tauranga
- The Port of Tauranga and KiwiRail jointly operate an inland "metroport" where businesses deliver and collect their freight as if it were the actual port
- Wiri is Port of Auckland's response to the Tauranga challenge
- The Ports of Auckland only have about 10% of their total TEU moved by rail at present - establishing the inland ports is a way of addressing that
- The environmental benefit is widely accepted - an unpopular proposed urban motorway became harder to justify once traffic congestion was eased by the rail freight link

# This approach demonstrates that freight for local distribution can be sent a short distance via rail to a point to be distributed from

## DESTINATION AUCKLAND

NEARLY 80% OF AUCKLAND-BASED EXPORTS AND IMPORTS COME FROM, OR GO TO, PREMISES LOCATED SOUTH OF THE CBD, INCLUDING WIRI AND EAST TAMAKI. AXIS INTERMODAL FACILITATES THE BEST CONTAINER FREIGHT SUPPLY CHAIN FOR THESE GOODS.

**THE AUCKLAND AXIS CONTAINER TERMINALS ARE:**

→ In the best location to access the Auckland market. The Seaport is all-weather, connected 24/7 to business by motorway and rail.

→ Highly efficient. Container shipping lines say Auckland is the top port in Australasia and up with the best in the world.

→ Future proofing. A deepened shipping lane, extended main container terminal and investment in new equipment ensures the Seaport has the capacity and capability to handle the next generation larger container ships.

**AXIS WIRI INLAND PORT IS:**

→ A 16-hectare site in a great location. It's bounded by rail and within kilometres of SH1 and the new SH20.

→ A 24-hour extension of the Seaport, with all the road, yard (including empties), e-commerce, MAF/Customs functions of the Seaport.

**AXIS EAST TAMAKI INLAND PORT IS:**

→ A successful small-site Inland Port, in operation since 2002.

→ An essential part of the Auckland container freight supply chain for customers Fisher & Paykell and Panasonic, streamlining their logistics and delivering to their bottom line.


Taken from the axis intermodal inland Port website

# APPENDIX 3.1 GAZETTEER OF ARCHAELOGICAL DATA RELEVANT TO RINGASKIDDY

## Appendix 3.1: Gazetteer of Archaeological data relevant to Ringaskiddy

**Known information that occurs within the proposed development area is highlighted in blue,**

### National Museum of Ireland Topographical Files

There are no artefacts registered in the National Museum of Ireland's Topographic Files to the townlands that touch on the present developments areas, namely: Ballybricken; Barnahely; Ringaskiddy.

### Department of Arts, Heritage, and Local Government, Sites and Monuments Record.

Locations in Irish National Grid. Descriptions based on record files.

| Reference No. | Classification | Townland | Description | Easting | Northing | Distance to development |
|---|---|---|---|---|---|---|
| CO087-026 | Lime Kiln | Monkstown | | 176270 | 65330 | 700m |
| CO087-048 | Ringfort | Barnahely | Roughly circular area (45m E-W; 38m N-S) enclosed by earthen bank. | 176920 | 63800 | 800m |
| CO087-049 | Church | Ballybricken | Captain Hayes remembers the walls standing'. Site now occupied by Pfizer Chemicals. | 177050 | 64490 | 220m |
| CO087-050001-2 | Non antiquity | Barnahely | None | 177180 | 64010 | 500m |
| CO087-051001-2 | Graveyard | Barnahely | Rectangular graveyard (c.100m NE-SW; c. 30m NW-SE) enclosed by stone wall; still in use, many headstones, the earliest dating from 1720. Contained parish church of Barnahely, marked 'site of' on all editions of OS map; no visible trace of church. | 177370 | 63900 | 500m |
| CO087-052001-2 | Tower House | Barnahely | Overlooking Lough Beg and Cork Harbour. Complex of ruined buildings around courtyard which still functions as farmyard. Oldest structure near SW corner where 2-storey rectangular building (10.5m N-S; 6.6m E-W) appears to be remains tower house, showing much evidence of rebuilding. Built by de Cogan family, reputedly by Richard de Cogan, lord of the manorin 1536; de Cogans occupied site until 1642 when garrison surrendered to Lord Inchiquin. Also known as Castle Warren. Limited test excavation in 1999 did not reveal anything of interest, 99D079. | 177380 | 63730 | 600m |
| CO087-053 | Ringaskiddy | | On highest point of Ringaskiddy promontory, overlooking | 178710 | 63990 | 1km |

| Reference No. | Classification | Townland | Description | Easting | Northing | Distance to development |
|---|---|---|---|---|---|---|
| | | | Cork Harbour. Circular tower (diam. 15.5m E-W; 10.9m N-S; H 12.1m) with flattened profile to N and S; enclosed by dry fosse (Wth 4.6m; D 3.1m); within circular enclosure (diam. 100m) marked by ordnance stones. Built of coursed limestone ashlar. Largest of Cork Harbour Martellos; it was under construction 1813-15. Also registered in the NIAH as 20908747. | | | |
| CO087-054 | Midden | Ringaskiddy | On beach at Curlane Bank. 10cm thick lens of material extended 30m along foreshore. | 179063 | 63447 | 1.6km |
| CO087-059001-3 | Martello Tower and Barracks | Haulbowline | Martello Tower and Barracks complex on high ground at N edge of Haulbowline Island, overlooking entrance to Upper harbour; formerly part of 'Ordnance Ground' (CO087-05902-), now occupied by Naval Service. Constructed 1813-15. Built of coursed limestone blocks. Restored wooden floor; tower is being converted into museum by Naval Service.<br>Earlier reference to possible Viking occupation of the island, while the earliest known fortification here began in 1602.<br>Also described in the Archaeological Inventory of Co. Cork. Vol. 2. (Power, 1994), entries 5881, 5865. | 178880 | 65480 | 1.1km |
| CO087-061 | Church, site of | Ballintaggart | The site of Rosbeg church was noted by Bishop Dive Downes in October 1700. The 1842 OS map shows a walled garden NW of Ballybricken House, but in Ballintaggart townland which may be the location referred to above. This is likely to be the site of the 'early Irish church and graveyard. Area now occupied by industrial complex; no visible surface trace. | 176620 | 64760 | 500m |
| CO087-105 | Magazine | Rocky Island | Built 1808-18 to stone gun powder for the naval base on Haulbowline. Also described in the Archaeological Inventory of Co. Cork. Vol. 2. (Power, 1994), entry 5873. | 179248 | 64981 | 1.4 km |
| CO087-106 | Enclosure | Ballintaggart | INV_NOTES Crop mark (CUCAP, AIE 62) shows bivallate circular enclosure (int. diam. c.54m; ext. diam. c. 75m). | 176290 | 64470 | 800m |
| CO087-111 | House, Prospect Villa | Ringaskiddy | House demolished in 1981. Old photograph shows house as 2-storey, weather slated with hipped roof; of late 18th century appearance. Entrance front of 6-bays; central round-headed door ope; classical surround with broken pediment. Remains of ornate gate lodge (overgrown) survive to S on either side of entrance gate; one storey, appears to be hexagonal in plan; built of cut stone. | 177660 | 64320 | 200m |
| CO087-155 | Enclosure | Barnahely | Complex of features comprising interlocking enclosures, | 177605 | 63809 | 500m |

| Reference No. | Classification | Townland | Description | Easting | Northing | Distance to development |
|---|---|---|---|---|---|---|
| | | | identified in geophysical survey, possibly Bronze Age/Iron Age in date. | | | |
| CO087-161 | Midden | Ringaskiddy | Not available | 179370 | 63748 | 1.7km |

**National Inventory of Architectural Heritage**.

Based on www.buildingsofireland.ie

| Reference No. | Name | Description | Easting | Northing | Distance to development |
|---|---|---|---|---|---|
| 20908747 | Ringaskiddy | Martello tower, same as SMR CO087-053. | 178880 | 65480 | 1.1km |
| 20908747 | Haulbowline | Martello tower, same as SMR CO087-059 | 178880 | 65480 | 1.1km |
| CO-87-W-774641 | Barnahely | Prospect Villa was lived in by Lieutenant-Colonel Burke, and has since become the site of a modern factory. However a length of the boundary wall survives along its east side, where it forms one side of the R613 road. The wall is substantial in construction, measuring over 4m in height, and comprises of a mixture of dressed-, semi-dressed, and rough-cut stone of sandstone composition. A section has been removed from the northern end of the walls structure, approximately 10m+ section, as part of the development of the existing road network. Frequent repairs, both modern and old, are visible along its extent. The originally capping is obscured by heavy ivy growth.<br>Impact: The boundary wall will be directly impacted in part.<br>Mitigation: The area of impact will be recorded archaeologically in advance of its destruction, which will be monitored archaeologically. | 177515 to 177420 | 64190 to 64037 | Within, at tie-in of road network to N28/R613. |

**Department of the Environment, Heritage and Local Government, Historic Shipwreck Inventory**.

**The listing is restricted to those inventory entries that appear to be adjacent to or lie in the general vicinity of Ringaskiddy.**

Locational data where available converted to Irish National Grid

| Name | Date of Loss | Location | Easting | Northing | Description | Distance to development |
|---|---|---|---|---|---|---|
| *Luvius* | 2/5 November 1845 | Near Haulbowline | n/a | n/a | Ship en route to Cork from Cardiff which it collided with a steamer and sank. The crew was rescued. | Unknown but not less than 1.5km. |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Maria* | 1900 | Rocky Island | n/a | n/a | n/a | Unknown but Rocky Island is 1.5km E of main development, and c. 300m N of Paddy's Point |
| *Shannon Lass* | 1 February 1935 | Haulbowline wharf | n/a | n/a | Motor fishing boat sank at the wharf after collision with the SS Lisa at the piles | Unknown but not less than 1.5km. |
| Unknown | 20 October 1898 | Off Haulbowline | n/a | n/a | Wooden rowing boat collided with the launch *Cambridge* and was a total loss. | Unknown. |

**Department of the Environment, Heritage and Local Government, Licensed archaeological intervention**.

**Source:** *Excavations Bulletin*, annual publication edited by Isabel Bennett and published on behalf of the DAHG by Wordwell, Bray, and partially available online at www.excavations.ie

| Licence No. | Name | Description | Easting | Northing | Distance to development |
|---|---|---|---|---|---|
| 96E086 | Barnahely | Archaeological monitoring and trial excavation on the Merfin factory site observed a single small area of burning in an shallow fire-reddened pit, 75cm in diameter and filled with charcoal and ash. A millstone and two millstone fragments were also recovered, but nothing of archaeological significance was revealed. | 177200 | 63700 | *c.* 800m S of development. |
| 99E0279 | Barnahely | Castle Warren tower house, SMR CO87:5201, was subject to five test trenches in advance of a perimeter fence. No features of archaeological significance were observed. | 177200 | 63700 | *c.* 800m S of development. |
| 01E552 | Ringaskiddy | Archaeological trial excavation of a grassy mound revealed it to be of modern date and not of archaeological significance. | 178710 | 63990 | *c.* 900m S of development. |
| 03E1158 | Ringaskiddy | Monitoring was undertaken of marine dredging for the construction of a jetty and pontoon in connection with the National Maritime College Development. The area was excavated to an overall depth of ±4.183m, with a deeper area of 90m$^2$ excavated to ±6.1m. The excavated sediment was dark-grey silt, which became sandier in composition at its lower levels. Three non-archaeological timber fragments were recovered during the course of sieving. Two relatively modern glass bottles and a number of non-archaeological metal artefacts were also recovered. No archaeological features or artefacts were identified within the area of proposed development. | 17896 | 64600 | c. 400m E of development. |

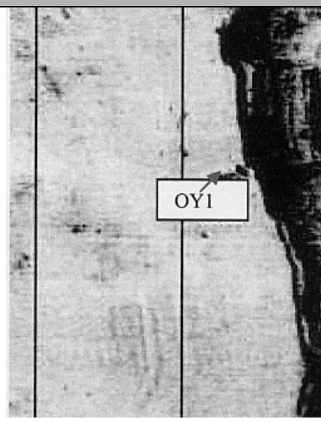
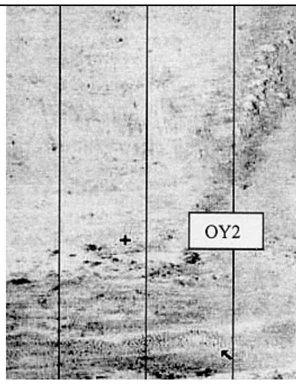
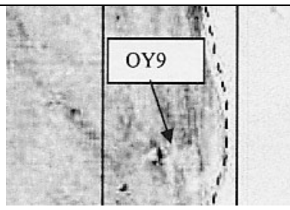
| | | | | | |
|---|---|---|---|---|---|
| 04E0774 | Barnahely | Road realignment close to Castle Warren (Barnahely Castle) and Barnahely graveyard (SMR CO87:51). Test trenching revealed the greater part of a partially extant early 19th-century walled garden located to the west of Castle Warren; an isolated stake-hole and shallow pit of suspected prehistoric date; clusters of recent parallel furrows criss-crossing the study area, a single charcoal-flecked pit, and a stray find of medieval green-glazed pottery from the topsoil | 177306 | 636940 | *c.* 1.2km S of development. |
| 04E1246 | Barnahely | Test-trenching in advance of the construction of a road network and ancillary trenching on a land bank at Barnahely, Ringaskiddy did not uncover any archaeological feature or find | 176290 | 64470 | *c.* 1.6km W of development. |
| 04E1441 | Haulbowline | Archaeological monitoring of dredging activity within the naval based did not reveal any material of archaeological significance. | 179000 | 65590 | > 1km N of development. |
| 04E1685 | Barnahely | Test-trenches in the vicinity of a ringfort revealed the remains of a keyhole-shaped kiln, located c. 10m to the west of the ringfort, and a levelled fulacht fiadh, located c. 20m to the north-west of the ringfort. Both of these sites were recorded and left in situ. | 176920 | 63800 | 1.5km W of development. |
| 06D026 | ADM jetty site and Oyster Bank site, Ringaskiddy | Marine geophysical survey conducted under license 05R133 as part of the Port of Cork's Strategic Development Plan identified 33 anomalies. Underwater inspection of the anomalies conducted under license 06D026 revealed no archaeologically significant material.<br>Mitigation: Archaeological monitoring. | Various | Various | Within. |
| 06D064 | Ringaskiddy and Cork Harbour | Non-disturbance visual inspection was employed to assess the archaeological potential of the seabed along two cable-lay routes identified for the Aghada to Cuskinny Cable Lay Project. In addition, a number of side-scan sonar and magnetometer anomalies, located within the vicinity of each cable route, were investigated, and the shoreline at each location was inspected. No material/deposits of archaeological significance were observed exposed on the seabed as part of the survey. The seabed was largely clear of man-made surface debris, with only occasional fragments of metal being encountered (jetsam from fishing vessels). | 185527 to 183140 | 675611 to 652600 | 4km E of ddevelopment. |
| 06D072 | Rocky Island, Ringaskiddy | Intertidal and metal-detector survey carried out on the north-western foreshore area of Rocky Island in Cork Harbour in advance of the proposed construction of an outfall pipe revealed no features or finds of archaeological significance. | 17938 | 65100 | 1km E of development |
| 06E0809 | Rocky Island, Ringaskiddy | Disarticulated human remains were identified during the redevelopment of the magazine (CO87-105) as a crematorium. It is likely the remains pre-date construction of the magazine, which was built between 1808 and 1818. | 179380 | 65100 | 1km E of development. |
| 07E0711 | Ringaskiddy | A programme of testing adjacent to the Pfizer facility on a circular crop-mark feature did not reveal anything of archaeological significance. | 176050 | 65020 | 1km W of development |

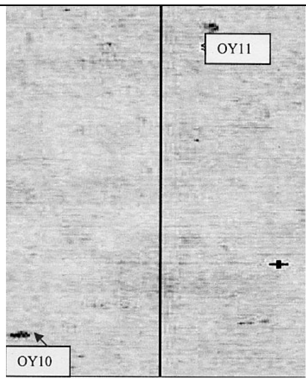
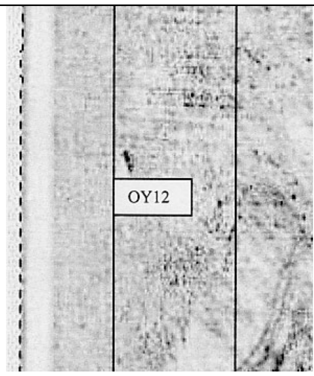
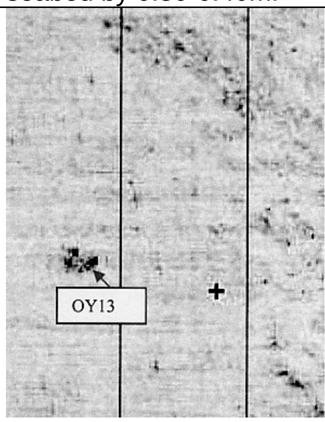
| | | | | | |
|---|---|---|---|---|---|
| 09D053 | Ringaskiddy to Corkbeg | Underwater assessment of marine geophysical anomalies located along the proposed route of a 220kV submarine cable between Corkbeg Island and Ringaskiddy, Cork Harbour included examination of a new shipwreck location identified in the side-scan sonar data, at 180660E 63784N. Inspection suggests the wreckage is from a composite vessel of late 19th century date. | 179315 to 182749 | 64226 to 63456 | 1km E of development. |
| 12D016, 12R073 | Barnahely | Non-disturbance intertidal and underwater assessment of the Ramp area in the East Basin, Monkstown creek, and the extension of the DWB in the West Basin, and the seabed at No. 2 Dolphin Ramps was conducted. The seabed is characterised by sand and silt which would provide a good holding content for buried material if it exists. No features or objects of archaeological significance were observed lying on the seabed surface or protruding from it.<br>Mitigation: Archaeological monitoring. | Various | Various | Within. |
| 12D034 | Haulbowline | An archaeological study has included intertidal and sub-tidal assessment of the eastern tip of the island. The work has confirmed the survival of footings associated with a former stone-built causeway that connected Haulbowline with Spike Island. | 179862 | 65170 | 1.5km E of development. |
| 14D004, 14R003 | Paddy's Point | Systematic intertidal and sub-tidal inspection and metal-detection was carried out and did not reveal material of archaeological significance.<br>Mitigation: Subject to granting of permission, inspection of seabed area that lay outside the survey footprint but is now within the development area; Archaeological monitoring during construction activity. | 179148 | 64678 | Witihin |

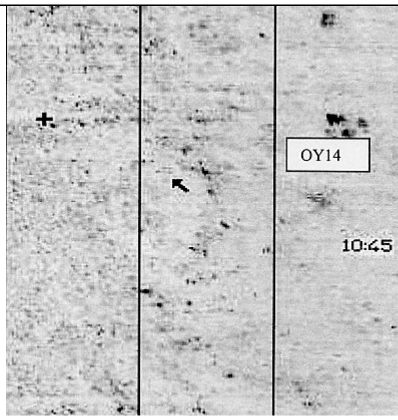
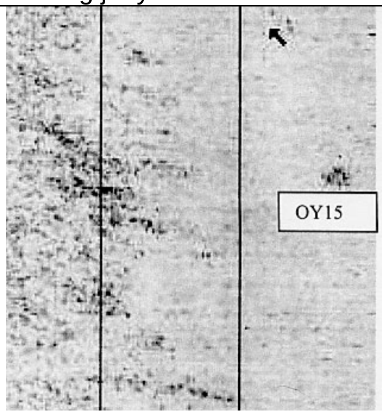
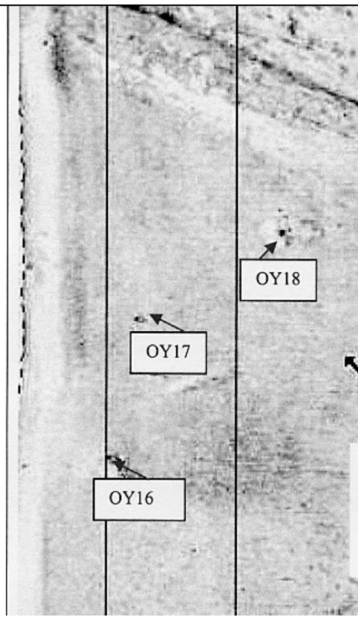
# APPENDIX 3.2 DIVER TRUTHING OF MARINE GEOPHYSICAL ANOMALIES DETECTED ON OYSTER BANK AND AT THE ADM JETTY

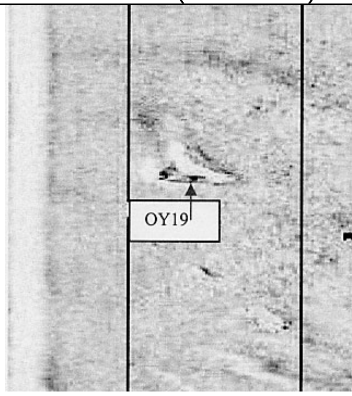
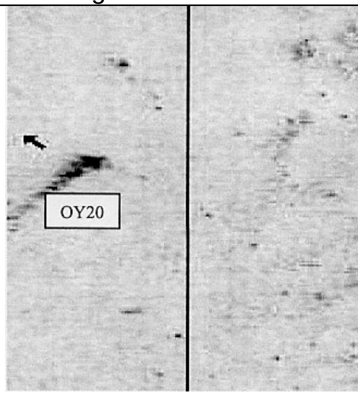
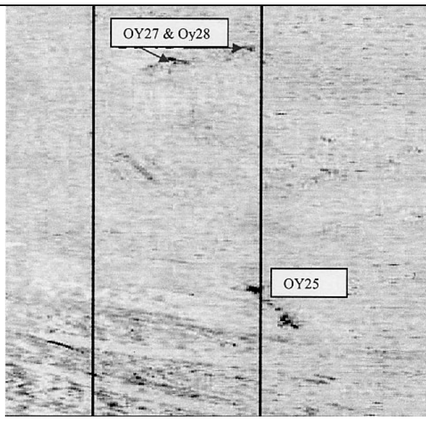
**Appendix 3.2: Diver-truthing of Marine Geophysical Survey anomalies detected on Oyster Bank and at the ADM Jetty**

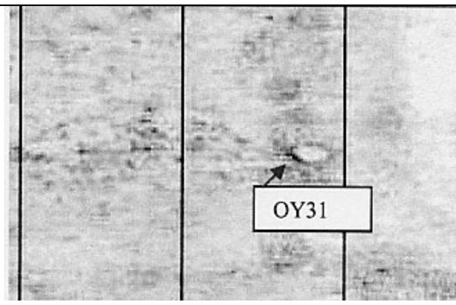
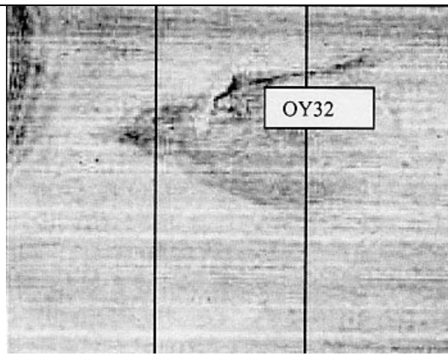
**3.3.1 Oyster Bank**

| Target | Easting | Northing | Long (W) D-M-S: | Lat (N) D-M-S: | Image/ Diver Identification |
|---|---|---|---|---|---|
| OY1 | 178376 | 65157 | 8-18-51.976 | 51-50-19.826 | <br>Half shell of life raft container lying on seabed. |
| OY2 | 17884 | 65122 | 8-18-25.438 | 51-50-18.764 | <br>Linear ridge composed of gravel and small rocks with some marine growth. Sterile seabed surrounding feature. |
| OY9 | 178368 | 65134 | 8-18-52.389 | 51-50-19.081 | <br>Small pile of rocks, upstanding c.0.30m from seabed. |

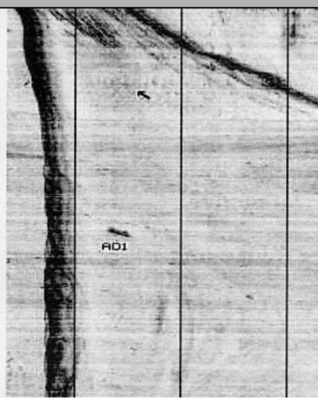
| | | | | | |
|---|---|---|---|---|---|
| OY10 | 178785 | 64998 | 8-18-30.58 | 51-50-14.738 |   No target visible. OY10 either buried by a shifting seabed or target represents portable object that has moved with the tide. |
| OY11 | 178725 | 65012 | 8-18-33.716 | 51-50-15.183 | Wire rope hawser (¾ inch diameter). See OY10. |
| OY12 | 178742 | 65061 | 8-18-32.839 | 51-50-16.77 |   Large boulder upstanding from the seabed by 0.30-0.40m. |
| OY13 | 178671 | 65007 | 8-18-36.535 | 51-50-15.013 |   No target visible. Sterile sand/silt bottom visible surrounding target location. |

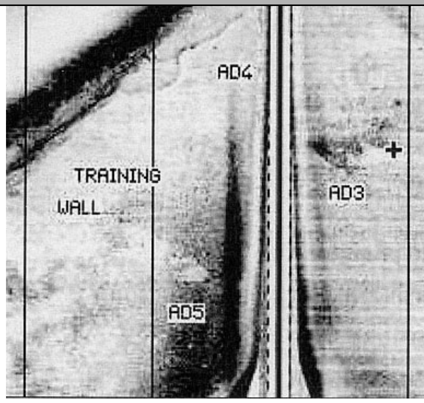
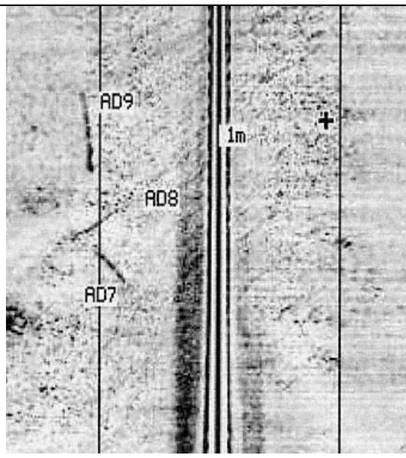
| | | | | | |
|---|---|---|---|---|---|
| OY14 | 178630 | 64956 | 8-18-38.664 | 51-50-13.353 | <br>Debris from construction of survival training jetty. |
| OY15 | 178916 | 64898 | 8-18-23.715 | 51-50-11.52 | <br>Two medium sized boulders lying adjacent to each other; upstanding c.0.15m from seabed. |
| OY16 | 17177 | 6490 | 8-19-2.284 | 51-50-7.924 | <br>Pile of hand sized rocks upstanding between 0.10 and 0.20m from seabed. |
| OY17 | 178200 | 64790 | 8-19-1.083 | 51-50-7.927 | Large tyre lying approximately 2m from target OY18. Tyre upstanding from seabed by 0.30m (See OY16). |

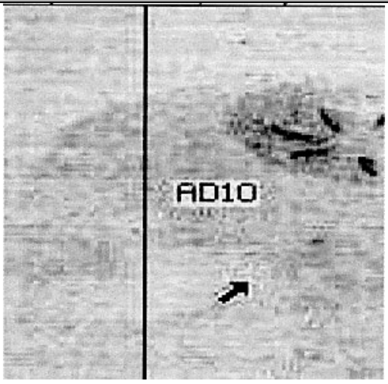
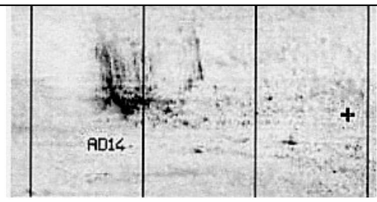
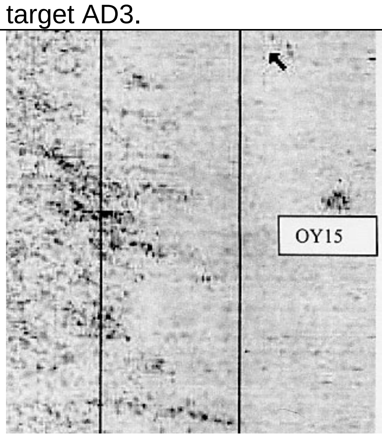
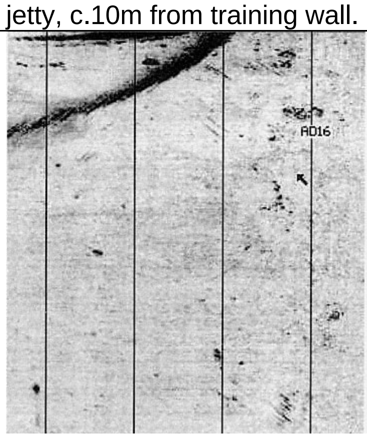
| | | | | | |
|---|---|---|---|---|---|
| OY18 | 178215 | 64780 | 8-19-0.297 | 51-50-7.915 | Large Tyre upstanding from seabed, c.0.20-0.30m (See OY16). |
| OY19 | 178346 | 64789 | 8-18-53.457 | 51-50-7.915 |   Large rock armour boulder; some scouring evident. |
| OY20 | 178617 | 64846 | 8-18-39.317 | 51-50-9.797 |   Debris from Training wall. Targets OY20-OY28 all located along the Low Water mark. |
| OY23 | 178259 | 64717 | 8-18-57.984 | 51-50-5.573 | See OY20 |
| OY24 | 178236 | 64707 | 8-18-59.182 | 51-50-5.246 | See OY20 |
| OY25 | 178219 | 64782 | 8-19-0.086 | 51-50-7.67 |   Debris from Training wall. Targets OY20-OY28 all located along the Low Water mark. |
| OY26 | 178196 | 64723 | 8-19-1.274 | 51-50-5.758 | See OY25 |
| OY27 | 178156 | 64775 | 8-19-3.374 | 51-50-7.435 | See OY25 |
| OY28 | 178153 | 64780 | 8-19-3.532 | 51-50-7.596 | See OY25 |

| | | | | | |
|---|---|---|---|---|---|
| OY31 | 177854 | 65034 | 8-19-19.206 | 51-50-15.771 |   Pile of small to medium sized rocks with scour hole to one side. Upstanding 0.10 from seabed and 0.40m from bottom of scour hole. |
| OY32 | 178351 | 65137 | 8-18-53.272 | 51-50-19.174 |   A distinctive ridge of stones and gravel with marine growth attached. Dead mans fingers secured to some of the larger stones. |
| | | | | | |

**3.3.2 ADM Jetty**

| Target | Easting | Northing | Long (W) D-M-S: | Lat (N) D-M-S: | Image/ Diver Identification |
|---|---|---|---|---|---|
| AD1 | 177277 | 64939 | 8-19-49.326 | 51-5-12.618 |   Linear deposit of rocks upstanding c.0.40m from seabed. Deposit measures 2.25m length x 0.50m width. Deposit located along base of 45º slope. |

| Target | Easting | Northing | Long (W) D-M-S: | Lat (N) D-M-S: | Image/ Diver Identification |
|---|---|---|---|---|---|
| AD3 | 177218 | 65247 | 8-19-52.48 | 51-50-22.573 |   Gently undulating seabed with small ridge located above large hole measuring 2.5-3m in circumference and 1.5m in depth. Probably from dredging or prop-wash. |
| AD4 | 177266 | 65213 | 8-19-52.054 | 51-50-21.475 | Gently undulating seabed with frequent plough marks; linear rake marks measuring 0.40m in width and 0.30m in depth. |
| AD5 | 177261 | 65254 | 8-19-50.233 | 51-50-22.515 | Large, linear, dredge scar with newly exposed dredge face measuring 2.5m in height. Almost vertical in profile. Dredge-scar 2m+ in width. |
| AD7 | 177255 | 65125 | 8-19-50.518 | 51-50-18.631 | Targets AD7-AD9 represent the mooring chain from Navigation buoy no. 2. These targets appear to have been pinged during different tidal states; when the mooring chain was leaning in different directions due to the tide (see image AD8) |
| AD8 | 177249 | 65111 | 8-19-50.827 | 51-50-18.177 |   Same as AD7 |
| AD9 | 177233 | 65105 | 8-19-51.602 | 51-50-17.981 | Same as AD7 |

| Target | Easting | Northing | Long (W) D-M-S: | Lat (N) D-M-S: | Image/ Diver Identification |
|---|---|---|---|---|---|
| AD10 | 177634 | 65150 | 8-19-30.729 | 51-50-19.495 |   Large rock armour boulder that has fallen away from the training wall. |
| AD14 | 177220 | 65253 | 8-19-52.375 | 51-50-22.767 |   Dredge scar/hole; may form part of target AD3. |
| AD15 | 177069 | 65180 | 8-20-0.244 | 51-50-20.283 |   Rock amour spit located along side jetty, c.10m from training wall. |
| AD16 | 176981 | 65107 | 8-20-4.822 | 51-50-18.008 |   Large rock armour boulder that has fallen away from the training wall. |

# APPENDIX 4.1 24-HOUR AMBIENT NOISE SURVEY RESULTS

## APPENDIX 4.1

## 24-HOUR AMBIENT NOISE SURVEY RESULTS
## EIS 2014

**Location N1: Summary Results 5th – 6th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 17:48 | 45.9 | 47.6 | 36.4 |
| | 18:00 | 47.6 | 48.6 | 37.7 |
| | 19:00 | 48.6 | 49.2 | 36.6 |
| | 20:00 | 45.5 | 38.4 | 34.9 |
| | 21:00 | 45.3 | 46.0 | 34.7 |
| | 22:00 | 41.1 | 42.2 | 34.2 |
| | 23:00 | 39.6 | 40.0 | 35.6 |
| | 00:00 | 41.3 | 39.8 | 34.9 |
| | 01:00 | 39.1 | 38.2 | 33.6 |
| | 02:00 | 40.1 | 34.8 | 32.6 |
| | 03:00 | 43.5 | 42.6 | 37.3 |
| | 04:00 | 45.2 | 37.2 | 35.1 |
| | 05:00 | 48.9 | 55.2 | 36.6 |

**Location N1: Summary Results 5th – 6th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 06:00 | 45.8 | 40.6 | 37.0 |
| | 07:00 | 50.2 | 45.4 | 38.9 |
| | 08:00 | 54.4 | 58.8 | 39.8 |
| | 09:00 | 53.2 | 57.2 | 39.6 |
| | 10:00 | 63.8 | 61.2 | 40.2 |
| | 11:00 | 63.9 | 61.0 | 40.3 |
| | 12:00 | 59.2 | 60.8 | 40.2 |
| | 13:00 | 51.3 | 53.8 | 38.4 |
| | 14:00 | 51.5 | 56.8 | 38.2 |
| | 15:00 | 51.0 | 56.8 | 39.1 |
| | 16:00 | 52.4 | 52.6 | 40.6 |
| | 17:00 | 54.8 | 59.8 | 37.2 |
| Mean | | 54.8 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N2: Summary Results 4th – 5th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 16:31:52 | 38.2 | 37.0 | 34.2 |
| | 17:15:00 | 41.5 | 37.0 | 31.8 |
| | 18:15:00 | 38.1 | 43.2 | 29.4 |
| | 19:15:00 | 41.4 | 41.6 | 30.0 |
| | 20:15:00 | 42.1 | 43.8 | 29.8 |
| | 21:15:00 | 37.7 | 34.0 | 29.2 |
| | 22:15:00 | 33.5 | 34.8 | 29.2 |
| | 23:15:00 | 31.3 | 34.0 | 28.6 |
| | 00:15:00 | 34.3 | 31.6 | 28.6 |
| | 01:15:00 | 31.3 | 32.8 | 29.0 |
| | 02:15:00 | 31.5 | 34.2 | 27.4 |
| | 03:15:00 | 36.5 | 30.4 | 28.2 |
| | 04:15:00 | 34.2 | 35.4 | 29.6 |

**Location N2: Summary Results 4th – 5th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-hour}}$ | $L_{A10}$ | $L_{A90}$ |
| | 05:15:00 | 40.0 | 48.4 | 29.4 |
| | 06:15:00 | 38.3 | 41.2 | 29.8 |
| | 07:15:00 | 38.9 | 41.8 | 31.0 |
| | 08:15:00 | 43.1 | 45.4 | 37.4 |
| | 09:15:00 | 50.2 | 54.8 | 52.6 |
| | 10:15:00 | 46.8 | 49.4 | 38.8 |
| | 11:15:00 | 47.3 | 51.2 | 38.8 |
| | 12:15:00 | 45.9 | 53.2 | 37.6 |
| | 13:15:00 | 55.2 | 56.6 | 54.4 |
| | 14:15:00 | 55.9 | 58.2 | 51.0 |
| | 15:15:00 | 50.9 | 51.8 | 50.2 |
| | 16:15:00 | 46.6 | 46.0 | 34.8 |
| Mean | | 47.0 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N3: Summary Results 5th – 6th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 18:05 | 53.8 | 53.0 | 30.6 |
| | 19:05 | 45.9 | 48.8 | 30.4 |
| | 20:05 | 45.9 | 45.6 | 29.0 |
| | 21:05 | 45.5 | 43.8 | 30.5 |
| | 22:05 | 45.1 | 49.2 | 41.9 |
| | 23:05 | 45.2 | 42.3 | 31.6 |
| | 00:05 | 38.0 | 35.3 | 32.2 |
| | 01:05 | 37.2 | 35.4 | 29.3 |
| | 02:05 | 37.9 | 31.5 | 29.6 |
| | 03:05 | 39.2 | 38.2 | 31.6 |
| | 04:05 | 37.1 | 37.3 | 32.0 |
| | 05:05 | 44.3 | 44.8 | 33.6 |
| | 06:05 | 41.1 | 39.0 | 31.2 |

**Location N3: Summary Results 5th – 6th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 07:05 | 53.2 | 48.5 | 36.1 |
| | 08:05 | 55.8 | 59.3 | 38.6 |
| | 09:05 | 50.8 | 54.8 | 38.2 |
| | 10:05 | 49.7 | 51.6 | 34.5 |
| | 11:05 | 52.0 | 53.8 | 38.0 |
| | 12:05 | 52.9 | 56.6 | 39.8 |
| | 13:05 | 50.7 | 55.1 | 38.7 |
| | 14:05 | 51.0 | 54.8 | 38.6 |
| | 15:05 | 51.3 | 53.7 | 40.9 |
| | 16:05 | 51.1 | 53.5 | 38.2 |
| | 17:05 | 52.8 | 57.0 | 48.3 |
| | 18:05 | 55.8 | 64.3 | 47.5 |
| Mean | | 50.4 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N4: Summary Results 9th – 10th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 11:00 | 54.3 | 56.7 | 45.1 |
| | 12:00 | 55.2 | 60.1 | 44.3 |
| | 13:00 | 54.8 | 59.7 | 41.3 |
| | 14:00 | 54.2 | 58.5 | 42.2 |
| | 15:00 | 55.9 | 53.8 | 40.1 |
| | 16:00 | 56.8 | 59.5 | 44.3 |
| | 17:00 | 59.3 | 64.0 | 43.7 |
| | 18:00 | 59.9 | 64.3 | 44.0 |
| | 19:00 | 57.4 | 66.1 | 41.8 |
| | 20:00 | 50.1 | 52.7 | 43.5 |
| | 21:00 | 49.9 | 50.5 | 40.1 |
| | 22:00 | 49.0 | 50.1 | 42.2 |
| | 23:00 | 46.7 | 48.7 | 40.8 |

**Location N4: Summary Results 9th – 10th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 00:00 | 49.9 | 52.0 | 44.3 |
| | 01:00 | 45.2 | 43.7 | 36.7 |
| | 02:00 | 44.1 | 40.1 | 31.2 |
| | 03:00 | 45.5 | 37.6 | 30.7 |
| | 04:00 | 48.6 | 48.0 | 35.3 |
| | 05:00 | 47.6 | 40.8 | 32.0 |
| | 06:00 | 57.0 | 50.4 | 33.2 |
| | 07:00 | 60.3 | 65.5 | 42.9 |
| | 08:00 | 58.2 | 63.4 | 44.5 |
| | 09:00 | 54.2 | 59.3 | 41.9 |
| | 10:00 | 51.2 | 54.9 | 41.6 |
| | 11:00 | 51.2 | 52.0 | 41.4 |
| Mean | | 55.0 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N5: Summary Results 5th – 6th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq,\ 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 18:46 | 59.3 | 61.2 | 46.0 |
| | 19:01 | 52.4 | 56.8 | 38.5 |
| | 20:01 | 48.1 | 53.1 | 33.2 |
| | 21:01 | 47.7 | 49.6 | 35.0 |
| | 22:01 | 44.8 | 46.8 | 32.6 |
| | 23:01 | 45.7 | 46.9 | 33.9 |
| | 00:01 | 44.0 | 46.8 | 29.2 |
| | 01:01 | 39.7 | 40.6 | 28.0 |
| | 02:01 | 40.4 | 38.3 | 32.3 |
| | 03:01 | 40.9 | 42.8 | 30.9 |
| | 04:01 | 41.1 | 34.4 | 32.7 |
| | 05:01 | 46.2 | 45.1 | 36.0 |
| | 06:01 | 51.5 | 45.5 | 40.3 |

**Location N5: Summary Results 5th – 6th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 07:01 | 54.2 | 58.9 | 44.8 |
| | 08:01 | 54.5 | 57.4 | 47.0 |
| | 09:01 | 51.3 | 56.6 | 41.7 |
| | 10:01 | 50.8 | 54.7 | 42.7 |
| | 11:01 | 55.2 | 58.6 | 44.5 |
| | 12:01 | 53.1 | 54.9 | 46.5 |
| | 13:01 | 54.2 | 57.9 | 47.9 |
| | 14:01 | 54.4 | 56.6 | 47.7 |
| | 15:01 | 55.3 | 55.6 | 45.8 |
| | 16:01 | 55.1 | 58.2 | 45.9 |
| | 17:01 | 56.0 | 58.7 | 46.8 |
| | 18:01 | 56.4 | 65.3 | 47.3 |
| Mean | | 52.9 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N6: Summary Results 9th – 10th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 10:42 | 53.3 | 56.1 | 47.4 |
| | 10:57 | 54.2 | 56.7 | 50.2 |
| | 11:57 | 55.8 | 58.1 | 51.6 |
| | 12:57 | 54.1 | 56.1 | 51.4 |
| | 13:57 | 55.3 | 56.5 | 52.2 |
| | 14:57 | 55.5 | 56.9 | 52.3 |
| | 15:57 | 57.7 | 58.0 | 53.5 |
| | 16:57 | 56.8 | 58.2 | 53.6 |
| | 17:57 | 56.0 | 57.8 | 52.7 |
| | 18:57 | 55.0 | 59.4 | 51.4 |
| | 19:57 | 54.1 | 55.9 | 50.7 |
| | 20:57 | 53.1 | 55.3 | 50.0 |
| | 21:57 | 52.9 | 55.6 | 50.0 |

**Location N6: Summary Results 9th – 10th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 22:57 | 52.2 | 53.3 | 49.9 |
| | 23:57 | 52.6 | 54.0 | 50.6 |
| | 00:57 | 51.0 | 52.4 | 47.8 |
| | 01:57 | 42.2 | 42.4 | 37.3 |
| | 02:57 | 44.1 | 44.2 | 37.1 |
| | 03:57 | 44.0 | 48.6 | 38.4 |
| | 04:57 | 45.5 | 50.4 | 38.9 |
| | 05:57 | 51.3 | 50.8 | 42.3 |
| | 06:57 | 55.4 | 57.8 | 51.3 |
| | 07:57 | 55.5 | 57.0 | 52.1 |
| | 08:57 | 53.9 | 56.1 | 50.0 |
| | 09:57 | 53.8 | 56.7 | 49.6 |
| Mean | | 53.9 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N7: Summary Results 3rd – 4th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 16:01 | 53.0 | 55.8 | 50.2 |
| | 17:00 | 44.2 | 44.8 | 41.6 |
| | 18:00 | 42.8 | 42.6 | 39.4 |
| | 19:00 | 42.0 | 43.0 | 39.6 |
| | 20:00 | 41.3 | 44.2 | 38.6 |
| | 21:00 | 42.6 | 42.0 | 38.0 |
| | 22:00 | 40.5 | 43.8 | 39.2 |
| | 23:00 | 41.2 | 41.2 | 37.6 |
| | 00:00 | 40.1 | 42.4 | 38.8 |
| | 01:00 | 39.0 | 41.0 | 37.0 |
| | 02:00 | 38.4 | 38.6 | 36.0 |
| | 03:00 | 40.5 | 39.4 | 36.8 |
| | 04:00 | 39.0 | 38.2 | 35.6 |

**Location N7: Summary Results 3rd – 4th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 05:00 | 41.3 | 46.6 | 35.6 |
| | 06:00 | 43.7 | 42.8 | 36.8 |
| | 07:00 | 43.9 | 45.0 | 40.0 |
| | 08:00 | 48.2 | 50.0 | 42.2 |
| | 09:00 | 52.5 | 50.6 | 40.6 |
| | 10:00 | 53.4 | 47.4 | 39.2 |
| | 11:00 | 49.3 | 47.6 | 41.2 |
| | 12:00 | 48.1 | 50.0 | 42.6 |
| | 13:00 | 46.9 | 48.8 | 45.4 |
| | 14:00 | 49.0 | 53.8 | 48.0 |
| | 15:00 | 47.3 | 48.6 | 42.2 |
| | 16:00 | 42.8 | 44.0 | 40.8 |
| Mean | | 47.0 | | |

Survey Details:

| | |
|---|---|
| Survey Personnel: | Darragh Kingston, RPS. |
| $L_{Aeq}$ | Time-averaged noise level. |
| $L_{A90}$ | Noise level exceeded for 90% of measurement period (steady underlying noise level). |
| $L_{A10}$ | Noise level exceeded for 10 % of measurement period. |

**Location N8: Summary Results 9th – 10th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 12:26:10 | 46.9 | 46.0 | 41.4 |
| | 13:15:00 | 46.3 | 48.0 | 41.6 |
| | 14:15:00 | 44.8 | 47.8 | 42.0 |
| | 15:15:00 | 46.4 | 48.0 | 42.2 |
| | 16:15:00 | 46.1 | 48.6 | 43.6 |
| | 17:15:00 | 49.5 | 53.2 | 42.8 |
| | 18:15:00 | 48.1 | 50.6 | 43.4 |
| | 19:15:00 | 46.8 | 46.4 | 41.8 |
| | 20:15:00 | 49.6 | 54.2 | 45.0 |
| | 21:15:00 | 49.1 | 49.6 | 44.0 |
| | 22:15:00 | 51.1 | 53.8 | 47.2 |
| | 23:15:00 | 51.8 | 52.6 | 44.8 |
| | 00:15:00 | 55.2 | 57.6 | 50.4 |

**Location N8: Summary Results 9th – 10th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 01:15:00 | 49.1 | 53.8 | 44.8 |
| | 02:15:00 | 41.6 | 43.8 | 37.2 |
| | 03:15:00 | 40.8 | 43.8 | 37.4 |
| | 04:15:00 | 45.5 | 46.4 | 38.2 |
| | 05:15:00 | 42.7 | 43.8 | 37.0 |
| | 06:15:00 | 42.3 | 40.2 | 37.0 |
| | 07:15:00 | 46.7 | 48.4 | 42.4 |
| | 08:15:00 | 45.8 | 47.0 | 43.8 |
| | 09:15:00 | 49.3 | 51.6 | 44.4 |
| | 10:15:00 | 48.4 | 51.2 | 44.6 |
| | 11:15:00 | 47.1 | 48.6 | 43.0 |
| | 12:15:00 | 48.9 | 52.2 | 44.8 |
| Mean | | 48.4 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N9: Summary Results 11th – 12th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 13:58 | 55.7 | 59.0 | 43.0 |
| | 14:00 | 53.0 | 57.6 | 40.5 |
| | 15:00 | 55.1 | 57.4 | 41.1 |
| | 16:00 | 54.0 | 58.4 | 39.9 |
| | 17:00 | 54.3 | 58.0 | 39.9 |
| | 18:00 | 54.1 | 58.0 | 40.0 |
| | 19:00 | 54.0 | 57.6 | 38.3 |
| | 20:00 | 52.1 | 56.8 | 37.9 |
| | 21:00 | 51.4 | 56.0 | 36.1 |
| | 22:00 | 49.4 | 55.4 | 35.1 |
| | 23:00 | 49.1 | 47.0 | 34.0 |
| | 00:00 | 44.5 | 42.8 | 38.3 |
| | 01:00 | 44.3 | 43.0 | 40.3 |

**Location N9: Summary Results 11th – 12th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 02:00 | 42.8 | 41.4 | 38.6 |
| | 03:00 | 44.5 | 41.2 | 41.7 |
| | 04:00 | 47.5 | 44.2 | 43.6 |
| | 05:00 | 52.8 | 49.2 | 48.6 |
| | 06:00 | 56.2 | 49.4 | 50.9 |
| | 07:00 | 58.6 | 60.2 | 49.6 |
| | 08:00 | 60.0 | 64.4 | 50.3 |
| | 09:00 | 59.6 | 63.8 | 52.7 |
| | 10:00 | 58.3 | 62.0 | 51.1 |
| | 11:00 | 58.3 | 61.8 | 51.0 |
| | 12:00 | 57.7 | 62.0 | 49.7 |
| | 13:00 | 56.2 | 61.0 | 34.8 |
| Mean | | 55.1 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N10:Summary Results 10th – 11th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 13:45 | 51.8 | 55.8 | 38.9 |
| | 14:45 | 52.2 | 56.5 | 39.4 |
| | 15:45 | 54.2 | 56.7 | 41.1 |
| | 16:45 | 53.2 | 57.7 | 43.8 |
| | 17:45 | 52.7 | 56.7 | 39.8 |
| | 18:45 | 52.8 | 57.3 | 39.5 |
| | 19:45 | 52.4 | 56.7 | 40.8 |
| | 20:45 | 51.0 | 56.1 | 37.0 |
| | 21:45 | 50.7 | 53.0 | 33.2 |
| | 22:45 | 48.3 | 50.8 | 30.1 |
| | 23:45 | 44.2 | 41.5 | 29.4 |
| | 00:45 | 42.1 | 36.4 | 31.7 |
| | 01:45 | 38.3 | 36.0 | 32.0 |

**Location N10: Summary Results 10th – 11th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 02:45 | 38.9 | 44.9 | 31.2 |
| | 03:45 | 39.1 | 36.7 | 33.0 |
| | 04:45 | 39.2 | 40.7 | 31.8 |
| | 05:45 | 43.8 | 48.5 | 32.7 |
| | 06:45 | 46.8 | 51.2 | 34.8 |
| | 07:45 | 52.7 | 58.2 | 36.8 |
| | 08:45 | 53.5 | 58.4 | 39.0 |
| | 09:45 | 53.5 | 56.6 | 34.7 |
| | 10:45 | 53.1 | 57.9 | 41.4 |
| | 11:45 | 52.6 | 56.5 | 43.3 |
| | 12:45 | 54.2 | 57.2 | 39.1 |
| | 13:45 | 67.9 | 56.5 | 40.1 |
| Mean | | 55.7 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N11: Summary Results 11th – 12th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 14:47 | 40.2 | 42.7 | 36.4 |
| | 15:47 | 42.3 | 44.8 | 35.1 |
| | 16:47 | 44.7 | 44.0 | 36.4 |
| | 17:47 | 52.3 | 43.9 | 37.5 |
| | 18:47 | 41.4 | 44.3 | 35.3 |
| | 19:47 | 59.4 | 42.7 | 34.5 |
| | 20:47 | 36.3 | 38.0 | 31.5 |
| | 21:47 | 44.8 | 53.2 | 29.0 |
| | 22:47 | 46.6 | 30.0 | 25.8 |
| | 23:47 | 51.0 | 32.9 | 27.3 |
| | 00:47 | 29.4 | 33.3 | 27.5 |
| | 01:47 | 31.1 | 32.2 | 30.3 |
| | 02:47 | 39.6 | 32.1 | 28.5 |

**Location N11: Summary Results 11th – 12th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 03:47 | 38.7 | 37.0 | 34.3 |
| | 04:47 | 43.5 | 51.1 | 41.0 |
| | 05:47 | 49.7 | 50.2 | 43.5 |
| | 06:47 | 52.0 | 54.3 | 49.5 |
| | 07:47 | 47.9 | 50.4 | 46.8 |
| | 08:47 | 46.7 | 50.8 | 46.8 |
| | 09:47 | 51.4 | 54.4 | 46.6 |
| | 10:47 | 49.3 | 51.1 | 45.9 |
| | 11:47 | 47.4 | 49.8 | 45.4 |
| | 12:47 | 44.4 | 45.5 | 39.3 |
| | 13:47 | 49.1 | 42.6 | 35.4 |
| | 14:47 | 49.6 | 50.6 | 39.4 |
| Mean | | 49.4 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N12:Summary Results 10th – 11th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 13:29 | 53.1 | 58.4 | 42.4 |
| | 14:00 | 54.5 | 59.2 | 41.0 |
| | 15:00 | 55.8 | 58.2 | 42.2 |
| | 16:00 | 55.1 | 58.4 | 44.4 |
| | 17:00 | 54.9 | 59.2 | 41.6 |
| | 18:00 | 54.3 | 59.0 | 41.8 |
| | 19:00 | 54.8 | 58.4 | 43.0 |
| | 20:00 | 52.9 | 57.8 | 41.0 |
| | 21:00 | 53.0 | 57.0 | 40.0 |
| | 22:00 | 50.3 | 54.0 | 38.6 |
| | 23:00 | 46.7 | 49.6 | 37.8 |
| | 00:00 | 44.4 | 45.8 | 36.8 |
| | 01:00 | 42.5 | 39.6 | 37.6 |

**Location N12: Summary Results10th – 11th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 02:00 | 42.3 | 43.0 | 39.4 |
| | 03:00 | 41.8 | 40.8 | 37.6 |
| | 04:00 | 41.5 | 40.6 | 38.4 |
| | 05:00 | 45.0 | 42.2 | 38.4 |
| | 06:00 | 48.7 | 44.6 | 37.2 |
| | 07:00 | 55.0 | 59.0 | 38.6 |
| | 08:00 | 55.8 | 60.8 | 41.0 |
| | 09:00 | 55.7 | 60.2 | 40.4 |
| | 10:00 | 54.6 | 58.4 | 39.4 |
| | 11:00 | 53.5 | 57.2 | 41.0 |
| | 12:00 | 54.8 | 58.6 | 43.6 |
| | 13:00 | 53.3 | 58.6 | 40.4 |
| Mean | | 52.9 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N13: Summary Results 10th – 11th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 14:09 | 51.8 | 55.4 | 44.1 |
| | 15:09 | 54.6 | 56.1 | 45.6 |
| | 16:09 | 51.9 | 55.2 | 45.4 |
| | 17:09 | 52.0 | 55.3 | 43.8 |
| | 18:09 | 50.8 | 54.5 | 43.7 |
| | 19:09 | 51.7 | 54.4 | 44.6 |
| | 20:09 | 50.3 | 52.5 | 43.7 |
| | 21:09 | 49.3 | 54.4 | 42.7 |
| | 22:09 | 47.2 | 53.1 | 39.8 |
| | 23:09 | 44.5 | 48.1 | 39.3 |
| | 00:09 | 41.9 | 43.2 | 38.2 |
| | 01:09 | 40.7 | 42.3 | 37.9 |
| | 02:09 | 42.4 | 44.3 | 38.0 |

**Location N13: Summary Results 10th – 11th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 03:09 | 40.1 | 38.6 | 37.8 |
| | 04:09 | 39.0 | 38.5 | 37.8 |
| | 05:09 | 41.9 | 40.7 | 38.0 |
| | 06:09 | 47.2 | 45.9 | 38.3 |
| | 07:09 | 51.1 | 54.3 | 39.0 |
| | 08:09 | 52.7 | 57.3 | 41.1 |
| | 09:09 | 52.5 | 56.7 | 41.1 |
| | 10:09 | 52.4 | 55.0 | 47.1 |
| | 11:09 | 51.1 | 54.4 | 44.0 |
| | 12:09 | 51.5 | 54.1 | 46.3 |
| | 13:09 | 52.5 | 54.6 | 44.3 |
| | 14:09 | 54.3 | 58.0 | 46.6 |
| Mean | | 50.5 | | |

Survey Details:

| | |
|---|---|
| Survey Personnel: | Darragh Kingston, RPS. |
| $L_{Aeq}$ | Time-averaged noise level. |
| $L_{A90}$ | Noise level exceeded for 90% of measurement period (steady underlying noise level). |
| $L_{A10}$ | Noise level exceeded for 10 % of measurement period. |

**Location N14: Summary Results 11th – 12th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 14:42 | 55.7 | 59.7 | 41.1 |
| | 14:57 | 55.2 | 58.1 | 41.0 |
| | 15:57 | 61.0 | 61.3 | 45.3 |
| | 16:57 | 56.9 | 61.3 | 42.8 |
| | 17:57 | 55.4 | 59.3 | 41.4 |
| | 18:57 | 54.0 | 58.9 | 39.8 |
| | 19:57 | 53.7 | 58.5 | 39.7 |
| | 20:57 | 52.9 | 57.8 | 36.3 |
| | 21:57 | 50.5 | 56.1 | 35.5 |
| | 22:57 | 49.4 | 49.1 | 27.7 |
| | 23:57 | 46.6 | 42.4 | 31.3 |
| | 00:57 | 43.6 | 41.8 | 32.8 |
| | 01:57 | 42.8 | 37.9 | 32.9 |

**Location N14: Summary Results 11th – 12th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 02:57 | 44.6 | 38.6 | 35.4 |
| | 03:57 | 43.8 | 39.0 | 38.0 |
| | 04:57 | 50.6 | 45.8 | 44.5 |
| | 05:57 | 55.3 | 46.9 | 47.3 |
| | 06:57 | 59.7 | 63.5 | 45.6 |
| | 07:57 | 60.3 | 65.0 | 47.7 |
| | 08:57 | 59.2 | 64.6 | 50.1 |
| | 09:57 | 58.2 | 62.8 | 47.5 |
| | 10:57 | 58.4 | 63.2 | 47.5 |
| | 11:57 | 57.8 | 62.7 | 45.6 |
| | 12:57 | 56.1 | 60.4 | 44.5 |
| | 13:57 | 55.6 | 59.1 | 47.8 |
| Mean | | 56.0 | | |

Survey Details:

| | |
|---|---|
| Survey Personnel: | Darragh Kingston, RPS. |
| $L_{Aeq}$ | Time-averaged noise level. |
| $L_{A90}$ | Noise level exceeded for 90% of measurement period (steady underlying noise level). |
| $L_{A10}$ | Noise level exceeded for 10 % of measurement period. |

**Location N15: Summary Results 30th – 31st July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq,\ 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 09:53 | 45.8 | 48.4 | 41.8 |
| | 10:00 | 47.3 | 44.6 | 40.7 |
| | 11:00 | 45.1 | 45.6 | 40.8 |
| | 12:00 | 44.6 | 45.4 | 41.3 |
| | 13:00 | 44.6 | 48.2 | 40.9 |
| | 14:00 | 45.9 | 49.6 | 42.7 |
| | 15:00 | 46.7 | 47.4 | 44.1 |
| | 16:00 | 47.1 | 47.0 | 44.2 |
| | 17:00 | 46.5 | 50.8 | 43.4 |
| | 18:00 | 47.6 | 53.2 | 41.0 |
| | 19:00 | 43.5 | 39.2 | 33.8 |
| | 20:00 | 46.5 | 47.0 | 42.3 |
| | 21:00 | 40.6 | 45.0 | 35.7 |

**Location N15: Summary Results 30th – 31st July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 22:00 | 38.3 | 36.0 | 32.2 |
| | 23:00 | 35.9 | 38.8 | 33.5 |
| | 00:00 | 41.2 | 35.6 | 33.5 |
| | 01:00 | 38.5 | 40.2 | 36.6 |
| | 02:00 | 36.3 | 38.6 | 34.9 |
| | 03:00 | 43.6 | 42.6 | 41.9 |
| | 04:00 | 43.4 | 42.0 | 40.9 |
| | 05:00 | 48.5 | 46.6 | 43.8 |
| | 06:00 | 47.8 | 47.8 | 44.2 |
| | 07:00 | 48.5 | 48.6 | 46.8 |
| | 08:00 | 49.4 | 48.8 | 47.5 |
| | 09:00 | 47.5 | 48.4 | 33.8 |
| Mean | | 45.7 | | |

| | |
|---|---|
| Survey Details: | |
| Survey Personnel: | Darragh Kingston, RPS. |
| $L_{Aeq}$ | Time-averaged noise level. |
| $L_{A90}$ | Noise level exceeded for 90% of measurement period (steady underlying noise level). |
| $L_{A10}$ | Noise level exceeded for 10 % of measurement period. |

**Location N16: Summary Results 16th – 17th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 09:55 | 52.6 | 56.1 | 43.3 |
| | 10:55 | 53.2 | 55.3 | 44.9 |
| | 11:55 | 52.4 | 55.7 | 43.1 |
| | 12:55 | 52.3 | 56.4 | 44.3 |
| | 13:55 | 53.1 | 55.8 | 44.4 |
| | 14:55 | 53.3 | 56.6 | 48.7 |
| | 15:55 | 53.0 | 56.1 | 45.2 |
| | 16:55 | 52.1 | 55.8 | 45.9 |
| | 17:55 | 51.7 | 56.0 | 42.6 |
| | 18:55 | 50.7 | 54.6 | 40.1 |
| | 19:55 | 49.4 | 54.4 | 40.2 |
| | 20:55 | 49.3 | 55.0 | 38.3 |
| | 21:55 | 45.8 | 50.3 | 31.9 |

**Location N16: Summary Results 16th – 17th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 22:55 | 44.6 | 49.3 | 31.5 |
| | 23:55 | 42.2 | 42.4 | 30.3 |
| | 00:55 | 38.8 | 39.5 | 29.6 |
| | 01:55 | 37.7 | 34.2 | 31.1 |
| | 02:55 | 33.2 | 33.1 | 30.6 |
| | 03:55 | 34.9 | 33.3 | 29.1 |
| | 04:55 | 45.6 | 37.4 | 27.6 |
| | 05:55 | 45.3 | 41.7 | 29.0 |
| | 06:55 | 49.2 | 50.5 | 33.0 |
| | 07:55 | 51.0 | 56.7 | 38.8 |
| | 08:55 | 51.3 | 55.6 | 37.8 |
| | 09:55 | 50.1 | 54.6 | 38.8 |
| Mean | | 50.1 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

Location N17: Summary Results 27th - 28th January 2013 (Sheet 1 of 2)

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 14:30 | 49.2 | 50.8 | 46.6 |
| | 15:30 | 49.6 | 48.8 | 45.5 |
| | 16:30 | 52.4 | 53.9 | 48.9 |
| | 17:30 | 52.3 | 53.2 | 48.2 |
| | 18:30 | 50.9 | 49.5 | 45.2 |
| | 19:30 | 48.9 | 48.0 | 44.3 |
| | 20:30 | 45.7 | 46.5 | 42.8 |
| | 21:30 | 42.3 | 41.3 | 39.2 |
| | 22:30 | 41.5 | 41.5 | 39.5 |
| | 23:30 | 41.0 | 40.9 | 39.1 |
| | 00:30 | 41.0 | 41.0 | 39.1 |
| | 01:30 | 41.8 | 41.9 | 39.2 |
| | 02:30 | 39.8 | 39.0 | 36.8 |

**Location N17: Summary Results 27th - 28th January 2013 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 03:30 | 38.4 | 37.7 | 35.6 |
| | 04:30 | 37.6 | 37.3 | 35.1 |
| | 05:30 | 39.0 | 39.5 | 36.6 |
| | 06:30 | 44.0 | 45.2 | 41.6 |
| | 07:30 | 46.2 | 47.4 | 41.5 |
| | 08:30 | 46.2 | 46.9 | 42.8 |
| | 09:30 | 45.9 | 46.2 | 42.5 |
| | 10:30 | 49.3 | 49.5 | 43.5 |
| | 11:30 | 50.8 | 52.0 | 46.7 |
| | 12:30 | 50.0 | 50.4 | 46.8 |
| | 13:30 | 49.1 | 52.0 | 47.7 |
| Mean | | 47.6 | | |

Survey Details:
Survey Personnel: Ronan Murphy, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N18: Summary Results 16th – 17th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 10:44 | 49.1 | 51.3 | 46.4 |
| | 11:44 | 50.2 | 51.6 | 46.8 |
| | 12:44 | 47.3 | 47.8 | 43.3 |
| | 13:44 | 47.7 | 47.1 | 43.5 |
| | 14:44 | 49.4 | 53.2 | 48.7 |
| | 15:44 | 50.0 | 50.6 | 43.3 |
| | 16:44 | 49.7 | 52.2 | 46.5 |
| | 17:44 | 46.8 | 49.2 | 41.5 |
| | 18:44 | 45.1 | 47.9 | 41.6 |
| | 19:44 | 44.1 | 43.1 | 37.8 |
| | 20:44 | 61.4 | 45.0 | 38.5 |
| | 21:44 | 38.8 | 38.6 | 33.7 |
| | 22:44 | 35.0 | 37.9 | 33.5 |

**Location N18: Summary Results 16th – 17th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 23:44 | 35.3 | 35.3 | 33.2 |
| | 00:44 | 39.4 | 35.4 | 32.6 |
| | 01:44 | 37.9 | 37.2 | 33.5 |
| | 02:44 | 42.2 | 36.9 | 33.9 |
| | 03:44 | 34.8 | 35.8 | 33.0 |
| | 04:44 | 32.7 | 32.8 | 29.9 |
| | 05:44 | 42.0 | 37.6 | 31.9 |
| | 06:44 | 38.0 | 42.9 | 34.8 |
| | 07:44 | 42.7 | 42.5 | 37.7 |
| | 08:44 | 41.9 | 42.6 | 38.1 |
| | 09:44 | 43.9 | 46.8 | 39.9 |
| | 10:44 | 45.8 | 46.3 | 40.2 |
| Mean | | 49.5 | | |

Survey Details:
Survey Personnel: Darragh Kingston, RPS.
$L_{Aeq}$ Time-averaged noise level.
$L_{A90}$ Noise level exceeded for 90% of measurement period (steady underlying noise level).
$L_{A10}$ Noise level exceeded for 10 % of measurement period.

**Location N19: Summary Results 16th – 17th July 2012 (Sheet 1 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1-hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 10:34:04 | 53.0 | 55.4 | 47.6 |
| | 11:15:00 | 52.0 | 54.2 | 45.0 |
| | 12:15:00 | 51.7 | 56.0 | 44.2 |
| | 13:15:00 | 50.8 | 51.2 | 42.2 |
| | 14:15:00 | 52.7 | 56.0 | 45.6 |
| | 15:15:00 | 53.0 | 57.4 | 47.6 |
| | 16:15:00 | 53.0 | 56.2 | 46.0 |
| | 17:15:00 | 51.1 | 54.8 | 43.6 |
| | 18:15:00 | 52.6 | 55.6 | 43.6 |
| | 19:15:00 | 51.5 | 55.0 | 42.4 |
| | 20:15:00 | 50.4 | 54.6 | 40.4 |
| | 21:15:00 | 48.8 | 53.4 | 37.6 |
| | 22:15:00 | 45.9 | 47.4 | 35.4 |

**Location N19: Summary Results 16th – 17th July 2012 (Sheet 2 of 2)**

| Monitoring Location | Time | Measured Noise Level dB(A) | | |
|---|---|---|---|---|
| | | $L_{Aeq, 1\text{-}hour}$ | $L_{A10}$ | $L_{A90}$ |
| | 23:15:00 | 45.7 | 45.4 | 32.6 |
| | 00:15:00 | 41.7 | 49.2 | 32.4 |
| | 01:15:00 | 41.1 | 39.0 | 32.2 |
| | 02:15:00 | 34.0 | 33.6 | 31.0 |
| | 03:15:00 | 34.0 | 34.8 | 32.2 |
| | 04:15:00 | 40.1 | 35.2 | 32.6 |
| | 05:15:00 | 40.4 | 35.2 | 31.2 |
| | 06:15:00 | 45.3 | 40.6 | 33.6 |
| | 07:15:00 | 47.5 | 47.8 | 36.8 |
| | 08:15:00 | 48.4 | 51.8 | 38.8 |
| | 09:15:00 | 50.0 | 53.6 | 39.4 |
| | 10:15:00 | 51.6 | 55.0 | 41.8 |
| Mean | | 49.8 | | |

Survey Details:

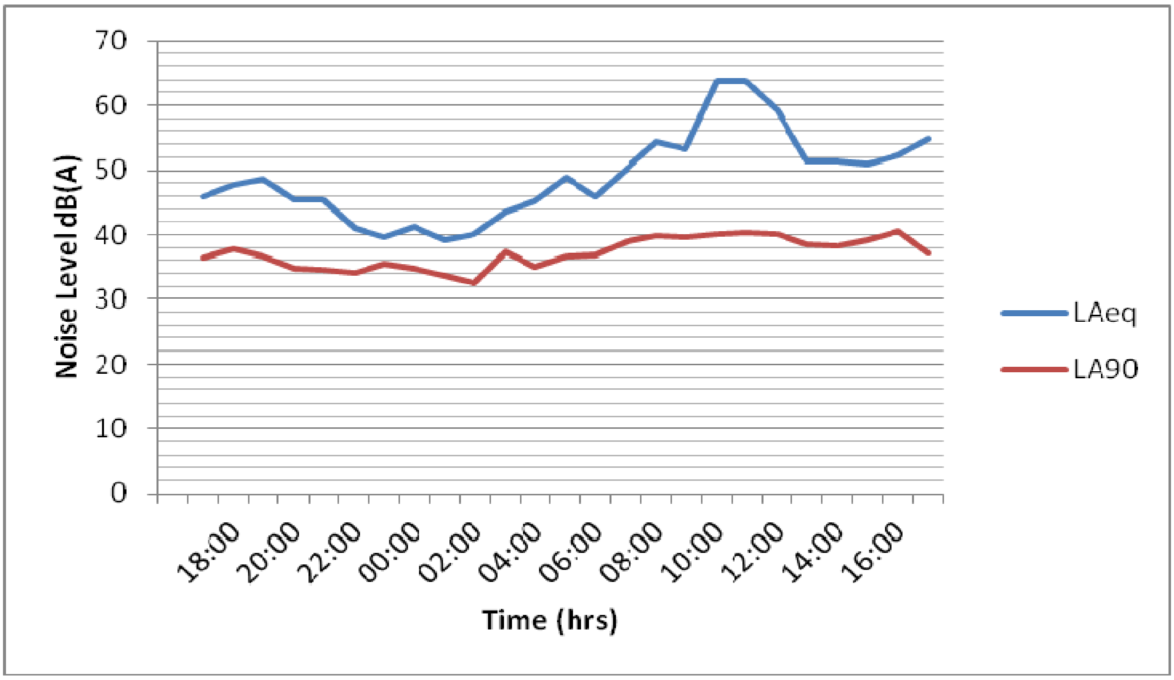
| | |
|---|---|
| Survey Personnel: | Darragh Kingston, RPS. |
| $L_{Aeq}$ | Time-averaged noise level. |
| $L_{A90}$ | Noise level exceeded for 90% of measurement period (steady underlying noise level). |
| $L_{A10}$ | Noise level exceeded for 10 % of measurement period. |

# APPENDIX 4.2 GRAPHICAL SUMMARY OF 24HR AMBIENT NOISE SURVEY RESULTS 2014

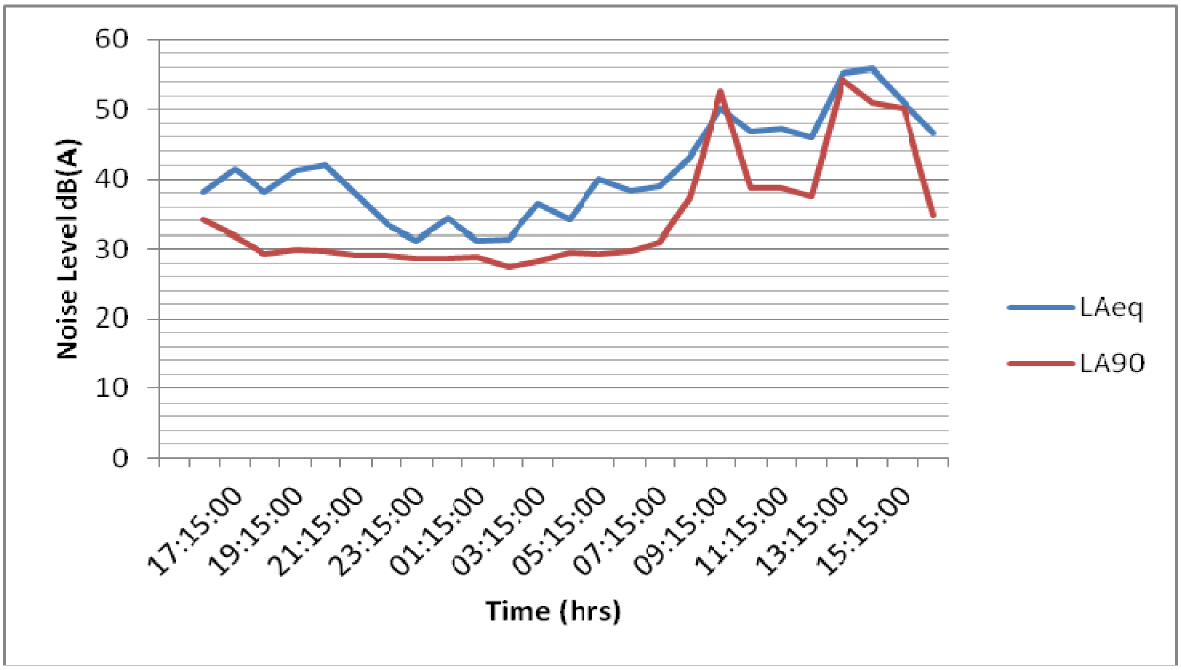
**APPENDIX 4.2**

**GRAPHICAL SUMMARY OF 24-HOUR AMBIENT NOISE SURVEY RESULTS 2014**

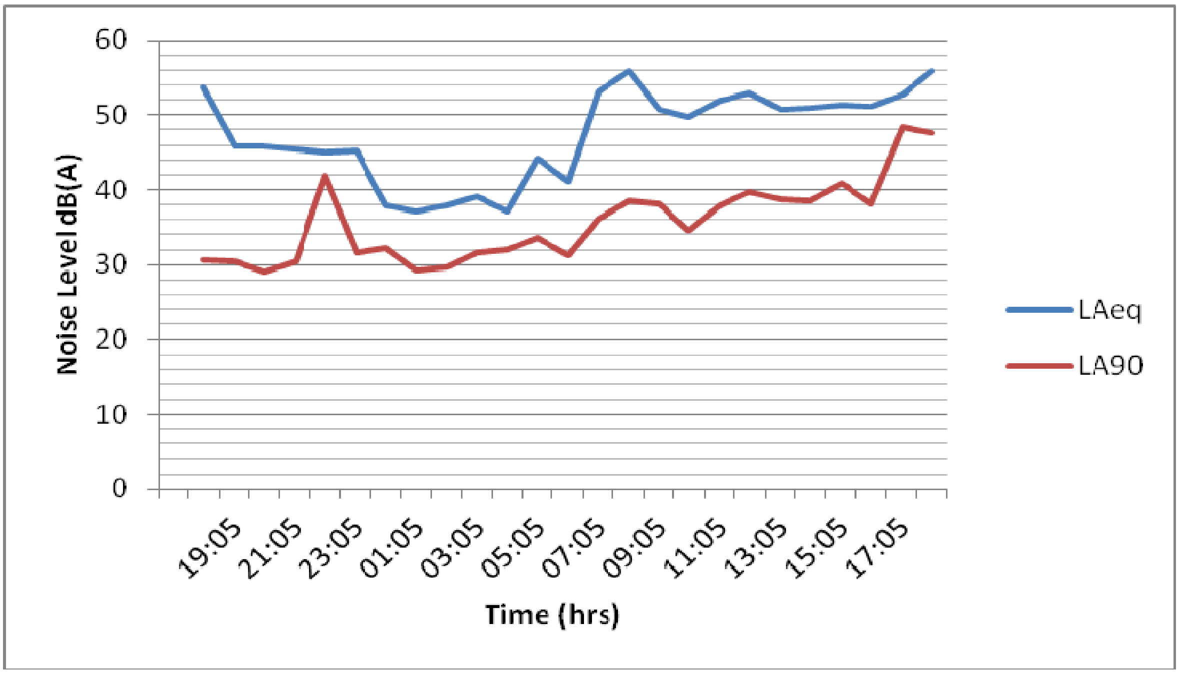
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N1**



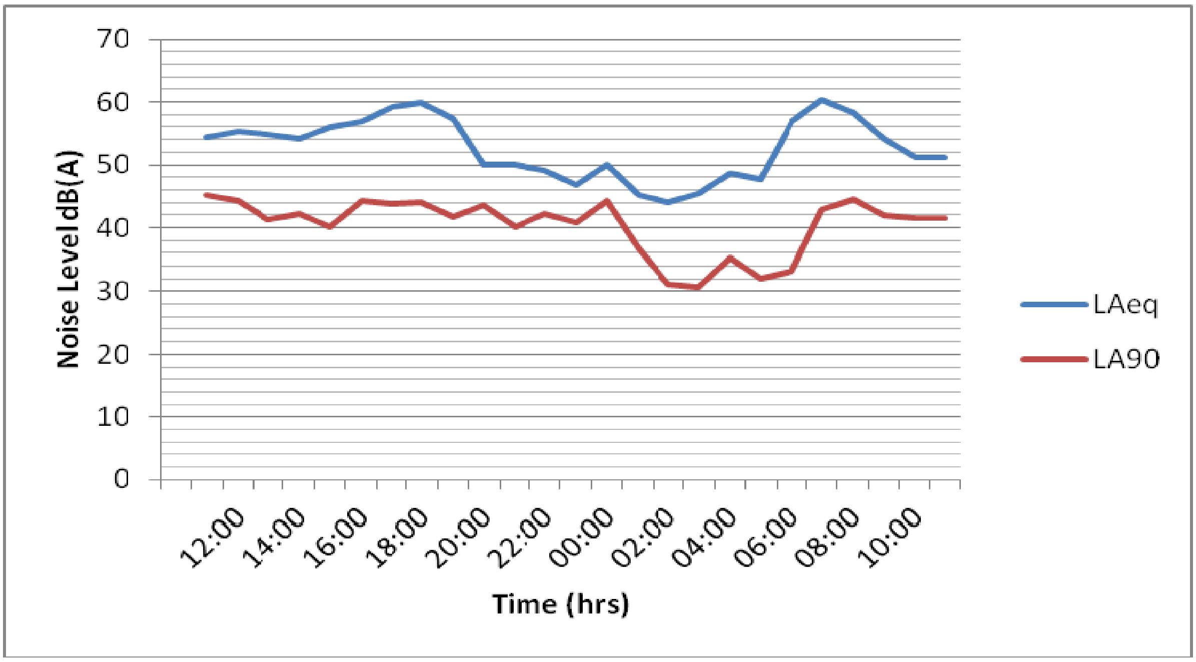

**Graphical Summary of 24-hour Unattended Noise Measurements at Location N2**



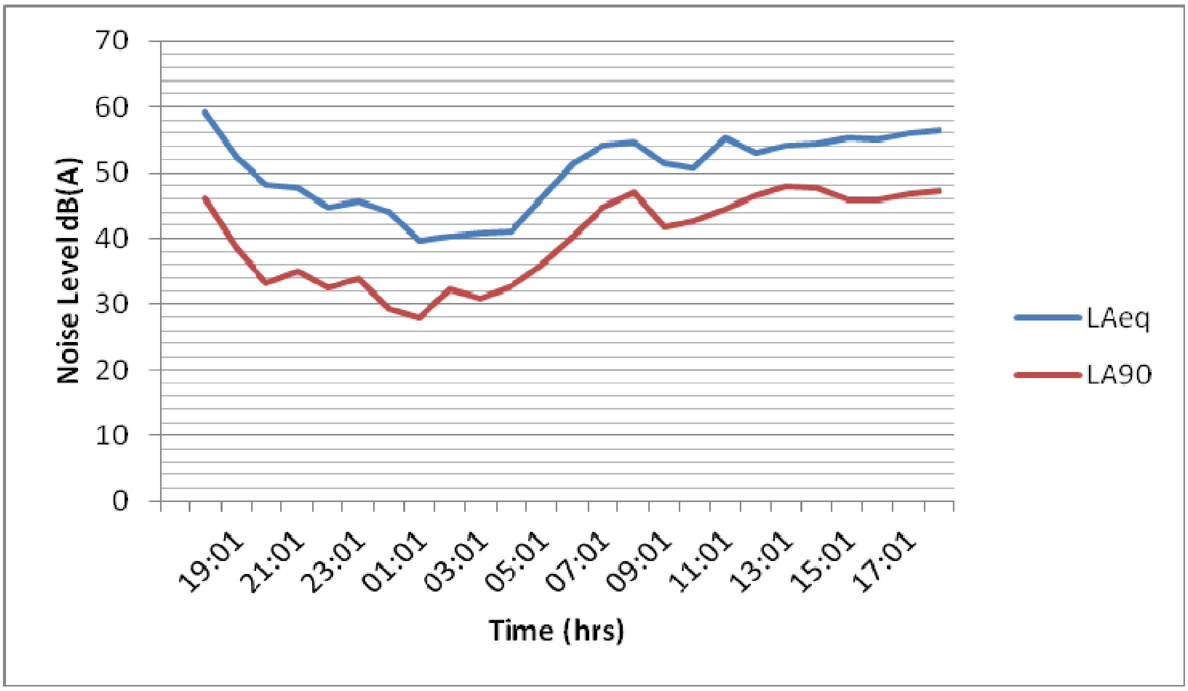
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N3**



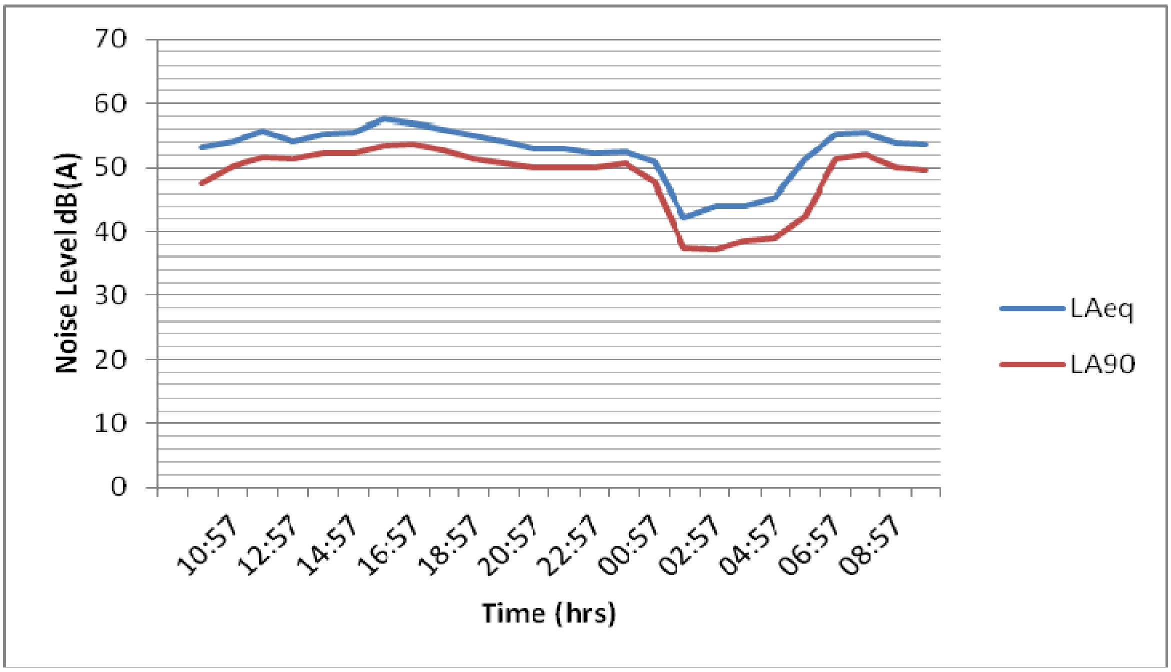

**Graphical Summary of 24-hour Unattended Noise Measurements at Location N4**



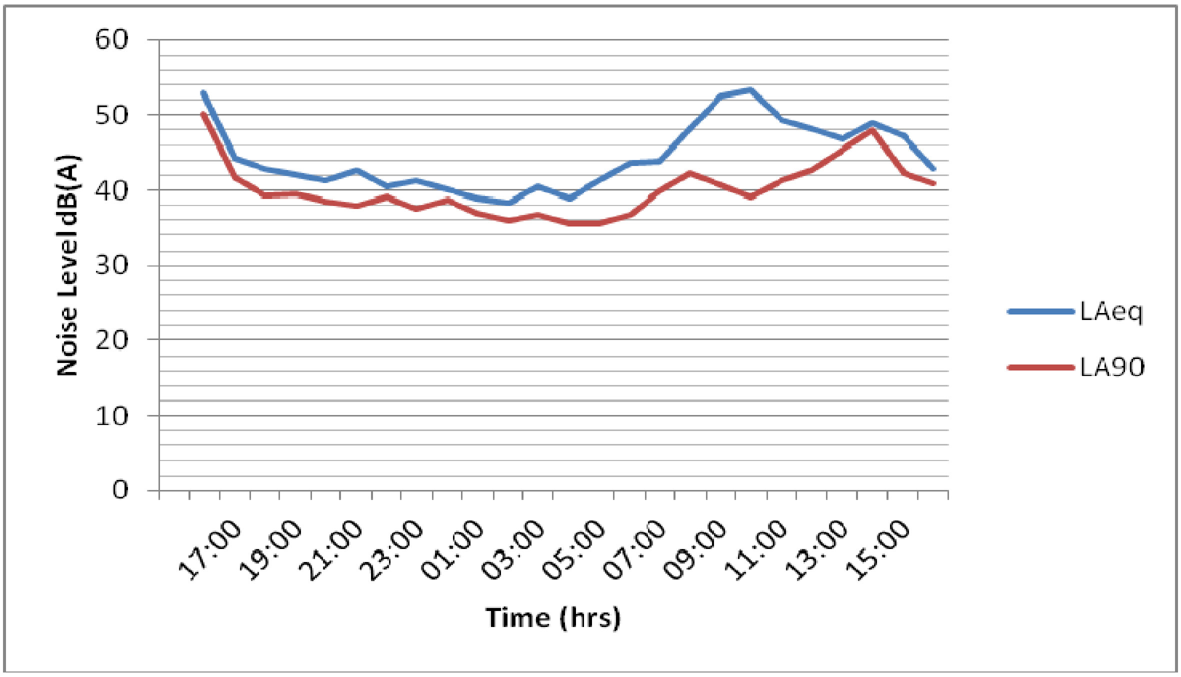
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N5**



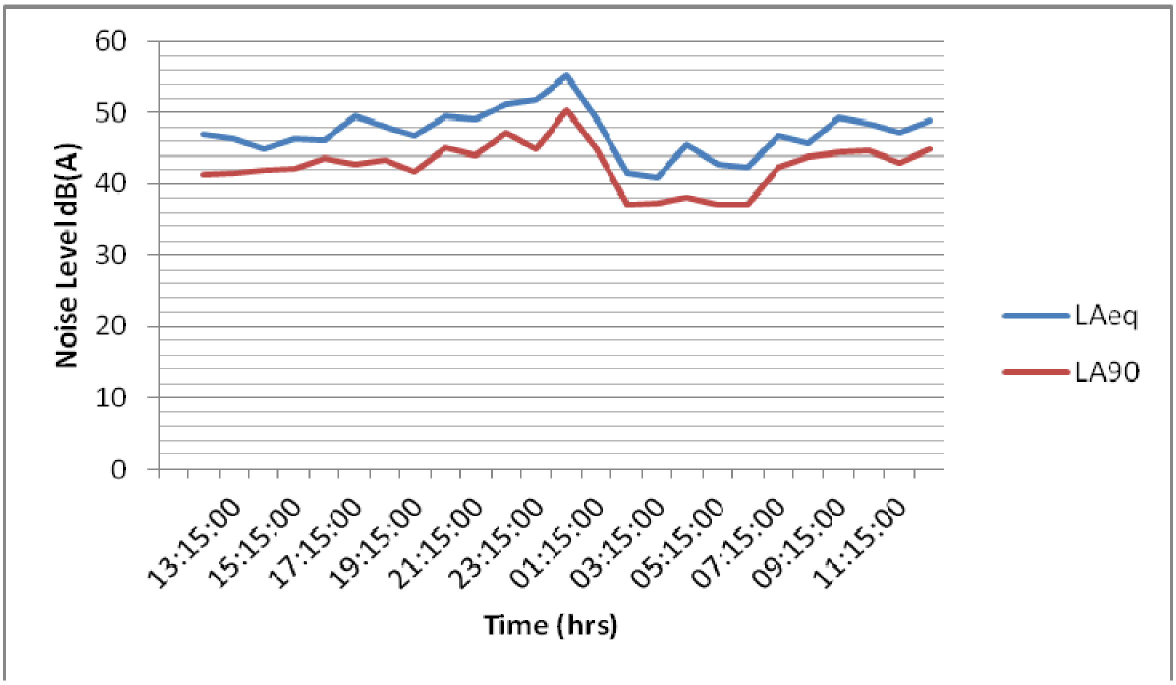

**Graphical Summary of 24-hour Unattended Noise Measurements at Location N6**



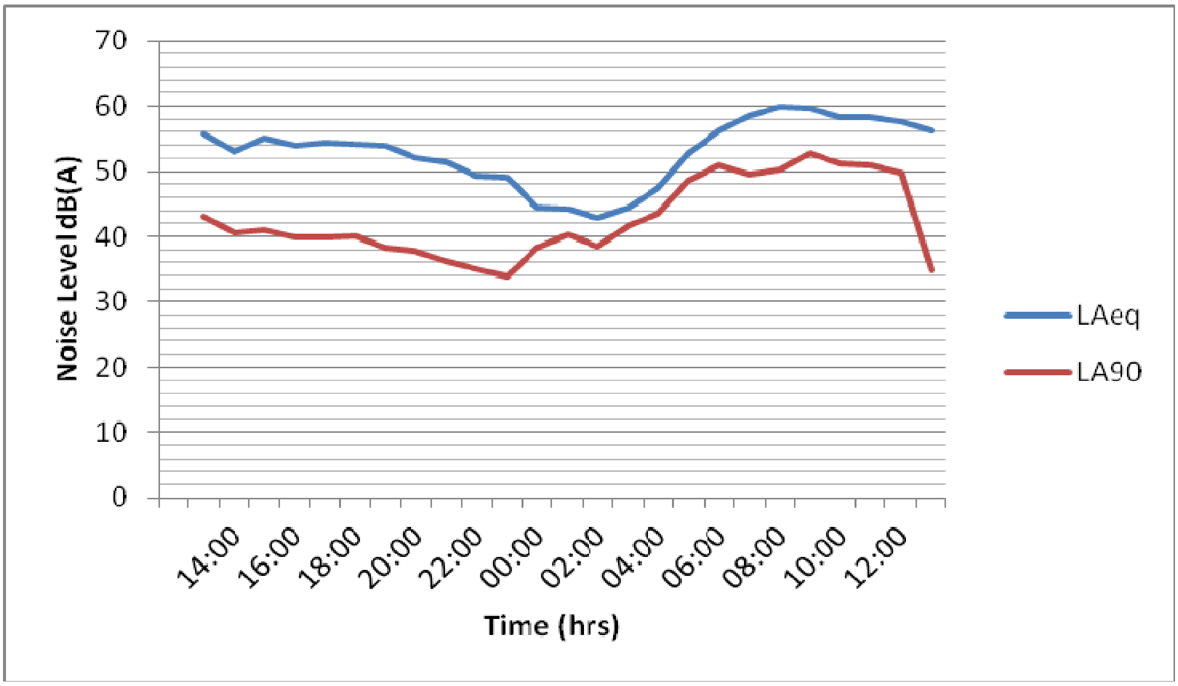
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N7**



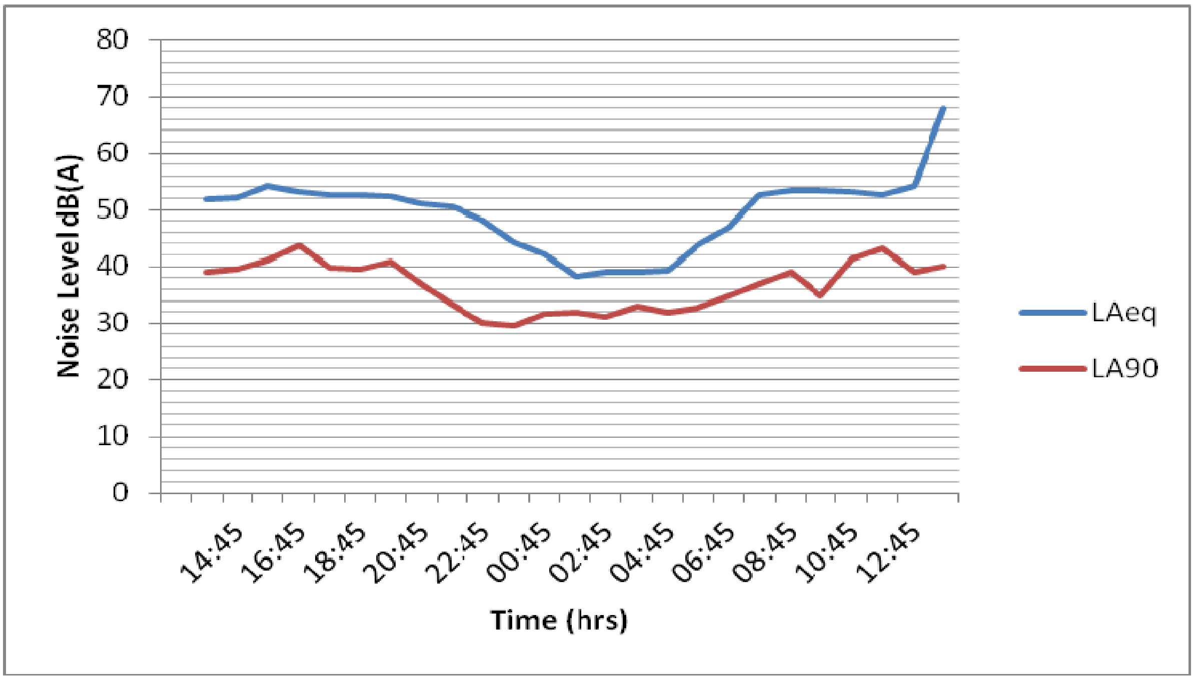

**Graphical Summary of 24-hour Unattended Noise Measurements at Location N8**



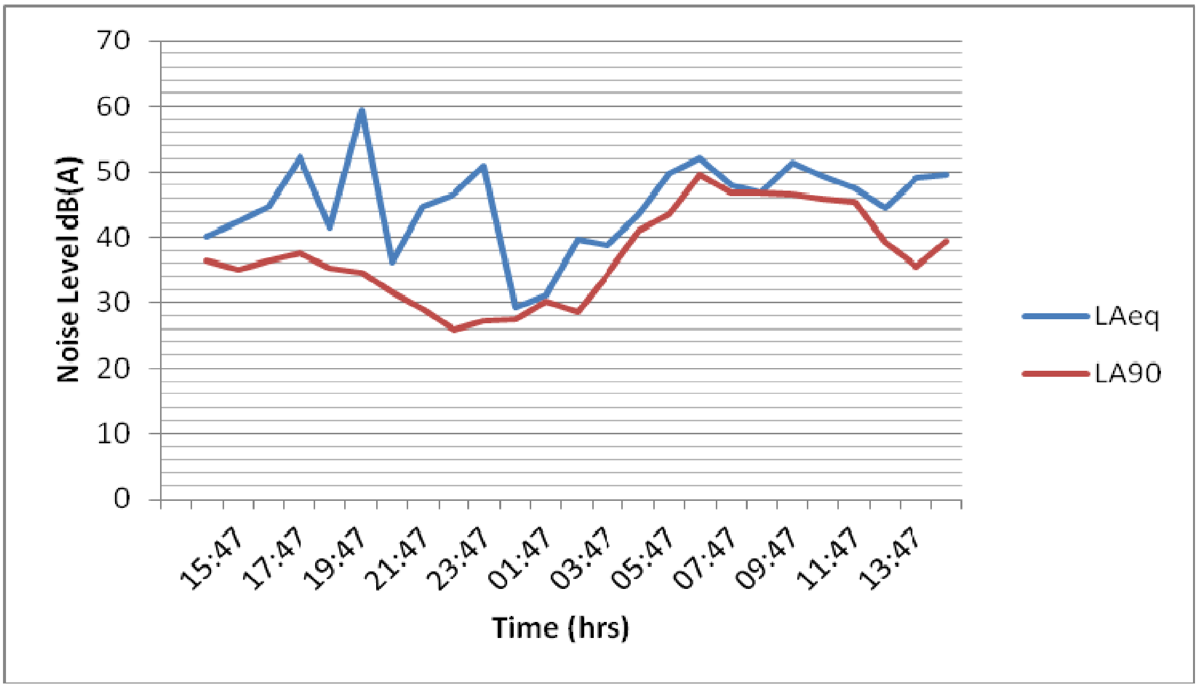
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N9**



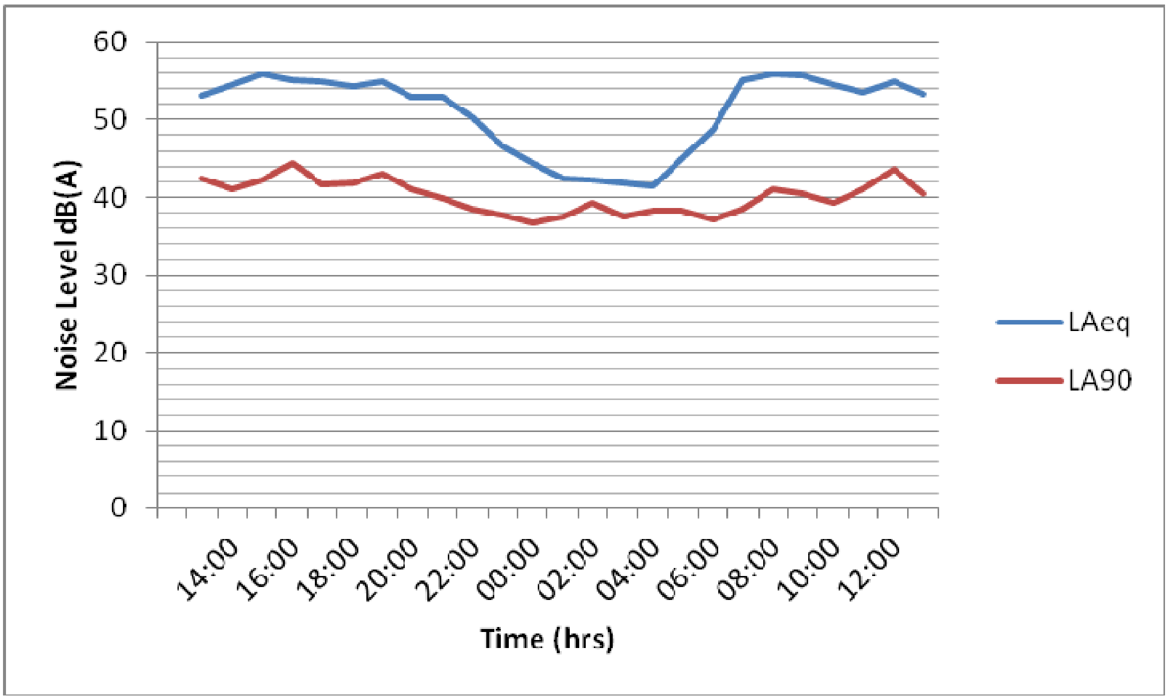

**Graphical Summary of 24-hour Unattended Noise Measurements at Location N10**



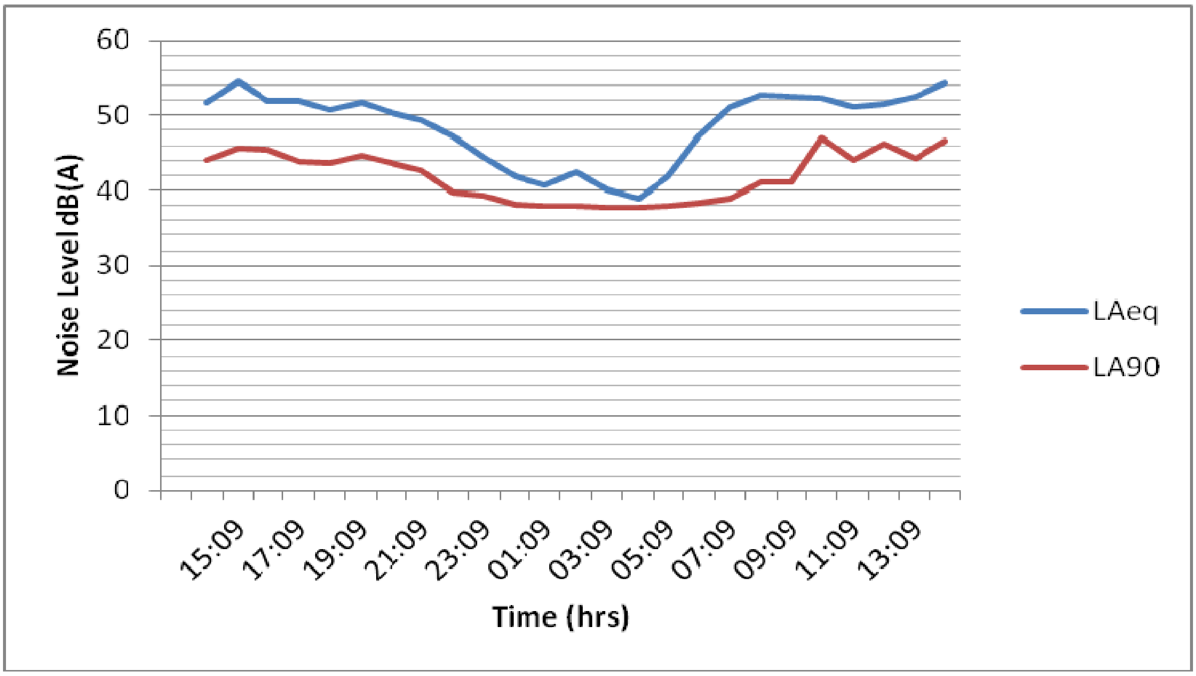
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N11**



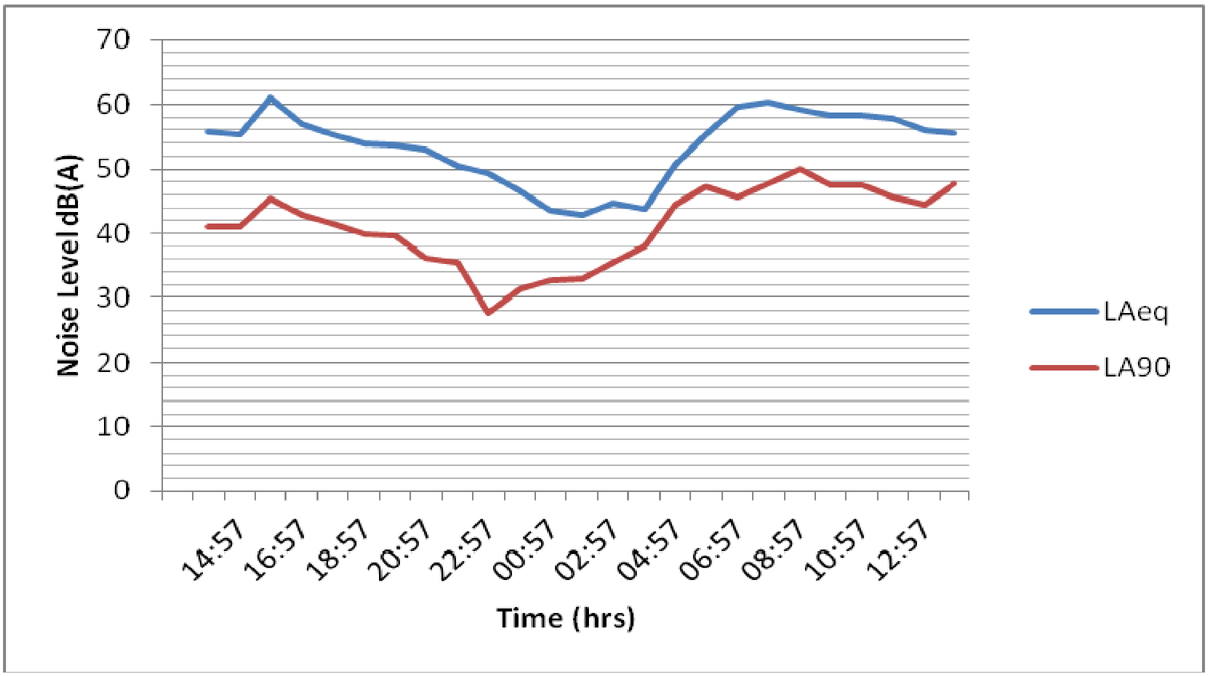

**Graphical Summary of 24-hour Unattended Noise Measurements at Location N12**



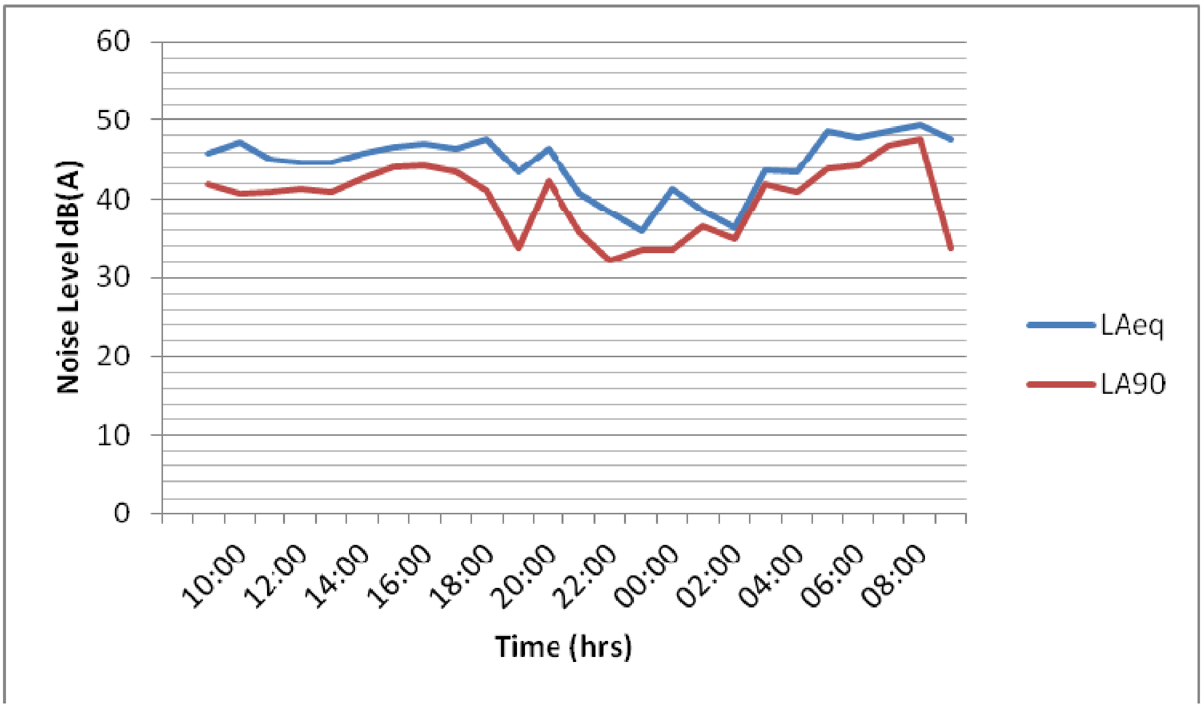
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N13**



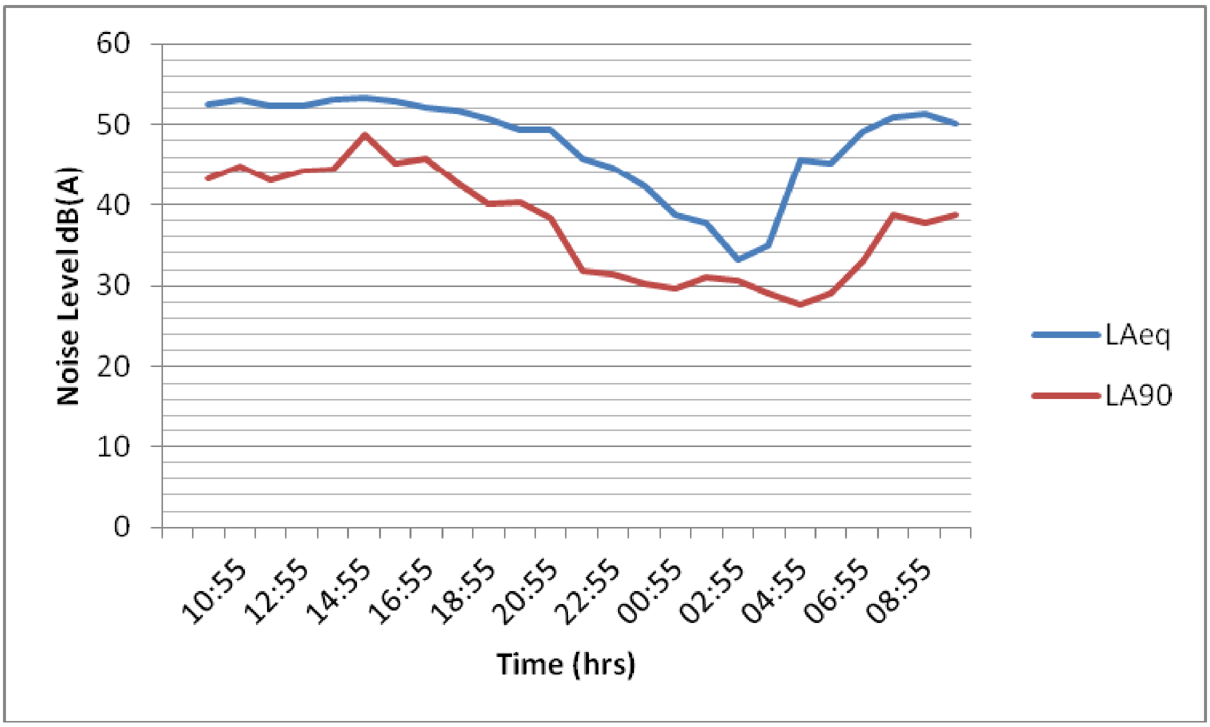

**Graphical Summary of 24-hour Unattended Noise Measurements at Location N14**



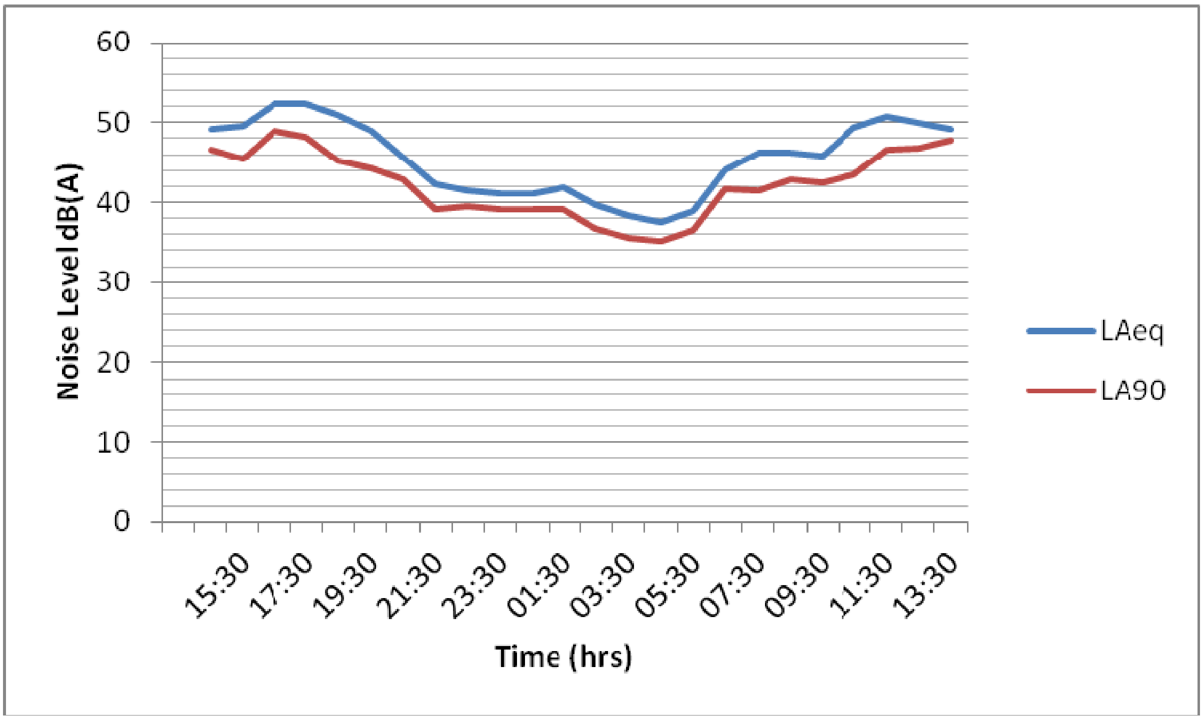
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N15**



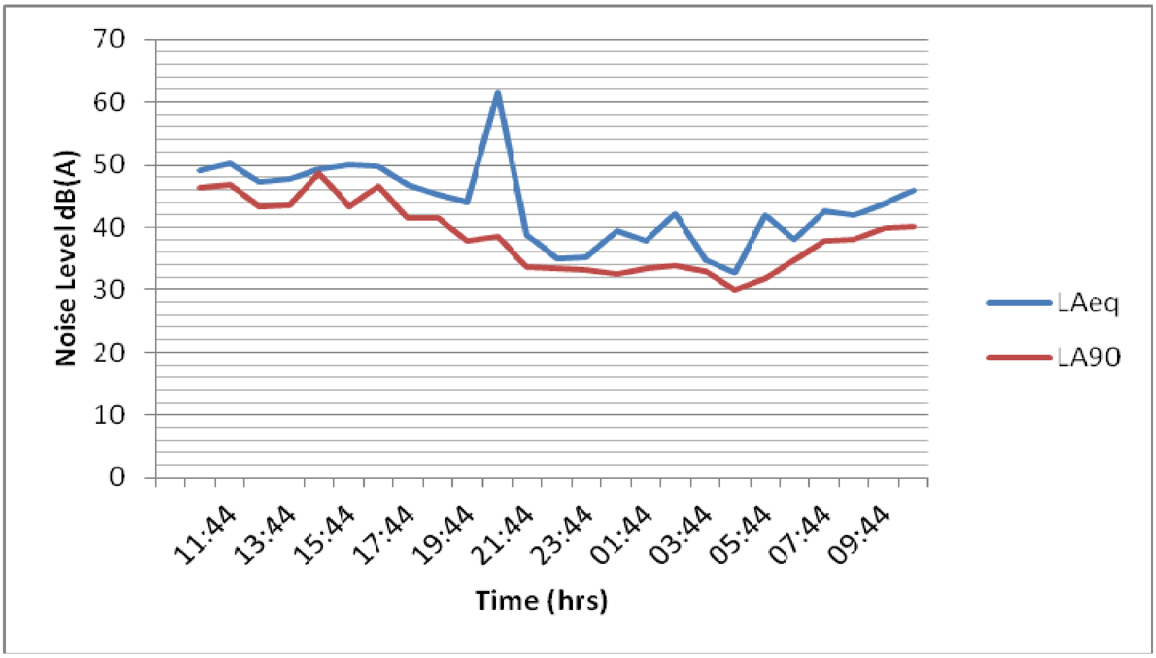

**Graphical Summary of 24-hour Unattended Noise Measurements at Location N16**



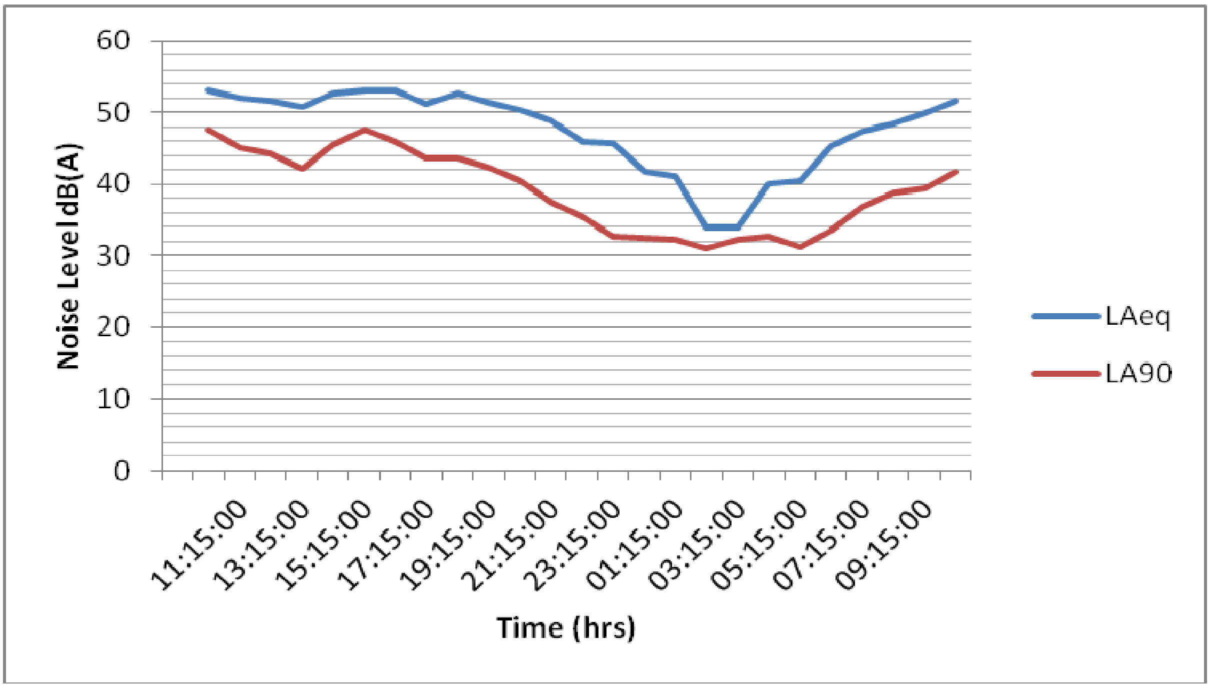
**Graphical Summary of 24-hour Unattended Noise Measurements at Location N17**




**Graphical Summary of 24-hour Unattended Noise Measurements at Location N18**



**Graphical Summary of 24-hour Unattended Noise Measurements at Location N19**



# APPENDIX 4.3 SUMMARY OF ATTENDED SHORT-TERM BASELINE NOISE MONITORING SURVEYS 2014

# APPENDIX 4.3

## SUMMARY OF ATTENDED SHORT-TERM MEASUREMENTS

**Attended Short-Term Measurements at Locations N1**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 06/07/12<br>Day | 14:45 | 50.7 | 53.6 | 37.1 | 71.3 | 35.5 | Dominant noise source was intermittent traffic passing within the naval base including mini bus and also cars entering and leaving the base. Noise from Naval Ship berthed at the quay (same as during the night) was influential source also. Some noise from birds in the area noted. |
| 06/07/12<br>Day | 15:36 | 49.9 | 53.8 | 38.6 | 68.9 | 36.7 | Dominant source overall was traffic travelling to and from the base Wastewater tank pump was coming on and off during measurement also, same as during night-time surveys and was dominant when no traffic noise. Noise from ship berthed at quay was noted during their survey also. |
| 06/07/12<br>Day | 16:31 | 52.4 | 55.2 | 42.1 | 77.1 | 39.0 | Dominant source was traffic entering and leaving the base same as earlier survey. Noise from inshore fishing boat passing up harbour Southside of bridge was influential also. Noise from ship berthed on north side of island still audible during this survey also. Occasional noise from birds in the area. |
| 06/07/12 – 07/07/12 | 23:15 | 39.9 | 39.0 | 32.9 | 68.8 | 31.6 | Dominant noise source initially sounded like an engine noise coming from area to the north possibly noise from a boat. Two cars passed during the survey. After 10 minutes noise from what sounded like a discharge of water from a pipe and subsequently noise from a pump or motor was dominant for a few minutes. |
| 06/07/12 – 07/07/12<br>Night | 00:20 | 36.5 | 37.6 | 35.0 | 46.7 | 33.5 | Dominant noise source was pump in wastewater treatment tank which came on and off every few minutes. Engine noise from boat (possibly) tug on north-western jetty was notable source and was operating (i.e. engine running) throughout survey. |
| 06/07/12 – 07/07/12<br>Night | 01:24 | 35.1 | 35.8 | 34.1 | 49.0 | 32.4 | Dominant source was pump coming on and going off same as earlier. Engine noise from boat/tug on jetty noted throughout this survey also. |

**Attended Short-Term Measurements at Locations N2**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 04/07/12<br><br>Day | 17:21 | 34.8 | 36.7 | 31.3 | 50.3 | 29.4 | Very quiet location and no significant noise sources evident during survey other than noise from birds in the area to west of monitoring position. Occasional cars on Haulbowline bridge but traffic on N28 not really noticeable (only slightly influential) No activities at Maritime College during survey. |
| 04/07/12<br><br>Day | 17:43 | 38.7 | 37.8 | 30.5 | 59.8 | 28.7 | Noise sources same as during earlier survey. One car passed in yard near monitoring position during survey. Also plane passing at high altitude influential briefly. |
| 04/07/12<br><br>Day | 18:07 | 35.9 | 38.0 | 29.5 | 53.3 | 27.6 | Noise sources similar to sources noted during previous surveys. |
| 04/07/12 – 05/07/12<br><br>Night | 21:20 | 33.8 | 36.3 | 30.1 | 53.9 | 28.3 | Very quiet at this location again. Only notable noise source were birds in the area, some turbulence due to breezy conditions. Occasional cars passing on Haulbowline bridge. Background noise due to low level of noise from doors of plant room midway along western side of NMCI building. |
| 04/07/12 – 05/07/12<br><br>Night | 21:37 | 37.2 | 38.8 | 31.4 | 64.4 | 28.8 | Noise levels same as above. Steady background noise from plant room but overall fairly quiet. |
| 04/07/12 – 05/07/12<br><br>Night | 21:54 | 42.5 | 42.5 | 31.7 | 60.5 | 29.2 | Noise levels same as above. Slightly more breezy conditions. Plane flying overhead influential briefly. Additional noise from fan / generator? Influential for 4 minutes towards the end of survey. |

**Attended Short-Term Measurements at Locations N3**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 04/07/12<br>Day | 14:05 | 52.0 | 55.6 | 42.4 | 66.6 | 37.6 | Dominant noise source was traffic passing on N28. Steady background noise audible from machinery working in metal recycling site noted throughout. Occasional noise from birds in the area around the house. |
| 04/07/12<br>Day | 14:44 | 48.4 | 51.9 | 33.7 | 65.0 | 30.5 | Dominant source was traffic passing on N28. Max. noise due to helicopter flying past to the south. Noise evident from Metal recyclers during earlier survey was not as noticeable during this survey (i.e. less activity). Noise from birds in the area was noted at times. Noise from activities in the car storage area and within large shed at the yard was also noted at times. |
| 04/07/12<br>Day | 16:54 | 49.2 | 53.2 | 33.0 | 68.2 | 29.3 | Dominant source was traffic on N28. Noise from birds in the area was influential source also. Noise from car transporters trucks in car storage compound on other side of road was noted briefly. |
| 04/07/12 – 05/07/12<br>Night | 23:18 | 47.7 | 44.4 | 33.4 | 69.5 | 31.5 | Dominant source was occasional passing traffic on M28. In absence of traffic buzzing electrical noise from street lamp at end of garden of property was dominant. Occasional banging noise in far distance to North / Northwest was noted twice during measurement also. Max noise due to cars passing relatively fast. |
| 04/07/12 – 05/07/12<br>Night | 23:35 | 37.0 | 36.4 | 32.4 | 69.0 | 30.2 | Dominant noise source was buzzing on street lamp. Noise from birds noted at times. No cars passed on N28 during this survey. Distant bangs were noted around five times during this survey. Generally fairly quiet. |
| 04/07/12 – 05/07/12<br>Night | 23:52 | 40.0 | 44.2 | 32.7 | 57.3 | 30.8 | Dominant noise source was buzzing on street lamp. Slight noise from breeze in trees. Occasional distant banging noise towards north / northeast. Low level of plant noise in distance towards south / southwest was audible but not significant. |

**Attended Short-Term Measurements at Locations N4**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 09/07/12<br><br>Day | 13:50 | 53.8 | 56.8 | 40.7 | 75.0 | 38.1 | Dominant source was traffic passing on hill near monitoring position. Max noise due to HGV passing up the hill. Traffic passing also but traffic on hill dominant. In absence of traffic noise from the Deepwater Berth (Cargo / Grain Ship being unloaded) and Grimaldi ship being unloaded also influential. |
| 09/07/12<br><br>Day | 14:34 | 55.0 | 59.3 | 41.8 | 70.7 | 37.6 | Dominant source was traffic on hill and in village same as earlier survey. Very little noise from birds at this monitoring location, only occasional. Noise from Port activities noted during periods in absence of traffic noise. No significant noise sources from RingPort Industrial Estate other than traffic. |
| 09/07/12<br><br>Day | 15:20 | 56.0 | 59.4 | 41.7 | 73.7 | 39.2 | Dominant source traffic same as other surveys. In absence of traffic for brief periods, noise from Port Operations was audible. Noise from birds in the area noted as contributory source but not significant. Max noise due to HGV travelling up the hill. |
| 09/07/12 – 10/07/12<br><br>Night | 01:32 | 46.5 | 47.6 | 40.2 | 64.9 | 37.1 | Dominant source overall was engine noise from Grimaldi ship. Max noise was due to occasional traffic passing on road/hill adjacent to house. Noise from breeze/wind blowing in the trees near house was significant also. |
| 09/07/12 – 10/07/12<br><br>Night | 02:21 | 33.8 | 36.1 | 30.7 | 55.0 | 29.2 | Dominant source was wind blowing in tree near monitoring position and occasional noise from birds towards the Port of Cork lands. Occasional traffic noise passing the village. |
| 09/07/12 – 10/07/12<br><br>Night | 03:12 | 43.4 | 38.2 | 30.5 | 69.7 | 28.6 | Dominant source was engine noise from Cargo ship at deep water berth for first 10 minutes of survey. Then two cars passed on hill and these were dominant. Noises from birds near Port of Cork lands were influential also. |

**Attended Short-Term Measurements at Locations N5**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 06/07/12<br><br>Day | 15:12 | 55.2 | 56.7 | 44.0 | 72.6 | 38.9 | Dominant noise source was traffic both on the N28 and full adjacent to property. Possible low frequency tonal component. Container ship passing down the harbour and two tugs (Alex & Gerry O'Sullivan) were audible for a few minutes of the survey. Noise from birds in the area was noted also. Industrial noise that was audible last night was not noticeable due to the level of traffic noise. |
| 06/07/12<br><br>Day | 16:07 | 54.6 | 57.1 | 44.3 | 71.8 | 39.1 | Dominant noise source was traffic both on the N28 and full adjacent to property. Noise from birds in the area was significant at times, more bird noise then earlier. Possible low frequency noise from ride-on lawnmower cutting grass at the end of the road during the survey also. Airplane passing overhead briefly. Max noise due to truck passing up hill, also car with boat on trailer passing. |
| 06/07/12<br><br>Day | 17:01 | 53.9 | 57.1 | 46.0 | 69.5 | 43.2 | Dominant source was traffic on N28 and hill past house. Another truck passed up hill during this measurement also. Airplane flying overhead was influential briefly. Noise from birds in the area significant during this survey. |
| 05/07/12 – 06/07/12<br><br>Night | 23:52 | 40.6 | 40.5 | 34.4 | 60.2 | 32.2 | Dominant noise source was occasional traffic on N28. Generally very quiet but low level of steady plant noise from Bio was audible and dominant noise when no traffic passing. |
| 05/07/12 – 06/07/12<br><br>Night | 00:52 | 43.8 | 41.9 | 27.5 | 65.6 | 25.9 | Dominant noise source was occasional traffic same as earlier measurement. Max noise due to Jeep passing on road outside house / monitoring position. Background noise of plant noise became dominant when no traffic but generally very quiet during survey. |
| 05/07/12 – 06/07/12<br><br>Night | 01:52 | 39.5 | 36.4 | 28.8 | 61.6 | 27.3 | Dominant source was occasional traffic similar to earlier measurements. Noise from birds around the Port area to the north was influential also. Steady plant noise from Bio noted throughout also. |

**Attended Short-Term Measurements at Locations N6**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 09/07/12 Day | 14:11 | 54.3 | 56.1 | 51.8 | 61.5 | 49.5 | Dominant noise source was a combination of traffic on the N28 at western side of Ringaskiddy and operations at the deep water berth. Grimaldi ship was being unloaded and also cargo ship with grain was being unloaded. Noise from birds in the area around the house was significant throughout the survey also. |
| 09/07/12 Day | 14:58 | 55.3 | 55.7 | 50.6 | 73.8 | 47.6 | Dominant source was traffic on the N28. Traffic entering and leaving deep water berth was significant also. Grain/cargo ship and Grimaldi ship were still being unloaded – associated noise was significant also. Noise from birds was additional influential source noted throughout also. Dog barking influential briefly also. |
| 09/07/12 Day | 15:41 | 54.9 | 56.7 | 52.7 | 66.9 | 50.5 | Dominant source was traffic on main road, similar to earlier surveys. Operations at deep-water berth, unloading cars from Grimaldi Ship were influential also. Almost constant noise from birds noted. |
| 09/07/12 – 10/07/12 Night | 01:08 | 49.9 | 51.8 | 46.6 | 60.9 | 43.6 | Dominant source overall was engine noise from Grimaldi Ship Grande Ellade. Traffic noise passing through Ringaskiddy on occasional basis was dominant when present but ship was steady continuous. Noise from birds on water near mooring dolphins of ferry terminal was significant also. |
| 09/07/12 – 10/07/12 Night | 01:54 | 47.3 | 50.9 | 39.4 | 60.0 | 36.5 | Dominant noise source for first approximately 8 minutes of survey was Grimaldi ship leaving Port and being assisted by tugboat. Possible low frequency tonal component due to the Grimaldi ship noise. Dominant source after ship was going was noise from birds near the ferry terminal and noise from other cargo ships. Road traffic was significant at times. |
| 09/07/12 – 10/07/12 Night | 03:35 | 43.6 | 46.7 | 36.1 | 60.3 | 33.8 | Noise from birds on the water near ferry terminal was dominant source overall as birds were continuous noise during survey. Five cars passed through Ringaskiddy on overall during survey also. Background noises was audible during survey also but not clear whether engine noise from cargo ship at deep water berth or plant noise from Pfizer site. |

**Attended Short-Term Measurements at Locations N7**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 03/07/12 Day | 16:12 | 56.6 | 59.3 | 53.8 | 62.7 | 51.9 | Dominant source was Amorina Cargo ship preparing to leave quay of Deep Water berth and Gerry O'Sullivan and Alex Tug boats arriving to remove ship. Occasional noise from birds and trucks moving within the Port. Some noise from take farm area and warehouse near monitoring position also. |
| 03/07/12 Day | 16:38 | 47.0 | 48.8 | 43.2 | 63.0 | 41.2 | Dominant noise source was a forklift loading timber onto Lorry at the other end of deep water berth. Noise from activity within the grain storage warehouse near monitoring position was significant at times. Noise was influential also. |
| 03/07/12 Day | 17:32 | 42.1 | 43.6 | 39.8 | 56.7 | 37.7 | Dominant noise source overall was birds in the area and on the water. No trucks or other activity at the Port. Noise from the area to rear (South West) of tank farm, possibly plant noise at Pfizer was influential also. Also tannoy announcement at Pfizer. Sound of water tapping against supports of old ADM jetty was noted also. |
| 03/07/12 – 04/07/12 Night | 23:26 | 39.7 | 41.2 | 37.3 | 52.8 | 35.4 | Dominant source was plant noise from Pfizer site. Noise from birds on the water in the area was other notable source. No activity at the deepwater berth during survey. Noise from reefer containers not audible due to plant noise. |
| 03/07/12 – 04/07/12 Night | 23:50 | 39.8 | 41.3 | 37.7 | 53.8 | 35.8 | Noise sources were same as during measurement above Pfizer Plant noise dominant. Tannoy noise from Pfizer also noted very briefly at 23:58 Reefer containers generally screened by large grain warehouse building also. |
| 03/07/12 – 04/07/12 Night | 00:14 | 40.1 | 41.8 | 38.1 | 55.0 | 36.3 | Dominant source was plant noise from Pfizer similar to other measurements. Slightly more noise from birds on the water during this survey. |

**Attended Short-Term Measurements at Locations N8**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 09/07/12 Day | 12:31 | 43.4 | 45.2 | 40.8 | 60.4 | 38.4 | Dominant source was breeze blowing in trees and bushes near monitoring point. Noise from water lapping on shore was significant also. Additional sources noted were birds in the area and traffic on the Monkstown road on opposite side of the Creek/Harbour. Airplane flow over during survey also. |
| 09/07/12 Day | 12:50 | 45.6 | 47.6 | 42.4 | 59.5 | 39.7 | Dominant source was breeze similar to first survey. Breeze was blowing little stronger but tide was going out. Birds in the area and traffic noise on Monkstown Road significant also. Cargo ship and Grimaldi lines ship were berthed at the Deepwater Quay but were not really visible. |
| 09/07/12 Day | 13:10 | 47.2 | 50.5 | 41.4 | 59.2 | 38.6 | Dominant source was breeze and birds in the area and on mid/foreshore near monitoring position. Tide now out further and more birds along shoreline near monitoring position. Traffic on Monkstown road influential also. |
| 09/07/12 – 10/07/12 Night | 23:42 | 53.2 | 55.3 | 47.4 | 69.1 | 43.2 | Dominant source was wind blowing in trees in the area. Noise from wave's leaping on shore was influential also. Grimaldi Ship Grand Ellade and Cargo ship were still at Deepwater berth (Grimaldi ship being actively loaded but no noise audible from port (Northwest wind) |
| 09/07/12 – 10/07/12 Night | 00:02 | 53.1 | 55.6 | 48.4 | 64.9 | 44.7 | Dominant source was wind blowing in trees. Noise from seabirds on the water and also on the far end of the breath water was significant also. Traffic on Monkstown road was clearly visible but not audible due to level of noise from wind blowing in the trees. |
| 09/07/12 – 10/07/12 Night | 00:24 | 54.4 | 57.0 | 49.5 | 65.4 | 46.0 | Dominant source was wind blowing in trees, same as previous surveys. Noise from water washing against shore and noise from birds on the water were significant sources also. Again occasional traffic on Monkstown road was visible but not audible due to wind noise. |

**Attended Short-Term Measurements at Locations N9**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 11/07/12 Day | 17:11 | 53.5 | 58.2 | 38.7 | 65.3 | 34.9 | Dominant source was traffic passing on Monkstown road. Property has a clear view of Deep Water berth and cargo ship was being unloaded during survey but no noise was audible from Ringaskiddy. Noise from birds in the area around the house was influential at times. People in the house and children outside were influential briefly also. Plant noise from Pfizer was not audible during survey. |
| 11/07/12 Day | 13:55 | 55.4 | 60.2 | 44.3 | 71.5 | 41.2 | Dominant source was traffic passing on Monkstown road during brief periods in absence of passing traffic , noise from operations at deep water berth were dominant. Grain was being unloaded from large cargo ship. Noise from birds in the area was also noted at times. |
| 11/07/12 Day | 14:32 | 54.1 | 57.9 | 45.4 | 72.2 | 42.1 | Dominant source again was traffic on Monkstown road. Noise from Cargo ship being unloaded was noted during this survey also. Noise from van arriving at home next door to monitoring position and stationary for a few minutes with engine running influential for a few minutes. Tannoy announcement at Pfizer also noted briefly. Noise from birds influential at times. |
| 11/07/12 – 12/07/12 Night | 23:13 | 47.2 | 45.8 | 31.9 | 70.7 | 30.4 | Dominant source overall was intermittent traffic passing on Monkstown road. Max noise due to passing motorbike. During periods in absence of traffic noise, plant noise from Pfizer was dominant noise source. |
| 11/07/12 – 12/07/12 Night | 00:31 | 42.6 | 40.8 | 36.4 | 64.8 | 34.8 | Dominant noise source was intermittent traffic similar to first survey although frequency of traffic was less during first survey. Plant noise from Pfizer dominant during periods in absence of traffic noise. |
| 11/07/12 – 12/07/12 Night | 02:00 | 39.9 | 39.9 | 37.2 | 59.1 | 35.8 | Dominant source overall was plant noise from Pfizer. Two cars passed on Monkstown road during survey – significant when passing but steady state noise from Pfizer dominant over full duration of survey. |

**Attended Short-Term Measurements at Locations N10**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 10/07/12<br><br>Day | 15:26 | 54.2 | 56.1 | 40.4 | 74.5 | 37.0 | Dominant source was traffic passing on Monkstown Road. Max noise due to passing JCB. Noise from birds in the area was influential also. Noise from children sailing in the area was noted too. |
| 10/07/12<br><br>Day | 16:34 | 52.2 | 56.4 | 40.8 | 68.3 | 37.2 | Dominant noise source was traffic passing on Monkstown Road. Children were no longer sailing so there was no noise from them during this survey. Sound of breeze blowing in trees near monitoring position was influential at times. Occasional noise from birds in the area noted. No noise audible from Marco Polo ship or scrap metal cargo ship at the port. |
| 10/07/12<br><br>Day | 17:53 | 51.7 | 56.3 | 40.2 | 63.2 | 34.5 | Dominant noise source was again traffic on Monkstown road. Noise from birds in the area, particularly to rear of house was significant source also. Smoke visible from funnel of Marco Polo ship but not audible (north-easterly breeze) Noise from breeze blowing in trees around property was additional noted source. Airplane flying overhead also. |
| 10/07/12 – 11/07/12<br><br>Night | 23:14 | 43.9 | 46.8 | 32.6 | 59.9 | 30.5 | Dominant source was intermittent traffic passing on Monkstown road. Steady background noise was from Marco Polo ship which was just departing from deep water berth during survey. Plant noise from Pfizer site was audible too but not significant. Noise from ship leaving was dominant during periods without traffic. |
| 10/07/12 – 11/07/12<br><br>Night | 00:28 | 40.3 | 35.0 | 29.7 | 61.5 | 28.2 | Dominant source overall was plant noise from Pfizer site. Only 3 cars passed during survey. Noise from birds in Monkstown Creek was noted as an influential source also. Traffic significant when passing but overall, the steady-state nature of plant noise made it dominant overall. |
| 10/07/12 – 11/07/12<br><br>Night | 01:43 | 35.1 | 34.1 | 30.8 | 56.0 | 29.0 | Dominant source was plant noise from Pfizer. Only one car passed on Monkstown Road during survey. Very little noise from birds in Monkstown Creek. No breeze at all. |

**Attended Short-Term Measurements at Locations N11**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 11/07/12 Day | 15:32 | 40.6 | 43.3 | 37.1 | 53.1 | 34.5 | Dominant source generally was sound of breeze blowing in taller trees near the property. People on the golf course were a contributory noise source also. Not a lot of noise from birds in the area during the survey. No traffic passed within the demesne during the survey. |
| 11/07/12 Day | 16:25 | 40.3 | 42.4 | 35.9 | 57.3 | 32.9 | Dominant source was a combination breeze blowing in taller trees near monitoring position and noise from birds in the area. Noise from a lawnmower towards the north was influential source also. People on the golf course were influential briefly and intermittently. No traffic passed within the demesne during this survey either. |
| 11/07/12 Day | 17:36 | 41.7 | 43.9 | 36.4 | 58.8 | 33.8 | Dominant source generally was breeze blowing in trees in the area. Airplane flying overhead was influential briefly. People on the golf course to rear of property were influential again during this survey also. Sound of radio on within house was noted during this survey – had not been on or near the back door of the property during earlier surveys. Noise from birds influential at times. One car passed during the survey. Lawnmower towards the north was noted as contributory source also. |
| 11/07/12 – 12/07/12 Night | 23:29 | 28.8 | 30.3 | 25.7 | 45.2 | 24.5 | No dominant source as such, very quiet location. Occasional sound of rustling leaves in hedge at boundary of property, slight breeze. Intermittent dog barking in distance to northeast. What sounded like a boiler coming on and off at nearby property twice during survey was noted also. Distant traffic noise audible to northeast but not significant. |
| 11/07/12 – 12/07/12 Night | 01:07 | 31.9 | 33.2 | 30.2 | 39.6 | 28.0 | Dominant noise source generally was low level of plant noise from Pfizer. Noise from “bark/call” of fox in distance towards northeast was significant and dominant for approximately 5 minutes. Fox call also set off distant dog barking for a few minutes. Tannoy from Pfizer was audible also. Occasional noise from birds noted but not significant. |
| 11/07/12 – 12/07/12 Night | 02:36 | 30.6 | 31.7 | 29.2 | 41.2 | 27.7 | Dominant noise source was plant noise from Pfizer. Distant traffic noise to northeast was again noted at times but was not significant. Again, very quiet conditions noted during this survey also. No breeze, hence no rustling foliage. |

**Attended Short-Term Measurements at Locations N12**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 10/07/12 Day | 14:35 | 52.0 | 56.3 | 43.0 | 66.2 | 39.7 | Dominant source was a lawnmower at a nearby house in the demesne. Traffic noise on Monkstown Road was significant source also. Noise from birds in the area was influential at times but was not significant. Noise from children out in sailing dinghies in the harbour was also noted. |
| 10/07/12 Day | 15:49 | 52.9 | 57.5 | 42.5 | 65.8 | 38.8 | Dominant source was traffic on Monkstown Road. Noise from children sailing in area and on pontoon in water to southeast of property was significant source. Noise from ship passing in harbour was influential briefly also. Cargo ship (scrap metal) was being loaded at deepwater berth but no noise was audible. Marco Polo cruise ship berthed at DWB but not audible either. |
| 10/07/12 Day | 17:06 | 53.0 | 57.7 | 40.0 | 64.0 | 37.6 | Dominant source was traffic on Monkstown Road. Noise from lawnmower was significant source also for around first five minutes but stopped thereafter. Noise from two boats near the Marina was noted also. Additional noise from birds in the area at times. |
| 10/07/12 – 11/07/12 Night | 00:01 | 43.8 | 45.0 | 35.6 | 61.0 | 34.3 | Dominant source overall was intermittent traffic passing on Monkstown Road. Steady background noise audible from Pfizer (Plant noise). Sound of water flowing in drain a little to northeast of monitoring position was noted also. An Airplane flew overhead during survey also. |
| 10/07/12 – 11/07/12 Night | 01:16 | 44.1 | 39.2 | 35.8 | 69.9 | 34.7 | Dominant source overall was plant noise from Pfizer. Steady noise from water flowing in drain was contributory source throughout survey also. Occasional traffic passing on Monkstown road significant at times but only a few vehicles passed during survey hence plant noise dominant overall. Occasional noise from birds in Monkstown creek road also. |
| 10/07/12 – 11/07/12 Night | 02:29 | 37.9 | 38.8 | 36.9 | 51.7 | 35.9 | Dominant source during the survey was again plant noise from Pfizer. Steady noise from water flowing in stream also influential. No noise from traffic as no vehicles passed on Monkstown road during survey. |

**Attended Short-Term Measurements at Locations N13**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 10/07/12 Day | 14:55 | 51.3 | 55.1 | 42.8 | 68.4 | 39.8 | Dominant source was traffic passing through Monkstown. Max noise due to motorbike. Noise from people sailing near sand quay was influential in addition to flapping sails and tattling lanyards. Boat passing down harbour and airplane overhead were notable sources briefly. Only occasional noise from birds in the area. |
| 10/07/12 Day | 16:10 | 50.3 | 53.9 | 44.4 | 63.9 | 42.0 | Dominant source was traffic passing on both main road in Monkstown village and road adjacent to Northern side of property boundary. Noise from children coming in from and going out sailing, flapping sails etc was also significant. Low level of noise from breeze blowing in trees in garden of property and water blowing in stream/drain was just about audible. |
| 10/07/12 Day | 17:28 | 51.8 | 54.8 | 44.1 | 69.8 | 41.0 | Dominant source was traffic passing through Monkstown. Noise from people talking in the area around sand quay was influential for around five minutes during survey. Max noise due to HGV passing. Noise from birds in the area was influential also and rattling lanyards noted during this survey too in addition to breeze blowing in trees in garden of property. |
| 10/07/12 – 11/07/12 Night | 23:38 | 43.9 | 44.5 | 37.5 | 62.0 | 36.2 | Dominant source overall was sound of water flowing in stream/drain along northern end of garden of property. Traffic when passing was dominant but very few cars passed during survey. Low level humming noise was audible from street lamp outside property but was not significant. |
| 10/07/12 – 11/07/12 Night | 00:51 | 41.0 | 42.1 | 36.8 | 61.4 | 35.6 | Dominant source overall was water flowing in stream/drain again. Occasional traffic passed through Monkstown and was dominant briefly but noise from drain was constant noise during survey. Hammering/buzzing noise evident from street lamp during earlier survey was not buzzing at all during this survey. |
| 10/07/12 – 11/07/12 Night | 02:08 | 39.0 | 40.4 | 37.2 | 53.6 | 35.1 | Dominant source overall again was water flowing in stream/drain along boundary of property. Only one car passed during survey. Teenagers began arriving and gathering at sand quay from around 2:15am (appeared to be arriving to prepare to go sailing). Noise from some of them talking was influential source also. |

**Attended Short-Term Measurements at Locations N14**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 11/07/12 Day | 15:55 | 58.0 | 59.7 | 41.4 | 78.7 | 36.6 | Dominant source was traffic passing on Monkstown road. Children playing in the garden were influential briefly. Children sailing in the harbour were noted also. Noise from the birds in the area influential at times. Rattling lanyards on yachts moored along the harbour near Monkstown was noted also. |
| 11/07/12 Day | 16:48 | 55.7 | 57.8 | 45.1 | 76.6 | 39.6 | Dominant source was traffic passing on Monkstown road. Children were playing in garden during survey and were a contributory source also. Also lots of children passing on opposite side of road coming in from sailing. Very little noise from birds in the area during this survey. |
| 11/07/12 Day | 18:00 | 53.4 | 57.9 | 40.3 | 64.9 | 35.3 | Dominant source was traffic on Monkstown Road, similar to earlier surveys. Noise from motorboats (four) passing up and down in the harbour was notable source also. Occasional noise from birds in the area. Some noise from children talking outside but not as much as when playing in the garden earlier. |
| 11/07/12 – 12/07/12 Night | 00:26 | 45.8 | 43.0 | 28.7 | 68.1 | 25.9 | Dominant source was occasional passing cars through Monkstown. In absence of traffic low level of background noise associated with Pfizer Plant noise was just audible. Very calm conditions, hence no lapping water, rustling hedges or rattling lanyards etc. |
| 11/07/12 – 12/07/12 Night | 01:33 | 43.3 | 41.0 | 31.3 | 67.7 | 29.5 | Dominant noise source overall was two chiller units on side of De Vesci Place (Monkstown Bay Sailing Club) House/Building Noise from three cars passing and a van in the car park nearby were significant briefly. Max noise due to vat in car park which left again after a few minutes. Pfizer plant noise audible too but chillers on side of Monkstown Sailing building more dominant. |
| 11/07/12 – 12/07/12 Night | 03:02 | 45.0 | 37.9 | 33.3 | 69.4 | 31.6 | Dominant noise source was chillers/compressors on side of De Vesci Place house/building. Noise from two cars passing through Monkstown significant while present. Max noise due to one of the cars which passed quiet fast. Chillers stopped after 12minutes of survey. Plant noise from Pfizer's was noted as dominant source thereafter. |

**Attended Short-Term Measurements at Locations N15**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 30/07/12 Day | 09:48 | 44.4 | 47.6 | 40.3 | 59.4 | 37.7 | Dominant noise source overall was cranes unloading ship at deep water berth at Ringaskiddy. Noise from birds in the area around house was significant also. Boat passing in harbour influential briefly. Water flowing out from pier at Cork Dockyard notable but not significant. Occasional noise from machinery at Cork Dockyard dominant when working but only operating intermittent. |
| 30/07/12 Day | 10:11 | 42.9 | 44.8 | 40.6 | 54.3 | 38.8 | Dominant noise source was a combination of cranes working at deep water berth at Ringaskiddy and on occasion, machinery working at Cork Dockyard. Tide was out during survey and noise from birds on the mud below property was influential at times. Activity at deep water berth at Ringaskiddy dominant overall. Water draining from pipe background noise. |
| 30/07/12 Day | 10:31 | 48.7 | 48.1 | 40.3 | 65.5 | 37.2 | Dominant source was cranes working at deep water berth. Noise from tug passing in harbour significant source briefly. Jet passing overhead was also influential for a few minutes and was noted as a source of max noise level. Noise from birds significant at times during this survey also. Noise from work at Cork Dockyard dominant on occasion. |
| 30/07/12 – 31/07/12 Night | 23:21 | 35.0 | 36.3 | 33.0 | 50.8 | 31.1 | Generally very quiet. Dominant noise source at times was traffic noise on road passing through Monkstown. Occasional noise from birds on the water noted. Low level of plant noise from Ringaskiddy direction was available (possibly Pfizer) but not significant. Distant traffic noise on Cobh road noted at times also. |
| 30/07/12 – 31/07/12 Night | 23:40 | 33.9 | 35.8 | 31.7 | 47.6 | 30.2 | Dominant source generally was birds on the water. Very little traffic on Monkstown road during this survey. Airplane passing at high altitude noted briefly. Water draining from pipe in pier at Cork Dockyard influential throughout. Low level of plant noise audible towards Ringaskiddy. |
| 30/07/12 – 31/07/12 Night | 00:00 | 32.6 | 33.9 | 31.1 | 43.0 | 29.5 | Very quiet location again. Dominant source was birds on the water. Sound of water flowing from drain pipe on pier of Cork Dockyard noted throughout this survey also. Occasional traffic in Monkstown. Low level of plant noise from Ringaskiddy direction audible. |

**Attended Short-Term Measurements at Locations N16**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 16/07/12 Day | 11:38 | 51.6 | 55.3 | 43.7 | 64.9 | 40.7 | Dominant noise source was traffic passing on main road. Max noise due to passing coach. Noise from men working in a house to southeast was noted intermittently. Steady noise from birds in the area was influential also. Noise from cranes at deep water berth was audible during brief periods in absence of traffic but was not significant. Sheltered location some noise at times from breeze in trees. |
| 16/07/12 Day | 13:04 | 51.8 | 55.8 | 43.3 | 62.6 | 39.3 | Dominant source was traffic similar to earlier survey. Noise from breeze blowing in trees and birds in the area were significant at times. No noise from men working on house to southeast during this survey. Noise from Cranes at deep water berth only just audible during brief periods in absence of traffic and breeze (rustling leaves) noise. |
| 16/07/12 Day | 14:13 | 52.0 | 55.6 | 45.6 | 63.5 | 40.6 | Dominant source was traffic. Noise from breeze blowing in trees was influential throughout and significant at times. Max noise due to passing motorbike. No noise from men working on house during survey either. Noise from cranes at deep water berth only just audible not significant, during brief periods in absence of traffic noise. |
| 16/07/12 – 17/07/12 Night | 00:11 | 40.8 | 42.0 | 29.7 | 58.4 | 27.7 | Dominant noise source was intermittent traffic on main road generally very quiet location in absence of passing cars. No breeze so no turbulence or rustling foliage. No noise from birds in the area. Possible tonal noise from car beeping. Noise from what sounded like a ship passing down the harbour was noted for approximately 5 minutes during survey. |
| 16/07/12 – 17/07/12 Night | 01:20 | 39.2 | 37.0 | 29.6 | 58.5 | 28.2 | Very quiet location. Dominant source was occasional passing cars on main road. Noise from birds in trees on opposite side of road noted at times. Low level of plant noise from Ringaskiddy just audible. |
| 16/07/12 – 17/07/12 Night | 02:32 | 32.6 | 33.8 | 29.4 | 48.7 | 27.2 | Again very quiet location. Dominant noise source was noise from birds in trees on opposite side of the road. Occasional sound of breeze and rustling leaves in tall sycamore tree near monitoring position. Low level of plant noise audible from Ringaskiddy area (possibly plant noise from Pfizer site audible but not significant) Only one car passed during this survey. Tannoy announcement noted very briefly also. |

**Attended Short-Term Measurements at Locations N18**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 16/07/12<br>Day | 11:13 | 49.3 | 51.0 | 47.3 | 58.1 | 45.4 | Dominant noise source was two cranes unloading two separate grain cargo ships at deep water berth. Noise from breeze blowing in trees and flax tree of garden significant and dominant at times. Noise from birds and seagulls significant at times also. No traffic within estate during survey. |
| 16/07/12<br>Day | 12:26 | 45.9 | 47.6 | 43.6 | 56.0 | 41.0 | Dominant source generally was Cranes unloading ships at deep water berth. No car passed during survey. Noise from birds in the area noted at times but not as significant as during earlier survey. Noise from breeze blowing in hedge influential during this survey again also, |
| 16/07/12<br>Day | 13:49 | 45.0 | 46.4 | 43.1 | 52.5 | 41.7 | Dominant source was cranes unloading ships at deep water berth. Noise from plane flying overhead at high altitude influential briefly. Noise from flax leaves rustling in breeze influential also. Tannoy on ship at deep water berth noted on occasion during this survey. No traffic passed during the survey. |
| 16/07/12 – 17/07/12<br>Night | 23:45 | 35.2 | 35.5 | 32.6 | 61.6 | 31.2 | General low level "plant noise" audible from Ringaskiddy direction. Possibly plant noise from Pfizer site. Did not appear to be any ships on berth at deep water berth. Noise from birds near house and foreshore was significant at times and gave rise to the max. level. No cars moving within estate during survey. Otherwise, quiet location. |
| 16/07/12 – 17/07/12<br>Night | 00:55 | 33.9 | 35.4 | 32.2 | 42.4 | 30.2 | Plant noise from Ringaskiddy noted during this survey again also but noted as low-level noise. Occasional noise from birds near the water (time coming in) No other notable noise sources during the survey. |
| 16/07/12 – 17/07/12<br>Night | 02:06 | 34.2 | 35.5 | 32.6 | 40.3 | 31.1 | Very quiet location again. Plant noise from Ringaskiddy noted as dominant noise source but still a low-level noise. Tannoy announcement noted very briefly also. Distant traffic also not significant. No noise from birds on/near the water noted during this survey. |

**Attended Short-Term Measurements at Locations N19**

| Monitoring Locations | Time | Measured Noise Level dB(A) | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq,15mins}$ | $L_{A10}$ | $L_{A90}$ | $L_{AMax}$ | $L_{AMin}$ | |
| 16/07/12 Day | 10:50 | 50.3 | 53.4 | 45.5 | 63.7 | 43.1 | Dominant source was traffic on lower road overall. Noise from boats in the harbour was significant also. Naval boa (P41) berthed on quay on north side of Haulbowline with engine running was clearly audible. Sound of cranes unloading ship at deep water berth at Ringaskiddy was also noted. Turbulence due to breezy conditions influential throughout also. |
| 16/07/12 Day | 12:00 | 49.8 | 53.5 | 43.1 | 61.6 | 40.1 | Dominant source again was traffic noise. Navy ship P41 no longer at Haulbowline. Noise from people in playground to south of property were influential at times. Breeze blowing in trees and hedges around garden was also influential sound of cranes at Haulbowline just audible at times in absence of traffic noise and when breeze calmed. Airplane flying overhead noted briefly also. |
| 16/07/12 Day | 13:27 | 50.0 | 52.7 | 42.1 | 67.3 | 39.1 | Dominant source was traffic on lower road. Noise from people in the playground was influential also. Train passed towards Cobh at around 13:29. Noise from boats passing in harbour was noted at times also. Noise from breeze blowing in trees in the area dominant at times in absence of traffic for brief periods. Noise from cranes unloading ships at Ringaskiddy only just audible at times when no traffic noise and breeze was occasionally calm. Train passed towards Cork at around 13:38 |
| 16/07/12 – 17/07/12 Night | 23:22 | 42.6 | 41.9 | 31.8 | 61.4 | 29.3 | Dominant noise source was intermittent traffic on lower road. Occasional dog barking towards west was significant at times. Traffic passing on upper road was also influential. Noise from people walking and talking on lower road was noted for a few minutes. Noise from what sounded like a ship was noted to the east (ferry?) to Haulbowline. |
| 16/07/12 – 17/07/12 Night | 00:33 | 37.3 | 36.8 | 29.5 | 58.7 | 28.1 | Very quiet during this survey. Ship had just passed down harbour at start of survey, hence was not significant. Only two cars passed during survey and very little noise from birds on the water. Low lever of plant noise from Ringaskiddy direction audible but not significant. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 16/07/12 – 17/07/12 Night | 01:41 | 37.5 | 41.5 | 33.9 | 52.4 | 32.1 | Dominant noise source initially was a cargo ship passing up river/harbour for first approximately five minutes of survey. After ship had passed sound of wash against sea wall was influential but not significant. No traffic noise during this survey. Low level of plant noise audible from Ringaskiddy direction. |

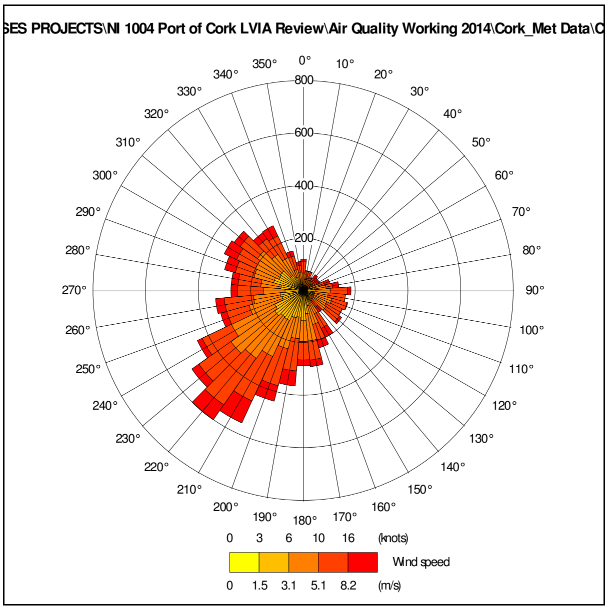
# APPENDIX 4.4 2024 BASELINE NOISE MONITORING COMPARISON

| | A | B | E | F | G | H | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Statior | Surveyed | Period | Date | Time | Operator | LAeq Variance | LAeq 1 h | Original LAeq | LAF10 1 h | LA90 Variance | LAF90 1 h | Original LA90 | Variance commentary | Sources audible updated | SLM ID | SLM serial | SLM validation | Calibration time | Sensitivity | Additional comments |
| 2 | N1 | Yes | Daytime | 11/10/24 | 0841-0941 | SF | Comparable | 46 | 49-52 | 49 | Comparable | 42 | 37-42 | Comparable | Distant traffic continuously audible , chiefly to N; Sporadic traffic audible on bridge; Intermittent car movements within carpark; Water lapping on shore; Bird calls on water; Aircraft; Sporadic dogs barking; Crane movemer | MKO3 | A2A-15392-E0 | 11/05/23 | 08:39:00 | 42.1 | |
| 3 | N1 | Yes | Night-time | 10/10/24 | 2300-0000 | DB | Comparable | 39 | 35-40 | 42 | Comparable | 35 | 33-34 | Comparable | Distant traffic continuously audible , chiefly to N; Sporadic traffic audible on bridge; Water lapping on shore; Bird calls on water; Aircraft; Distant vessel noise during last 2 min; No noise audible from port | MKO5 | A2A-17932-E0 | 06/03/24 | 22:37:00 | 42.7 | |
| 4 | N2 | Yes | Daytime | 11/10/24 | 1511-1611 | SF | Comparable | 42 | 35-39 | 40 | Comparable | 27 | 30-31 | Comparable | Distant traffic continuously faintly audible , chiefly to N and E; Bird calls on water; Aircraft; Voices from adjacent pier; Distant vehicle movements from NVD & CCT, echoing through sheet piles; Sheet piles creaking | MKO3 | A2A-15392-E0 | 11/05/23 | 08:39:00 | 42.1 | |
| 5 | N2 | Yes | Night-time | 14/10/24 | 2300-0000 | DB | Comparable | 34 | 37-43 | 36 | Comparable | 30 | 30-31 | Comparable | Wind turbine blade swish audible at low level; Distant traffic faintly audible - screened by embankment; Continuous whine audible at low level to SE; No port noise audible | MKO5 | A2A-17932-E0 | 06/03/24 | 22:54:00 | 41.2 | |
| 6 | N3 | Yes | Daytime | 11/10/24 | 0949-1049 | SF | Comparable | 55 | 48-52 | 59 | Comparable | 41 | 33-42 | Comparable | Regular N28 passing traffic; Construction activity to rear of derelict hse and field on W side clearly audible; HLM activity sporadically audible; Aircraft; Birdsong; Straddle carriers and truck movements intermittently clearl | MKO3 | A2A-15392-E0 | 11/05/23 | 08:39:00 | 42.1 | |
| 7 | N3 | Yes | Night-time | 10/10/24 | 0050-0150 | DB | Comparable | 41 | 37-48 | 43 | Increase | 38 | 32-33 | Comparable | Sporadic passing traffic; Lightly rustling trees; Aircraft; Blade swish from turbine to SE; Continuous emissions from port slightly audible (reefers and vessel at DWB) | MKO5 | A2A-17932-E0 | 06/03/24 | 22:58:00 | 42.8 | |
| 8 | N4 | Yes | Daytime | 11/10/24 | 1058-1158 | SF | Increase | 61 | 54-56 | 66 | Comparable | 43 | 41-42 | LA90 comparable, intermittent noise from Straddle carrier likely LAeq difference. | Regular N28 passing traffic; Intermittent local traffic; Aircraft; Birdsong; Straddle carriers and truck movements intermittently clearly audible during traffic lulls | MKO3 | A2A-15392-E0 | 11/05/23 | 08:39:00 | 42.1 | |
| 9 | N4 | Yes | Night-time | 10/10/24 | 0100-0200 | DB | Increase | 52 | 34-47 | 45 | Comparable | 39 | 31-40 | LA90 reduced, Laeq increase likely foliage noise. | Sporadic N28 and side road traffic; Lightly rustling trees; Aircraft; Continuous emissions slightly audible from port area (reefers and vessel at DWB) | MKO1 | A2A-13658-E0 | 11/05/23 | 00:56:00 | 38.5 | |
| 10 | N5 | Yes | Daytime | 11/10/24 | 1208-1308 | SF | Comparable | 55 | 54-55 | 57 | Comparable | 44 | 44-46 | Comparable | Regular N28 passing traffic; Intermittent local traffic; Aircraft; Birdsong; Straddle carriers and truck movements intermittently clearly audible during traffic lulls | MKO3 | A2A-15392-E0 | 11/05/23 | 08:39:00 | 42.1 | |
| 11 | N5 | Yes | Night-time | 11/10/24 | 0245-0345 | DB | Comparable | 44 | 40-44 | 41 | Comparable | 37 | 28-34 | Comparable | Sporadic N28 and side road traffic; Aircraft; Continuous emissions audible at low level from CCT reefers | MKO5 | A2A-17932-E0 | 06/03/24 | 22:37:00 | 42.7 | |
| 12 | N6 | Yes | Daytime | 11/10/24 | 1318-1418 | SF | Comparable | 52 | 54-55 | 50 | Increase | 41 | 51-53 | Comparable | Regular N28 passing traffic; Aircraft; Birdsong; Dogs barking clearly audible; Straddle carriers and truck movements intermittently audible at a low level during traffic lulls | MKO3 | A2A-15392-E0 | 11/05/23 | 08:39:00 | 42.1 | |
| 13 | N6 | Yes | Night-time | 10/10/24 | 0320-0420 | DB | Comparable | 42 | 44-50 | 42 | Comparable | 39 | 36-39 | Comparable | Sporadic N28 and side road traffic; Lightly rustling trees; Aircraft; Continuous emissions slightly audible from port area (reefers and vessel at DWB) | MKO5 | A2A-17932-E0 | 06/03/24 | 22:58:00 | 42.8 | |
| 14 | N7 | Omitted | | | | | | | | | | | | | | | | | | | |
| 15 | N7 | Omitted | | | | | | | | | | | | | | | | | | | |
| 16 | N8 | Omitted | | | | | | | | | | | | | | | | | | | |
| 17 | N8 | Omitted | | | | | | | | | | | | | | | | | | | |
| 18 | N9 | Omitted | | | | | | | | | | | | | | | | | | | |
| 19 | N9 | Omitted | | | | | | | | | | | | | | | | | | | |
| 20 | N10 | Yes | Daytime | 11/10/24 | 1629-1729 | SF | Increase | 70 | 52-54 | 75 | Comparable | 43 | 40-41 | LA90 Comparable, clangs from straddle carriers main difference in LAeq. | Regular local traffic dominant; Bird calls on water; Aircraft; Pfizer emissions faintly audible during lulls in traffic; Straddle carriers intermittently audible at a low level, loudest container clangs | MKO3 | A2A-15392-E0 | 11/05/23 | 08:39:00 | 42.1 | |
| 21 | N10 | Yes | Night-time | 11/10/24 | 0020-0120 | DB | Increase | 56 | 35-44 | 41 | Comparable | 35 | 30-33 | LA90 comparable, Sporadic night time traffic and overhead plane main elevator on LAeq | Pfizer emissions continuously clearly audible; Sporadic local traffic; Bird calls on water; Aircraft; No port noise audible | MKO5 | A2A-17932-E0 | 06/03/24 | 22:37:00 | 42.7 | |
| 22 | N11 | Yes | Daytime | 14/10/24 | 1241-1341 | SF | Increase | 47 | 40-42 | 49 | Increase | 43 | 36-37 | Construction active during daytime. | Intermittent local traffic audible at a low level; Construction activity N of station ; Birdsong; Aircraft; Pedestrian voices; Hum could be vessel /Pfizer; Straddle carrier movements and container clangs sporadically audible | MKO2 | A2A-14337-E0 | 10/05/23 | 09:44:00 | 38.2 | |
| 23 | N11 | Yes | Night-time | 11/10/24 | 0300-0400 | DB | Comparable | 30 | 29-32 | 31 | Comparable | 29 | 26-28 | Comparable | Pfizer emissions continuously audible at low level; Continuous emissions also slightly audible to NE from unidentified source (vessel at Rushbrooke?); Aircraft; No port noise audible | MKO1 | A2A-13658-E0 | 11/05/23 | 00:56:00 | 38.5 | |
| 24 | N12 | Omitted | | | | | | | | | | | | | | | | | | | |
| 25 | N12 | Omitted | | | | | | | | | | | | | | | | | | | |
| 26 | N13 | Yes | Daytime | 14/10/24 | 1127-1227 | SF | Increase | 66 | 50-52 | 69 | Comparable | 47 | 43-44 | LA90 Comparable, Street sweeper and idling buses raised LAeq | Regular passing traffic; Bird calls on water; Multiple buses, engines idling; Pedestrian voices; Street sweeper 1142; 1200 noon bells; During lulls in traffic hum from vessels, cruise ship possibly at DWB or Pfizer, warning si | MKO2 | A2A-14337-E0 | 10/05/23 | 09:44:00 | 38.2 | |
| 27 | N13 | Yes | Night-time | 11/10/24 | 0130-0230 | DB | Increase | 53 | 39-44 | 43 | Comparable | 39 | 37-38 | LA90 Comparable, Sporadic passing traffic raised LAeq, Port inaudible | Sporadic passing traffic; Bird calls on water; Continuous buzz from nearby street lamp; Recurring alarm (pulsing beep) audible at low level to NE; No port noise audible | MKO5 | A2A-17932-E0 | 06/03/24 | 22:37:00 | 42.7 | |
| 28 | N14 | Omitted | | | | | | | | | | | | | | | | | | | |
| 29 | N14 | Omitted | | | | | | | | | | | | | | | | | | | |
| 30 | N15 | Omitted | | | | | | | | | | | | | | | | | | | |
| 31 | N15 | Omitted | | | | | | | | | | | | | | | | | | | |
| 32 | N16 | Omitted | | | | | | | | | | | | | | | | | | | |
| 33 | N16 | Omitted | | | | | | | | | | | | | | | | | | | |
| 34 | N17 | Yes | Daytime | 14/10/24 | 0900-1000 | SF | Comparable | 48 | 51-52 | 50 | Increase | 38 | 43-46 | Comparable | Passing vessel 0945-0955 Maintal cargo ship (heading to CCT); Other passing water craft; Distant traffic; Distant barking; Aircraft; Bird calls on water; Both cranes working, straddle carrier movements, sporadic container | MKO4 | A2A-15429-E0 | 05/03/24 | 17:08:00 | 40.9 | |
| 35 | N17 | Yes | Night-time | 12/10/24 | 0200-0300 | SF | Comparable | 35 | 33-41 | 37 | Comparable | 32 | 29-30 | Comparable | Breeze rustling vegetation: Distant intermittent traffic; Bird calls on the water; No port noise audible | MKO4 | A2A-15429-E0 | 05/03/24 | 17:08:00 | 40.9 | |
| 36 | N18 | Yes | Daytime | 14/10/24 | 0946-1046 | SF | Comparable | 46 | 45-49 | 49 | Increase | 39 | 43-47 | Comparable | Passing vessel hum 0945-0955 Maintal cargo ship (heading to CCT); Other passing water craft; Distant traffic; Distant barking; Aircraft; Bird calls on water; Both cranes working, straddle carrier movements, sporadic cont | MKO2 | A2A-14337-E0 | 10/05/23 | 09:44:00 | 38.2 | |
| 37 | N18 | Yes | Night-time | 09/10/23 | 2300-0000 | DB | Increase | 42 | 34-35 | 44 | Comparable | 33 | 32-33 | LA90 Comparable, Passing Ships raised LAeq. No ships passed in origial survey. | Passing vessel hum 2300-2320 (heading to CCT); Other passing water craft; Distant traffic; Distant barking; Aircraft; Lightly rustling trees; Bird calls on water; No port noise, apart from faint vessel hum of docked CCT vesse | MKO5 | A2A-17932-E0 | 06/03/24 | 22:58:00 | 42.8 | Levels from 2320 with ship removed: LAeq1h: 38 dB; LAF101h: 41 dB; LAF901h: 33 dB |
| 38 | N19 | Omitted | | | | | | | | | | | | | | | | | | | |
| 39 | N19 | Omitted | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | |
| 41 | | Comparable | 0-3Db Change | | | | | | | | | | | | | | | | | | |
| 42 | | Increase | 3-5dB Change | | | | | | | | | | | | | | | | | | |
| 43 | | Increase | >5dB Change | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | | |

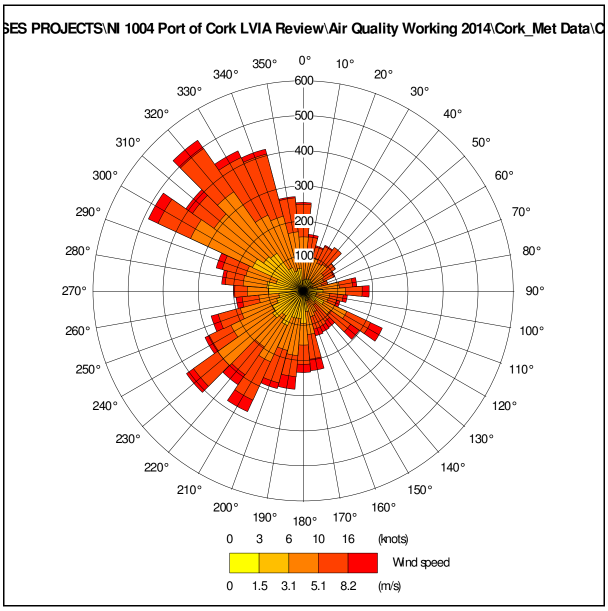
# APPENDIX 5.1 MODEL & CALCULATION INPUTS

# Appendix 5.1 2014 Air Quality Model & Calculation Inputs

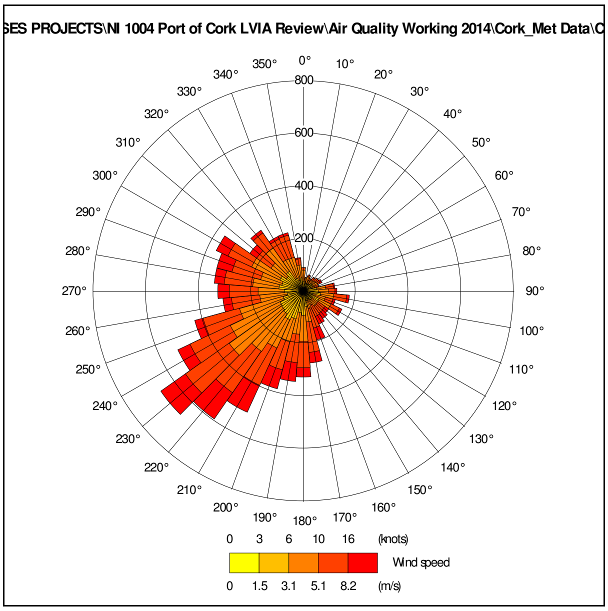
Met Data Used in ADMS CERC Roads 3.2 Dispersion Model



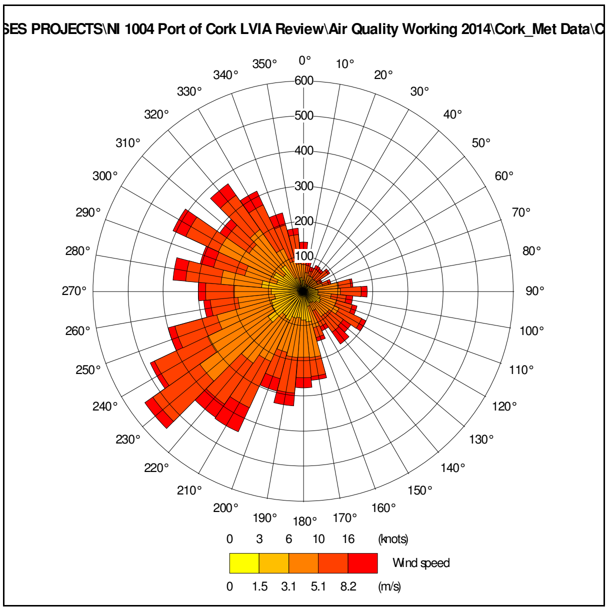

## 2009 Cork Airport Met Data Windrose



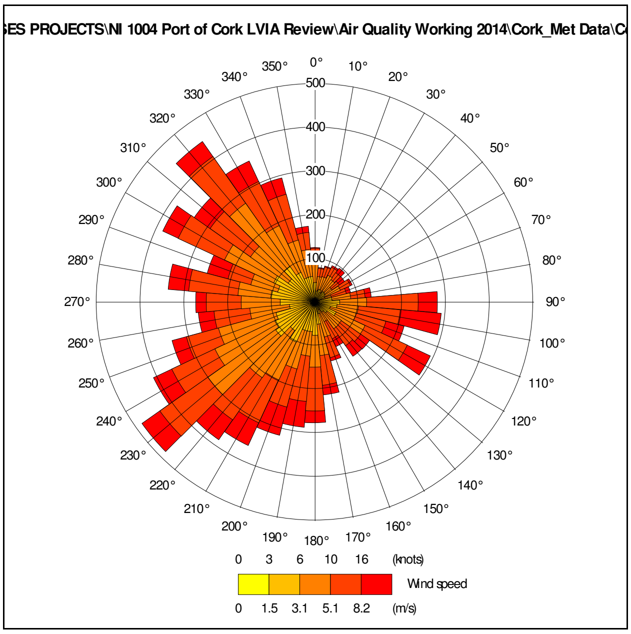

## 2010 Cork Airport Met Data Windrose




## 2011 Cork Airport Met Data Windrose




## 2012 Cork Airport Met Data Windrose




## 2013 Cork Airport Met Data Windrose

Representative Sensitive Receptors in ADMS CERC Roads 3.2 Dispersion Model

| **Ref** | **Location** | **X** | **Y** | **Z (Height m)** |
|---|---|---|---|---|
| **1** | 1.Ringaskiddy Main St | 177675 | 64219 | 1.5 |
| **2** | 2.4 Riverview Ringaskiddy | 177706 | 64219 | 1.5 |
| **3** | 3.Ringaskiddy Main St 2 | 177755 | 64221 | 1.5 |
| **4** | 4.Ringaskiddy Footpath | 177832 | 64242 | 1.5 |
| **5** | 5.Ringaskiddy Main St 3 | 177852 | 64218 | 1.5 |
| **6** | 6.Ringaskiddy Main St 4 | 177864 | 64218 | 1.5 |
| **7** | 7.Ringaskiddy Main St 5 | 177970 | 64205 | 1.5 |
| **8** | 8.Ringaskiddy Main St 6 | 178192 | 64202 | 1.5 |
| **9** | 9.Ringaskiddy Main St 7 | 178253 | 64210 | 1.5 |
| **10** | 10.Marello Pk Ringaskiddy | 178313 | 64199 | 1.5 |
| **11** | 11.Harbour 1 Ecological Designation | 178010 | 64803 | 0 |
| **12** | 12.Harbour 2 Ecological Designation | 177615 | 64791 | 0 |
| **13** | 13.Off Main N28 | 177611 | 64052 | 1.5 |
| **14** | 14.Layby N28 | 177327 | 64336 | 1.5 |
| **15** | 15.Shanbally Cross 1 | 175756 | 64457 | 1.5 |
| **16** | 16.Shanbally Cross 2 | 175715 | 64376 | 1.5 |
| **17** | 17.Shanbally Cross School | 175670 | 64363 | 1.5 |
| **18** | 18.Shanbally Cross 3 | 175635 | 64439 | 1.5 |
| **19** | 19.Shanbally Cross 4 | 175608 | 64436 | 1.5 |
| **20** | 20.Shanbally Cross 5 | 175481 | 64392 | 1.5 |

Model Parameters in ADMS CERC Roads 3.2 Dispersion Model

1. Surface roughness of 0.5m for all scenarios.
2. Meteorological data from Cork Airport have been considered. Hourly sequential data have been used to predict dispersion. Years 2009, 2010, 2011, 2012, 2013.
3. Atmospheric chemistry, plume sedimentation, photo-lytic reactions, washout and other removal effects have been ignored.
4. Predictions have been made at 20 fixed point receptor locations. These receptor locations are shown in Figure 10.1.
5. Monin – Obukhov Length 30m (Mixed Urban & Industrial).
6. Surface Albedo 0.23.
7. Cumulative impacts have been taken into account with regard to traffic volumes and increases in levels associated with other future known proposed developments.
8. Dispersion Model Traffic Speeds are given below:

| Links Modelled | Traffic Speed (Kilometres per hour) set in model | |
|---|---|---|
| | Cars and Non HGVs | HGVs |
| 98 - Internal Road | 10 | 10 |
| 10 - Ringaskiddy Main Street | 20 | 15 |
| 59 - Road to Port Access | 30 | 20 |
| 29 - R613 | 30 | 20 |
| 9 - N28 Main | 50 | 40 |
| 8 - N28 East Shanbally | 20 | 15 |
| 28 - Shanbally South Marian Terrace | 20 | 15 |
| 65 - Shanbally Mews | 20 | 15 |
| 7 - Shanbally West | 20 | 15 |

Full traffic volumes details are in Chapter 8 Traffic and Transportation of this EIS.

Construction Phase Model Parameters in ADMS CERC Roads 3.2 Dispersion Model

Non exhaust particulate matter can include brake and tyre wear, road wear and resuspension. For construction sites, the road-wear/resuspension component can be particularly significant due to the unpaved 'roads'.

The emissions can be treated in different levels of complexity, depending on the site, a case of using the number of vehicles and the distance they travel together with appropriate emission factors to calculate an emission rate. There are a number of sources of emission factors for non-road particulates, including:

Brake and tyre wear emissions calculated using the Defra EFT:
http://laqm.defra.gov.uk/documents/EFT_Version_4_2_2.zip

Road wear and resuspension:
http://www.airquality.co.uk/reports/cat15/0706061626_Report3__Modelling_Development.pdf

There are emission factors for unpaved roads:
http://www.epa.gov/oms/ap42.htm

Brake Wear factor – 0.028
Tyre Wear factor – 0.017

Speed – 5kph for construction site only

| |
|---|
| The construction phase will have a slight additional impact to receptors during the actual construction period. Traffic flows incorporating HGVs were used in all model runs. This specific model run incorporated site activity and high 2017 background pollution concentrations to represent worst case. Mitigation measure are set out in the Chapter 10 of this EIS in relation to construction phase activity. |

Emission factors for calculations of shipping emissions EMEP/EEA Emission Inventory Guidebook 2013, Section 1.A.3.d.i international water borne navigation - Tier 1 (Appendices in the following tables refer to appendices in Emissions Inventory Guidebook)

**Tier 1 Default Emission Factors for ships using bunker fuel oil**

| Tier 1 default emission factors | | | | | |
|---|---|---|---|---|---|
| | Code | Name | | | |
| **NFR Source Category** | 1.A.3.d.i | International navigation | | | |
| **Fuel** | Bunker Fuel Oil | | | | |
| **Not applicable** | Aldrin, Chlordane, Chlordecone, Dieldrin, Endrin, Heptachlor, Heptabromo-biphenyl, Mirex, | | | | |
| **Not estimated** | NH3, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, Total 4 PAHs | | | | |
| **Pollutant** | **Value** | **Unit** | **95% confidence interval** | | **Reference** |
| | | | **Lower** | **Upper** | |
| NOx | 79.3 | kg/tonne fuel | 0 | 0 | Entec (2007). See also note (2) |
| CO | 7.4 | kg/tonne fuel | 0 | 0 | Lloyd's Register (1995) |
| NMVOC | 2.7 | kg/tonne fuel | 0 | 0 | Entec (2007). See also note (2) |
| SOx | 20 | kg/tonne fuel | 0 | 0 | Note value of 20 should read |
| TSP | 6.2 | kg/tonne fuel | 0 | 0 | Entec (2007) |
| PM10 | 6.2 | kg/tonne fuel | 0 | 0 | Entec (2007) |
| PM2.5 | 5.6 | kg/tonne fuel | 0 | 0 | Entec (2007) |
| Pb | 0.18 | g/tonne fuel | 0 | 0 | average value |
| Cd | 0.02 | g/tonne fuel | 0 | 0 | average value |
| Hg | 0.02 | g/tonne fuel | 0 | 0 | average value |
| As | 0.68 | g/tonne fuel | 0 | 0 | average value |
| Cr | 0.72 | g/tonne fuel | 0 | 0 | average value |
| Cu | 1.25 | g/tonne fuel | 0 | 0 | average value |
| Ni | 32 | g/tonne fuel | 0 | 0 | average value |
| Se | 0.21 | g/tonne fuel | 0 | 0 | average value |
| Zn | 1.2 | g/tonne fuel | 0 | 0 | average value |
| PCB | 0.57 | mg/tonne fuel | 0 | 0 | Cooper (2005) |
| PCDD/F | 0.47 | ug I-TEQ/tonne fuel | 0 | 0 | Cooper (2005) |
| HCB | 0.14 | mg/tonne fuel | 0 | 0 | Cooper (2005) |

**Notes**

1. S = percentage sulphur content in fuel; pre-2006: 2.7 % wt. [source: Lloyd's Register, 1995]. For European Union as specified in the Directive 2005/33/EC:
   a. 1.5 % wt. from 11 August 2006 for Baltic sea and from 11 August 2007 for the North Sea for all ships;
   b. 1.5 % wt. from 11 August 2006 in EU territorial seas, exclusive economic zones and pollution control zones by passenger ships operating on regular services to or from any Community port at least in respect of vessels flying their flag and vessels of all flags while in their ports;
   c. 0.1 % by wt. from 1 January 2010 for inland waterway vessels and ships at berth in Community ports.
2. Emission factors for $NO_x$ and NMVOC are the 2000 values in cruise for medium speed engines (see Tier 2).
3. Reference: 'average value' is between Lloyd's Register (1995) and Cooper and Gustafsson (2004).
4. BC fraction of PM (f-BC) = 0.12. *Source: for further information see Appendix A*

## Tier 1 Default Emission Factors for ships using diesel oil/marine gas oil

| Tier 1 default emission factors | | | | | |
|---|---|---|---|---|---|
| | Code | Name | | | |
| NFR Source Category | 1.A.3.d.i | International navigation | | | |
| Fuel | Marine diesel oil/marine gas oil (MDO/MGO) | | | | |
| Not applicable | Aldrin, Chlordane, Chlordecone, Dieldrin, Endrin, Heptachlor, Heptabromo-biphenyl, Mirex, | | | | |
| Not estimated | NH3, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, Total 4 PAHs | | | | |
| Pollutant | Value | Unit | 95% confidence interval | | Reference |
| | | | Lower | Upper | |
| NOx | 78.5 | kg/tonne fuel | 0 | 0 | Entec (2007). See also note (2) |
| CO | 7.4 | kg/tonne fuel | 0 | 0 | Lloyd's Register (1995) |
| NMVOC | 2.8 | kg/tonne fuel | 0 | 0 | Entec (2007). See also note (2) |
| SOx | 20 | kg/tonne fuel | 0 | 0 | Note value of 20 should read |
| TSP | 1.5 | kg/tonne fuel | 0 | 0 | Entec (2007) |
| PM10 | 1.5 | kg/tonne fuel | 0 | 0 | Entec (2007) |
| PM2.5 | 1.4 | kg/tonne fuel | 0 | 0 | Entec (2007) |
| Pb | 0.13 | g/tonne fuel | 0 | 0 | average value |
| Cd | 0.01 | g/tonne fuel | 0 | 0 | average value |
| Hg | 0.03 | g/tonne fuel | 0 | 0 | average value |
| As | 0.04 | g/tonne fuel | 0 | 0 | average value |
| Cr | 0.05 | g/tonne fuel | 0 | 0 | average value |
| Cu | 0.88 | g/tonne fuel | 0 | 0 | average value |
| Ni | 1 | g/tonne fuel | 0 | 0 | average value |
| Se | 0.1 | g/tonne fuel | 0 | 0 | average value |
| Zn | 1.2 | g/tonne fuel | 0 | 0 | average value |
| PCB | 0.038 | mg/tonne fuel | 0 | 0 | Cooper (2005) |
| PCDD/F | 0.13 | ug I-TEQ/tonne | 0 | 0 | Cooper (2005) |
| HCB | 0.08 | mg/tonne fuel | 0 | 0 | Cooper (2005) |

**Notes**

1. S = percentage sulphur content in fuel; pre-2000 fuels: 0.5 % wt. [source: Lloyd's Register, 1995]. For European Union as specified in the Directive 2005/33/EC:
   a. 0.2 % wt. from 1 July 2000 and 0.1 % wt. from 1 January 2008 for marine diesel oil/marine gas oil used by seagoing ships (except if used by ships crossing a frontier between a third country and a Member State);
   b. 0.1% wt. from 1 January 2010 for inland waterway vessels and ships at berth in Community ports.
2. Emission factor for $NO_x$ and NMVOC are the 2000 values in cruise for medium speed engines (see Tier 2).
3. Reference: 'average value' is between Lloyd's Register (1995) and Cooper and Gustafsson (2004)
4. BC fraction of PM (f-BC) = 0.31. *Source: for further information see Appendix A*

## Tier 1 Emission Factors for ships using gasoline

| Tier 1 default emission factors | | | | | |
|---|---|---|---|---|---|
| | Code | Name | | | |
| NFR Source Category | 1.A.3.d.ii | National navigation | | | |
| Fuel | Gasoline | | | | |
| Not applicable | Aldrin, Chlordane, Chlordecone, Dieldrin, Endrin, Heptachlor, Heptabromo-biphenyl, Mirex, Toxaphene, HCH, DDT, PCB, HCB, PCP, SCCP | | | | |
| Not estimated | NH3, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, Total 4 PAHs | | | | |
| Pollutant | Value | Unit | 95% confidence interval | | Reference |
| | | | Lower | Upper | |
| NOx | 9.4 | kg/tonne fuel | 0 | 0 | Winther & Nielsen (2006) |
| CO | 573.9 | kg/tonne fuel | 0 | 0 | Winther & Nielsen (2006) |
| NMVOC | 181.5 | kg/tonne fuel | 0 | 0 | Winther & Nielsen (2006) |
| SOx | 20 | kg/tonne fuel | 0 | 0 | Winther & Nielsen (2006) |
| TSP | 9.5 | kg/tonne fuel | 0 | 0 | Winther & Nielsen (2006) |
| PM10 | 9.5 | kg/tonne fuel | 0 | 0 | Winther & Nielsen (2006) |
| PM2.5 | 9.5 | kg/tonne fuel | 0 | 0 | Winther & Nielsen (2006) |

**Notes**: The table contains averaged figures between 2-stroke and 4-stroke engines, assuming a share of 75% 2-stroke and 25% 4-stroke ones. If more detailed data are available the Tier 2 method should be used.
BC fraction of PM (f-BC) = 0.05. *Source: for further information see Appendix A*

# APPENDIX 5.2 2014 MODEL RESULTS & CALCULATIONS

# APPENDIX 5.2 MODEL RESULTS & CALCULATIONS

## ADMS CERC ROADS 3.2 DETAILS DISPERSION MODEL

**Table (i) Model Results – 2013 Model Calibration Annual Mean Nitrogen Dioxide (µg/m$^3$) {Threshold Level - 40 µg/m$^3$}**

| Ref | Location | Annual mean NO2 concentrations (µg/m$^3$) 2009 Met Data | Annual mean NO2 concentrations (µg/m$^3$) 2010 Met Data | Annual mean NO2 concentrations (µg/m$^3$) 2011 Met Data | Annual mean NO2 concentrations (µg/m$^3$) 2012 Met Data | Annual mean NO2 concentrations (µg/m$^3$) 2013 Met Data |
|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 12.45 | 12.92 | 12.44 | 12.56 | 12.59 |
| 2 | 4 Riverview Ringaskiddy | 12.29 | 12.74 | 12.29 | 12.39 | 12.43 |
| 3 | Ringaskiddy Main Street 2 | 12.39 | 12.91 | 12.40 | 12.50 | 12.57 |
| 4 | Ringaskiddy Footpath | 16.55 | 15.38 | 16.31 | 16.23 | 15.68 |
| 5 | Ringaskiddy Main Street 3 | 12.53 | 13.12 | 12.55 | 12.65 | 12.75 |
| 6 | Ringaskiddy Main Street 4 | 12.61 | 13.22 | 12.63 | 12.73 | 12.83 |
| 7 | Ringaskiddy Main Street 5 | 12.57 | 13.24 | 12.60 | 12.69 | 12.82 |
| 8 | Ringaskiddy Main Street 6 | 13.64 | 14.55 | 13.67 | 13.85 | 13.94 |
| 9 | Ringaskiddy Main Street 7 | 13.02 | 13.69 | 13.04 | 13.19 | 13.23 |
| 10 | Marello Park Ringaskiddy | 11.58 | 11.92 | 11.59 | 11.67 | 11.69 |
| 11 | Harbour 1 - Ecological Designation | 10.71 | 10.65 | 10.69 | 10.69 | 10.66 |
| 12 | Harbour 2 - Ecological Designation | 10.84 | 10.75 | 10.82 | 10.81 | 10.77 |
| 13 | Off Main N28 | 11.02 | 11.21 | 11.00 | 11.05 | 11.07 |
| 14 | Layby N28 (Calibration Point) | 17.73 | 15.17 | 16.73 | 16.93 | 15.17 |
| 15 | Shanbally Cross 1 | 20.25 | 18.14 | 19.82 | 19.48 | 18.68 |
| 16 | Shanbally Cross 2 | 14.78 | 15.75 | 14.70 | 14.89 | 14.93 |
| 17 | Shanbally Cross School | 12.75 | 13.52 | 12.78 | 12.86 | 13.00 |
| 18 | Shanbally Cross 3 | 20.30 | 18.41 | 19.91 | 19.58 | 18.92 |
| 19 | Shanbally Cross 4 | 19.80 | 17.92 | 19.41 | 19.09 | 18.43 |
| 20 | Shanbally Cross 5 | 19.22 | 21.28 | 19.30 | 19.72 | 19.86 |

*The detailed dispersion model constructed for 2013 baseline using 2013 Met data predicted a level of 15.17 (µg/m$^3$) location 14. Comparing this to the actual monitored data of 13.83 (µg/m$^3$) it suggests that the model is accurate and only slightly over predicting.*

**Table (ii) Model Results – 2012 Base, 2018 Without & With, 2023 & 2033 Without (Do Minimum (DM)) & With (Do Something (DS)) - Predicted Annual Mean Nitrogen Dioxide (µg/m$^3$) {Threshold Level - 40 µg/m$^3$}**

| Ref | Location | Annual mean NO2 concentrations (µg/m$^3$) 2012 BASE | Annual mean NO2 concentrations (µg/m$^3$) 2018 WITHOUT (DM) | Annual mean NO2 concentrations (µg/m$^3$) 2018 WITH (DS) | Annual mean NO2 concentrations (µg/m$^3$) 2023 WITHOUT (DM) | Annual mean NO2 concentrations (µg/m$^3$) 2023 WITH (DS) | Annual mean NO2 concentrations (µg/m$^3$) 2033 WITHOUT (DM) | Annual mean NO2 concentrations (µg/m$^3$) 2033 WITH (DS) |
|---|---|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 12.59 | 11.88 | 12.44 | 11.41 | 11.85 | 11.27 | 12.19 |
| 2 | 4 Riverview Ringaskiddy | 12.43 | 11.83 | 12.50 | 11.37 | 11.89 | 11.23 | 12.32 |
| 3 | Ringaskiddy Main Street 2 | 12.57 | 11.98 | 12.74 | 11.47 | 12.07 | 11.31 | 12.56 |
| 4 | Ringaskiddy Footpath | 15.68 | 14.42 | 16.06 | 13.10 | 14.43 | 12.68 | 15.50 |
| 5 | Ringaskiddy Main Street 3 | 12.75 | 12.13 | 12.80 | 11.58 | 12.12 | 11.40 | 12.55 |
| 6 | Ringaskiddy Main Street 4 | 12.83 | 12.19 | 12.84 | 11.62 | 12.15 | 11.44 | 12.56 |
| 7 | Ringaskiddy Main Street 5 | 12.82 | 11.96 | 12.38 | 11.46 | 11.82 | 11.30 | 12.09 |
| 8 | Ringaskiddy Main Street 6 | 13.94 | 12.51 | 12.67 | 11.83 | 12.02 | 11.63 | 12.11 |
| 9 | Ringaskiddy Main Street 7 | 13.23 | 12.11 | 12.33 | 11.56 | 11.78 | 11.40 | 11.92 |
| 10 | Marello Park Ringaskiddy | 11.69 | 11.21 | 11.45 | 10.96 | 11.16 | 10.88 | 11.32 |
| 11 | Harbour 1 - Ecological Designation | 10.66 | 10.57 | 10.67 | 10.54 | 10.61 | 10.53 | 10.67 |
| 12 | Harbour 2 - Ecological Designation | 10.77 | 10.58 | 10.65 | 10.54 | 10.58 | 10.53 | 10.61 |
| 13 | Off Main N28 | 11.07 | 10.73 | 10.82 | 10.65 | 10.71 | 10.63 | 10.74 |
| 14 | Layby N28 (Calibration Point) | 15.17 | 14.12 | 15.55 | 12.76 | 13.36 | 12.44 | 13.46 |
| 15 | Shanbally Cross 1 | 18.68 | 15.00 | 16.95 | 13.40 | 14.52 | 12.99 | 15.06 |
| 16 | Shanbally Cross 2 | 14.93 | 13.14 | 13.78 | 12.23 | 12.57 | 11.98 | 12.70 |
| 17 | Shanbally Cross School | 13.00 | 12.02 | 12.48 | 11.49 | 11.74 | 11.34 | 11.84 |
| 18 | Shanbally Cross 3 | 18.92 | 15.87 | 17.78 | 13.97 | 15.07 | 13.48 | 15.55 |
| 19 | Shanbally Cross 4 | 18.43 | 15.63 | 17.45 | 13.82 | 14.87 | 13.34 | 15.32 |
| 20 | Shanbally Cross 5 | 19.86 | 16.66 | 18.85 | 14.50 | 15.75 | 13.91 | 16.29 |

## ADMS CERC ROADS 3.2 DETAILS DISPERSION MODEL - CONTOURED PLOT NOx Baseline (2012)

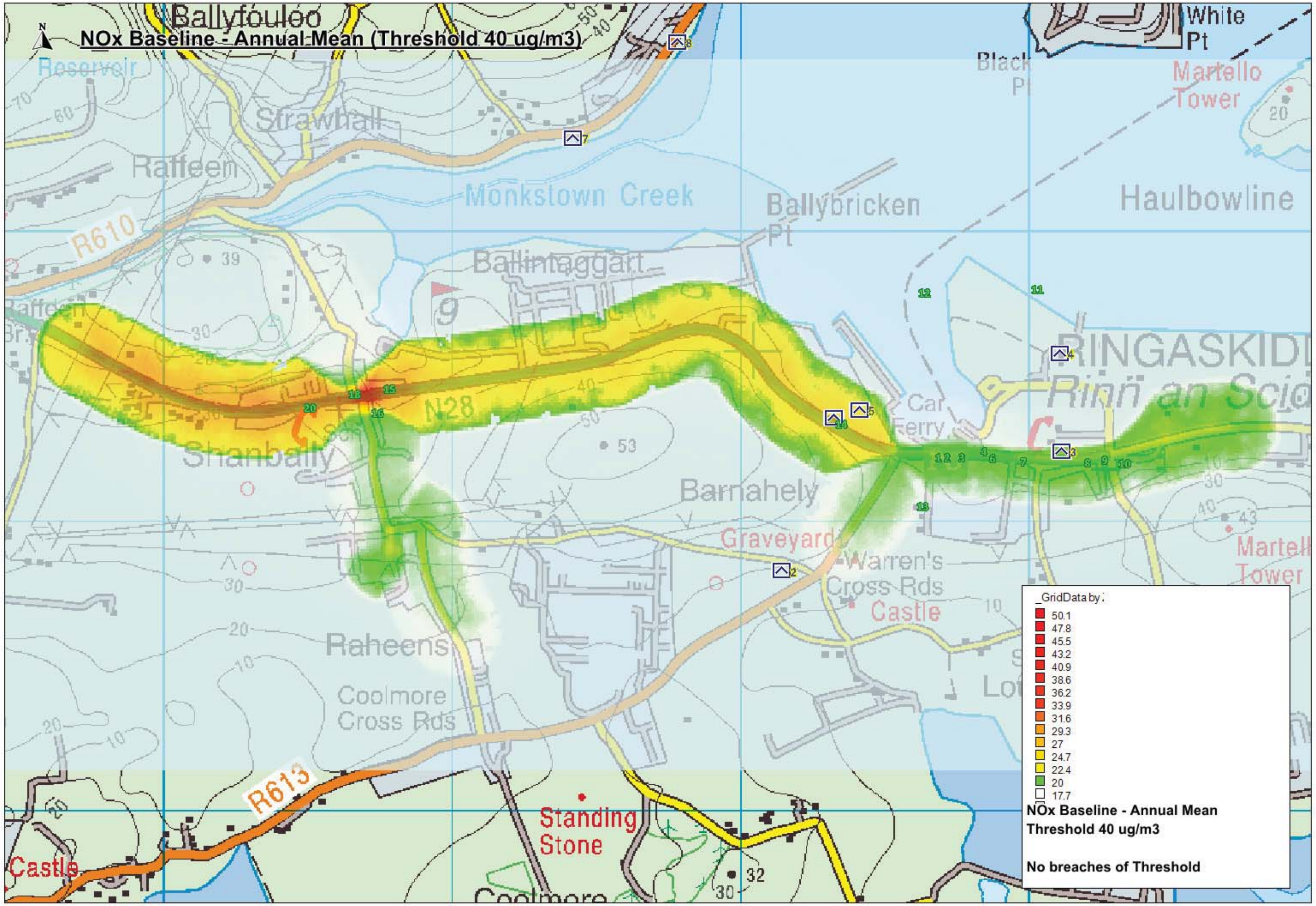


**Table (iii) Model Results – Percentage Change in Annual Mean Nitrogen Dioxide for 2016 Without (DM) & With (DS) and 2023 & 2033 Without (DM) & With (DS)**

| Ref | Location | 2016 PERCENTAGE CHANGE (%) | Magnitude of Change* | 2023 PERCENTAGE CHANGE (%) | Magnitude of Change* | 2031 PERCENTAGE CHANGE (%) | Magnitude of Change* |
|---|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 4.71 | Small | 3.86 | Small | 8.16 | Small |
| 2 | 4 Riverview Ringaskiddy | 5.66 | Small | 4.57 | Small | 9.71 | Small |
| 3 | Ringaskiddy Main Street 2 | 6.34 | Small | 5.23 | Small | 11.05 | Small |
| 4 | Ringaskiddy Footpath | 11.37 | Small | 10.15 | Small | 22.24 | Medium |
| 5 | Ringaskiddy Main Street 3 | 5.52 | Small | 4.66 | Small | 10.09 | Small |
| 6 | Ringaskiddy Main Street 4 | 5.33 | Small | 4.56 | Small | 9.79 | Small |
| 7 | Ringaskiddy Main Street 5 | 3.51 | Small | 3.14 | Small | 6.99 | Small |
| 8 | Ringaskiddy Main Street 6 | 1.28 | Imperceptible | 1.61 | Small | 4.13 | Small |
| 9 | Ringaskiddy Main Street 7 | 1.82 | Imperceptible | 1.90 | Small | 4.56 | Small |
| 10 | Marello Park Ringaskiddy | 2.14 | Imperceptible | 1.82 | Small | 4.04 | Small |
| 11 | Harbour 1 - Ecological Designation | 0.95 | Imperceptible | 0.66 | Small | 1.33 | Small |
| 12 | Harbour 2 - Ecological Designation | 0.66 | Imperceptible | 0.38 | Small | 0.76 | Small |
| 13 | Off Main N28 | 0.84 | Imperceptible | 0.56 | Small | 1.03 | Small |
| 14 | Layby N28 (Calibration Point) | 10.13 | Small | 4.70 | Small | 8.20 | Small |
| 15 | Shanbally Cross 1 | 13.00 | Small | 8.36 | Small | 15.94 | Medium |
| 16 | Shanbally Cross 2 | 4.87 | Small | 2.78 | Small | 6.01 | Small |
| 17 | Shanbally Cross School | 3.83 | Small | 2.18 | Small | 4.41 | Small |
| 18 | Shanbally Cross 3 | 12.04 | Small | 7.87 | Small | 15.36 | Medium |
| 19 | Shanbally Cross 4 | 11.64 | Small | 7.60 | Small | 14.84 | Small |
| 20 | Shanbally Cross 5 | 13.15 | Medium | 8.62 | Small | 17.11 | Medium |

*All increase in terms of air quality are negligible.*

**Taken from the NRA Guidelines for the treatment of air quality.*

**Table (iv) Model Results – 2012 Base, 2018 Without (DM) & With (DS) and 2023 & 2033 Without (DM) & With (DS), Predicted 1 hour Mean Nitrogen Dioxide (µg/m$^3$) {Threshold Level - 200 µg/m$^3$}**

| Ref | Location | 1-Hour mean NO2 concentrations (µg/m$^3$) 2012 BASE | 1-Hour mean NO2 concentrations (µg/m$^3$) 2018 WITHOUT | 1-Hour mean NO2 concentrations (µg/m$^3$) 2018 WITH | 1-Hour mean NO2 concentrations (µg/m$^3$) 2023 WITHOUT | 1-Hour mean NO2 concentrations (µg/m$^3$) 2023 WITH | 1-Hour mean NO2 concentrations (µg/m$^3$) 2033 WITHOUT | 1-Hour mean NO2 concentrations (µg/m$^3$) 2033 WITH |
|---|---|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 26.72 | 20.30 | 25.10 | 18.47 | 22.84 | 15.99 | 24.76 |
| 2 | 4 Riverview Ringaskiddy | 25.66 | 19.94 | 25.31 | 18.15 | 23.03 | 15.67 | 25.01 |
| 3 | Ringaskiddy Main Street 2 | 25.84 | 20.73 | 27.32 | 18.86 | 24.86 | 16.09 | 26.30 |
| 4 | Ringaskiddy Footpath | 39.58 | 31.10 | 39.21 | 28.30 | 35.68 | 22.36 | 37.36 |
| 5 | Ringaskiddy Main Street 3 | 26.59 | 21.69 | 27.39 | 19.74 | 24.92 | 16.64 | 25.96 |
| 6 | Ringaskiddy Main Street 4 | 27.06 | 22.02 | 27.55 | 20.04 | 25.07 | 16.87 | 26.11 |
| 7 | Ringaskiddy Main Street 5 | 26.60 | 20.77 | 24.63 | 18.90 | 22.41 | 16.17 | 23.26 |
| 8 | Ringaskiddy Main Street 6 | 35.85 | 24.99 | 26.85 | 22.74 | 24.43 | 18.64 | 22.76 |
| 9 | Ringaskiddy Main Street 7 | 31.76 | 22.53 | 24.53 | 20.50 | 22.32 | 17.25 | 21.92 |
| 10 | Marello Park Ringaskiddy | 21.55 | 16.92 | 19.09 | 15.40 | 17.37 | 14.03 | 18.53 |
| 11 | Harbour 1 - Ecological Designation | 12.60 | 11.44 | 12.81 | 10.41 | 11.66 | 11.01 | 13.21 |
| 12 | Harbour 2 - Ecological Designation | 13.46 | 11.77 | 12.39 | 10.71 | 11.27 | 11.19 | 12.29 |
| 13 | Off Main N28 | 16.05 | 12.78 | 13.71 | 11.63 | 12.48 | 11.80 | 13.91 |
| 14 | Layby N28 (Calibration Point) | 64.59 | 28.88 | 35.89 | 26.28 | 32.66 | 20.38 | 25.15 |
| 15 | Shanbally Cross 1 | 60.23 | 38.58 | 50.22 | 35.11 | 45.70 | 26.00 | 37.96 |
| 16 | Shanbally Cross 2 | 42.88 | 29.17 | 35.67 | 26.54 | 32.46 | 20.94 | 27.76 |
| 17 | Shanbally Cross School | 35.15 | 24.61 | 29.51 | 22.40 | 26.85 | 18.34 | 23.58 |
| 18 | Shanbally Cross 3 | 61.74 | 41.66 | 53.07 | 37.91 | 48.29 | 27.79 | 39.78 |
| 19 | Shanbally Cross 4 | 57.41 | 39.78 | 50.08 | 36.20 | 45.57 | 26.71 | 37.61 |
| 20 | Shanbally Cross 5 | 70.51 | 50.01 | 63.79 | 45.51 | 58.05 | 32.40 | 47.09 |

*Dispersion models are inevitably poorer at predicting short-term peaks than they are at predicting annual mean concentrations and the process of model verification is extremely challenging. These predicted levels are representative concentrations at each sensitive receptor and are all below the relevant threshold levels.*

**Table (v) Model Results – 2012 Base, 2018 Without (DM) & With (DS) and 2023 & 2033 Without (DM) & With (DS), Predicted Annual Mean Particulate Matter ($PM_{10}$) (Threshold Level - 40 $\mu g/m^3$)**

| Ref | Location | Annual mean $PM_{10}$ concentrations ($\mu g/m^3$) 2012 BASE | Annual mean $PM_{10}$ concentrations ($\mu g/m^3$) 2018 WITHOUT | Annual mean $PM_{10}$ concentrations ($\mu g/m^3$) 2018 WITH | Annual mean $PM_{10}$ concentrations ($\mu g/m^3$) 2023 WITHOUT | Annual mean $PM_{10}$ concentrations ($\mu g/m^3$) 2023 WITH | Annual mean $PM_{10}$ concentrations ($\mu g/m^3$) 2033 WITHOUT | Annual mean $PM_{10}$ concentrations ($\mu g/m^3$) 2033 WITH |
|---|---|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 16.82 | 16.82 | 16.83 | 16.81 | 16.85 | 16.81 | 16.85 |
| 2 | 4 Riverview Ringaskiddy | 16.82 | 16.81 | 16.83 | 16.80 | 16.85 | 16.80 | 16.85 |
| 3 | Ringaskiddy Main Street 2 | 16.83 | 16.82 | 16.84 | 16.81 | 16.87 | 16.82 | 16.87 |
| 4 | Ringaskiddy Footpath | 17.04 | 17.02 | 17.06 | 17.00 | 17.11 | 17.01 | 17.11 |
| 5 | Ringaskiddy Main Street 3 | 16.84 | 16.83 | 16.85 | 16.83 | 16.87 | 16.83 | 16.87 |
| 6 | Ringaskiddy Main Street 4 | 16.85 | 16.84 | 16.85 | 16.83 | 16.88 | 16.83 | 16.88 |
| 7 | Ringaskiddy Main Street 5 | 16.83 | 16.82 | 16.83 | 16.81 | 16.84 | 16.81 | 16.84 |
| 8 | Ringaskiddy Main Street 6 | 16.90 | 16.87 | 16.87 | 16.86 | 16.88 | 16.86 | 16.88 |
| 9 | Ringaskiddy Main Street 7 | 16.86 | 16.84 | 16.84 | 16.83 | 16.85 | 16.83 | 16.85 |
| 10 | Marello Park Ringaskiddy | 16.77 | 16.76 | 16.76 | 16.76 | 16.77 | 16.76 | 16.77 |
| 11 | Harbour 1 - Ecological Designation | 16.71 | 16.71 | 16.71 | 16.71 | 16.71 | 16.71 | 16.71 |
| 12 | Harbour 2 - Ecological Designation | 16.71 | 16.71 | 16.71 | 16.71 | 16.72 | 16.71 | 16.72 |
| 13 | Off Main N28 | 16.72 | 16.72 | 16.73 | 16.72 | 16.73 | 16.72 | 16.73 |
| 14 | Layby N28 (Calibration Point) | 17.12 | 17.10 | 17.22 | 17.08 | 17.37 | 17.09 | 17.37 |
| 15 | Shanbally Cross 1 | 17.07 | 17.00 | 17.07 | 16.98 | 17.15 | 16.98 | 17.15 |
| 16 | Shanbally Cross 2 | 16.93 | 16.89 | 16.91 | 16.87 | 16.93 | 16.87 | 16.93 |
| 17 | Shanbally Cross School | 16.83 | 16.81 | 16.82 | 16.80 | 16.84 | 16.80 | 16.84 |
| 18 | Shanbally Cross 3 | 17.12 | 17.07 | 17.13 | 17.03 | 17.20 | 17.04 | 17.20 |
| 19 | Shanbally Cross 4 | 17.10 | 17.05 | 17.11 | 17.02 | 17.18 | 17.03 | 17.18 |
| 20 | Shanbally Cross 5 | 17.18 | 17.12 | 17.19 | 17.08 | 17.27 | 17.09 | 17.27 |

**Table (vi) Model Results – Percentage Change in Annual Mean Particulate Matter ($PM_{10}$) 2018 Without (DM) & With (DS) and 2023 & 2033 Without (DM) & With (DS).**

| Ref | Location | 2018 PERCENTAGE CHANGE | Magnitude of Change* | 2023 PERCENTAGE CHANGE | Magnitude of Change* | 2033 PERCENTAGE CHANGE | Magnitude of Change* |
|---|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 0.01 | Negligible | 0.03 | Negligible | 0.04 | Negligible |
| 2 | 4 Riverview Ringaskiddy | 0.02 | Negligible | 0.05 | Negligible | 0.05 | Negligible |
| 3 | Ringaskiddy Main Street 2 | 0.02 | Negligible | 0.04 | Negligible | 0.05 | Negligible |
| 4 | Ringaskiddy Footpath | 0.04 | Negligible | 0.04 | Negligible | 0.1 | Negligible |
| 5 | Ringaskiddy Main Street 3 | 0.02 | Negligible | 0.04 | Negligible | 0.04 | Negligible |
| 6 | Ringaskiddy Main Street 4 | 0.01 | Negligible | 0.05 | Negligible | 0.05 | Negligible |
| 7 | Ringaskiddy Main Street 5 | 0.01 | Negligible | 0.03 | Negligible | 0.03 | Negligible |
| 8 | Ringaskiddy Main Street 6 | 0.01 | Negligible | 0.02 | Negligible | 0.02 | Negligible |
| 9 | Ringaskiddy Main Street 7 | 0.02 | Negligible | 0.02 | Negligible | 0.02 | Negligible |
| 10 | Marello Park Ringaskiddy | 0.02 | Negligible | 0.01 | Negligible | 0.01 | Negligible |
| 11 | Harbour 1 - Ecological Designation | 0.01 | Negligible | 0 | Negligible | 0 | Negligible |
| 12 | Harbour 2 - Ecological Designation | 0.01 | Negligible | 0.02 | Negligible | 0.01 | Negligible |
| 13 | Off Main N28 | 0.01 | Negligible | 0.01 | Negligible | 0.01 | Negligible |
| 14 | Layby N28 (Calibration Point) | 0.12 | Negligible | 0.28 | Negligible | 0.28 | Negligible |
| 15 | Shanbally Cross 1 | 0.07 | Negligible | 0.15 | Negligible | 0.17 | Negligible |
| 16 | Shanbally Cross 2 | 0.02 | Negligible | 0.06 | Negligible | 0.06 | Negligible |
| 17 | Shanbally Cross School | 0.01 | Negligible | 0.04 | Negligible | 0.04 | Negligible |
| 18 | Shanbally Cross 3 | 0.06 | Negligible | 0.14 | Negligible | 0.16 | Negligible |
| 19 | Shanbally Cross 4 | 0.06 | Negligible | 0.11 | Negligible | 0.15 | Negligible |
| 20 | Shanbally Cross 5 | 0.07 | Negligible | 0.18 | Negligible | 0.18 | Negligible |

*All increase in terms of air quality are negligible.*

**Taken from the NRA Guidelines for the treatment of air quality.*

**Table (vii) Model Results – Percentage Change in 24 hour mean Particulate Matter ($PM_{10}$) 2018 Without (DM) & With (DS) and 2023 & 2033 Without (DM) & With (DS).**

| Ref | Location | 2018 PERCENTAGE CHANGE | Magnitude of Change* | 2023 PERCENTAGE CHANGE | Magnitude of Change* | 2033 PERCENTAGE CHANGE | Magnitude of Change* |
|---|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 0.01 | Negligible | 0.03 | Negligible | 0.04 | Negligible |
| 2 | 4 Riverview Ringaskiddy | 0.02 | Negligible | 0.05 | Negligible | 0.05 | Negligible |
| 3 | Ringaskiddy Main Street 2 | 0.02 | Negligible | 0.05 | Negligible | 0.05 | Negligible |
| 4 | Ringaskiddy Footpath | 0.04 | Negligible | 0.1 | Negligible | 0.1 | Negligible |
| 5 | Ringaskiddy Main Street 3 | 0.02 | Negligible | 0.04 | Negligible | 0.04 | Negligible |
| 6 | Ringaskiddy Main Street 4 | 0.01 | Negligible | 0.05 | Negligible | 0.05 | Negligible |
| 7 | Ringaskiddy Main Street 5 | 0.01 | Negligible | 0.02 | Negligible | 0.03 | Negligible |
| 8 | Ringaskiddy Main Street 6 | 0.01 | Negligible | 0.02 | Negligible | 0.02 | Negligible |
| 9 | Ringaskiddy Main Street 7 | 0.02 | Negligible | 0.01 | Negligible | 0.02 | Negligible |
| 10 | Marello Park Ringaskiddy | 0.02 | Negligible | 0.01 | Negligible | 0.01 | Negligible |
| 11 | Harbour 1 - Ecological Designation | 0.01 | Negligible | 0 | Negligible | 0 | Negligible |
| 12 | Harbour 2 - Ecological Designation | 0.01 | Negligible | 0.01 | Negligible | 0.01 | Negligible |
| 13 | Off Main N28 | 0.01 | Negligible | 0.01 | Negligible | 0.01 | Negligible |
| 14 | Layby N28 (Calibration Point) | 0.12 | Negligible | 0.25 | Negligible | 0.28 | Negligible |
| 15 | Shanbally Cross 1 | 0.07 | Negligible | 0.14 | Negligible | 0.17 | Negligible |
| 16 | Shanbally Cross 2 | 0.02 | Negligible | 0.04 | Negligible | 0.06 | Negligible |
| 17 | Shanbally Cross School | 0.01 | Negligible | 0.04 | Negligible | 0.04 | Negligible |
| 18 | Shanbally Cross 3 | 0.06 | Negligible | 0.16 | Negligible | 0.16 | Negligible |
| 19 | Shanbally Cross 4 | 0.06 | Negligible | 0.13 | Negligible | 0.15 | Negligible |
| 20 | Shanbally Cross 5 | 0.07 | Negligible | 0.15 | Negligible | 0.18 | Negligible |

*All increase in terms of air quality are negligible.*

**Taken from the NRA Guidelines for the treatment of air quality.*

**Table (viii) Model Results – 2012 Base, 2018 Without & With and 2033 Without & With - 24 hour Mean Particulate Matter ($PM_{10}$) Number of times a year 50 (µg/m$^3$) exceeded. (**24-hour limit for protection of human health - not to be exceeded more than 35 times/year)

| Ref | Location | No. of times a year 50 (µg/m$^3$) exceeded 2012 BASE | No. of times a year 50 (µg/m$^3$) exceeded 2018 WITHOUT | No. of times a year 50 (µg/m$^3$) exceeded 2018 WITH | No. of times a year 50 (µg/m$^3$) exceeded 2023 & 2033 WITHOUT | No. of times a year 50 (µg/m$^3$) exceeded 2023 & 2033 WITH |
|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 1 | 1 | 1 | 1 | 1 |
| 2 | 4 Riverview Ringaskiddy | 1 | 1 | 1 | 1 | 1 |
| 3 | Ringaskiddy Main Street 2 | 1 | 1 | 1 | 1 | 1 |
| 4 | Ringaskiddy Footpath | 1 | 1 | 1 | 1 | 1 |
| 5 | Ringaskiddy Main Street 3 | 1 | 1 | 1 | 1 | 1 |
| 6 | Ringaskiddy Main Street 4 | 1 | 1 | 1 | 1 | 1 |
| 7 | Ringaskiddy Main Street 5 | 1 | 1 | 1 | 1 | 1 |
| 8 | Ringaskiddy Main Street 6 | 1 | 1 | 1 | 1 | 1 |
| 9 | Ringaskiddy Main Street 7 | 1 | 1 | 1 | 1 | 1 |
| 10 | Marello Park Ringaskiddy | 1 | 1 | 1 | 1 | 1 |
| 11 | Harbour 1 - Ecological Designation | 1 | 1 | 1 | 1 | 1 |
| 12 | Harbour 2 - Ecological Designation | 1 | 1 | 1 | 1 | 1 |
| 13 | Off Main N28 | 1 | 1 | 1 | 1 | 1 |
| 14 | Layby N28 (Calibration Point) | 1 | 1 | 1 | 1 | 1 |
| 15 | Shanbally Cross 1 | 1 | 1 | 1 | 1 | 1 |
| 16 | Shanbally Cross 2 | 1 | 1 | 1 | 1 | 1 |
| 17 | Shanbally Cross School | 1 | 1 | 1 | 1 | 1 |
| 18 | Shanbally Cross 3 | 1 | 1 | 1 | 1 | 1 |
| 19 | Shanbally Cross 4 | 1 | 1 | 1 | 1 | 1 |
| 20 | Shanbally Cross 5 | 1 | 1 | 1 | 1 | 1 |

Dispersion models are inherently less accurate at predicting the number of exceedences of the 24-hour mean PM10 objective than for the annual mean objective. There are also occasions where current year monitoring data need to be adjusted forwards to a year in the future, taking into account the likely number of 24-hour exceedences of 50 µg/m3.A relationship between the annual mean and the number of 24-hour mean exceedences of has been devised. It is unchanged at the time of writing from that used in the previous guidance and takes the form:

***No. 24-hour mean exceedences = -18.5 + 0.00145 x annual mean3 + (206/annual mean)***

**Table (ix) Model Results – 2012 Base, 2018 Without & With and 2033 Without & With - 8 Hours Rolling CO Matter ($PM_{10}$). {Threshold 10 mg/m$^3$)**

| Ref | Location | CO Maximum daily 8-hour running mean **2012 BASE** | CO Maximum daily 8-hour running mean **2018 WITHOUT** | CO Maximum daily 8-hour running mean **2018 WITH** | CO Maximum daily 8-hour running mean **2023 WITHOUT** | CO Maximum daily 8-hour running mean **2023 WITH** | CO Maximum daily 8-hour running mean **2033 WITHOUT** | CO Maximum daily 8-hour running mean **2033 WITH** |
|---|---|---|---|---|---|---|---|---|
| 1 | Ringaskiddy Main Street | 1.03 | 1.03 | 1.03 | 1.03 | 1.03 | 1.03 | 1.04 |
| 2 | 4 Riverview Ringaskiddy | 1.03 | 1.03 | 1.03 | 1.03 | 1.03 | 1.03 | 1.04 |
| 3 | Ringaskiddy Main Street 2 | 1.04 | 1.03 | 1.04 | 1.03 | 1.04 | 1.03 | 1.05 |
| 4 | Ringaskiddy Footpath | 1.09 | 1.07 | 1.06 | 1.07 | 1.07 | 1.07 | 1.08 |
| 5 | Ringaskiddy Main Street 3 | 1.04 | 1.03 | 1.04 | 1.03 | 1.04 | 1.04 | 1.05 |
| 6 | Ringaskiddy Main Street 4 | 1.04 | 1.03 | 1.04 | 1.04 | 1.04 | 1.04 | 1.05 |
| 7 | Ringaskiddy Main Street 5 | 1.04 | 1.03 | 1.03 | 1.03 | 1.03 | 1.03 | 1.04 |
| 8 | Ringaskiddy Main Street 6 | 1.05 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.05 |
| 9 | Ringaskiddy Main Street 7 | 1.04 | 1.03 | 1.03 | 1.03 | 1.04 | 1.04 | 1.04 |
| 10 | Marello Park Ringaskiddy | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| 11 | Harbour 1 - Ecological Designation | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 12 | Harbour 2 - Ecological Designation | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 13 | Off Main N28 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 |
| 14 | Layby N28 (Calibration Point) | 1.04 | 1.05 | 1.06 | 1.05 | 1.06 | 1.05 | 1.07 |
| 15 | Shanbally Cross 1 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.11 |
| 16 | Shanbally Cross 2 | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 | 1.07 |
| 17 | Shanbally Cross School | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| 18 | Shanbally Cross 3 | 1.10 | 1.11 | 1.11 | 1.11 | 1.11 | 1.11 | 1.12 |
| 19 | Shanbally Cross 4 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.11 | 1.12 |
| 20 | Shanbally Cross 5 | 1.11 | 1.12 | 1.12 | 1.12 | 1.12 | 1.13 | 1.14 |

*All predicted increase are imperceptible and remain well below the CO 8 - hour Rolling Limit Value of 10 mg/m$^3$*

**DMRB SCREENING MODEL - REGIONAL ASSESSMENT ROADS - GREENHOUSE GASES (GHGs)**

**Table (x) Regional Assessment Results**

| Ref | Pollutant | 2012 Baseline | 2018 Without (DM) | 2018 With (DS) | 2023 Without (DM) | 2023 With (DS) | 2033 Without (DM) | 2033 With (DS) |
|---|---|---|---|---|---|---|---|---|
| 1 | Carbon Monoxide (kg/year) | 15,007 | 15,721 | 16,340 | 16,033 | 16,875 | 16,882 | 17,224 |
| 2 | Total Hydrocarbons (kg/year) | 2,099 | 2,188 | 2,269 | 2,237 | 2,348 | 2,359 | 2,425 |
| 3 | Nitrogen Oxides (kg/year) | 9,297 | 7,648 | 7,883 | 7,411 | 7,723 | 7,783 | 7,999 |
| 4 | Particulate Matter (PM10) (kg/year) | 257 | 212 | 219 | 212 | 221 | 225 | 232 |
| 5 | Carbon Dioxide (tonnes/year) | 1,003 | 1,039 | 1,072 | 1,051 | 1,097 | 1,111 | 1,139 |
| | | | | | | | | |

*Showing Results for DMRB Regional Assessment. All percentage changes are below 5% and based on Worst Case Traffic Levels.*

Under the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), Ireland's total emissions are limited to an average of 62.84 million tonnes of $CO_2$ equivalents per annum (13 per cent above the baseline estimate) in the period 2008-2012. The actual situation in relation to compliance with the Kyoto protocol will not be known until after this five year period. However,it can be estimated that after the first four years the level currently sits at a total of 1.9 million tonnes above the target when the impact of the EU Emissions Trading Scheme and Forest Sinks are taken into account. Agriculture is the largest source of emissions, representing 32 per cent of total national emissions in 2011. The energy industries represented 20.8 per cent of total national greenhouse gas emissions in 2011. The transport sector, responsible for 19.6 per cent of total national emissions. The industry and commercial sector is responsible for 14.3 per cent of total national emissions.

The six common greenhouse gases are carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydro fluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6).

## POTENTIAL OPERATIONAL IMPACTS - SHIPPING EMISSIONS (RINGASKIDDY HIGHER GROWTH)

### Table (xi) 2012 Baseline Estimates

| 2012 BASELINE ESTIMATES | | | |
|---|---|---|---|
| **Vessel Type** | **Total NOx per annum (tonnes)** | **Total VOCs per annum (tonnes)** | **Total TSP per annum (tonnes)** |
| Ro-Ro | 980 | 58 | 133 |
| Lo-Lo | 380 | 13 | 30 |
| Bulk Liquid | 400 | 12 | 28 |
| Bulk Solid | 300 | 12 | 28 |
| Break Bulk | 18 | 1 | 3 |
| **Cruise** | 30 | 2 | 3 |
| **Total** | **2108** | **98** | **225** |

**Table (xii) 2033 Operational Estimates**

| 2033 OPERATIONAL ESTMATES (WITH - Do Something) | | | |
|---|---|---|---|
| **Vessel Type** | **Total NOx per annum (tonnes)** | **Total VOCs per annum (tonnes)** | **Total TSP per annum (tonnes)** |
| Ro-Ro | 2640 | 84 | 150 |
| Lo-Lo | 383 | 14 | 31 |
| Bulk Liquid | 416 | 14 | 31 |
| Bulk Solid | 380 | 17 | 38 |
| Break Bulk | 28 | 1 | 2 |
| **Cruise** | 32 | 2 | 3 |
| **Total** | **3879** | **132** | **255** |

Given the existing legal requirements around fuel and emissions for shipping, the extent of emissions are gradually reducing and will continue to reduce in future years. This increase is considered conservative as it does not factor in the Tier III emissions reductions or any other legislation implemented before 2033. This calculation does not incorporate benefits in savings made on road travel and reduction in trips up-river due to the existence of the redeveloped Ringaskiddy Port.

# APPENDIX 6.1 SHORE ANGLING IN CORK HARBOUR

## Appendix 6.1 Shore Angling in Cork Harbour

This information is based on an telephone Interview with Micheal Hennessey IFI (Sea Angling Officer for the South & South West) Feb 8th 2014-02-08. See Figure A1 below for the locations of the marks mentioned in the text.

**Mark Number** (see Map below for positions)

1 Ram Point Strand - Bass with lures (in fact, all out the harbour seaward of this point in the direction of Kinsale is good bass territory.

2 Camden shore- Summer Mackerel, Dabs, occ. ray (maybe Blondes at night) winter, cod, and whiting.

3 Crosshaven – Owenaboy Estuary Mullet mainly, occ bass and flounder

4 Lough Beg Point (point opposite # on the map) Bass & Mullett (May-October)

5 Golden Rock – no good

6 Paddy's Point Bass, Flounder and Thornbacks – Fished from the Ringaskiddy end on the harbour side, where there's a small beach. Fished the last 3 hrs of the ebb and 1st 3 hrs of the flood tides. At this time the fish are active and they are not so spread out and therefore more easily caught. At low tide the fish tend to be concentrated in the centre of the channels and be less active but as the tide rise they start to hunt again and this is the best time to catch them; too close to high tide they are too spread out to be able to get them. (Bass May- October – Harvest ban 15th of May to 15th of June in case pregnant females are taken).

7 No fishing

8 Monkstown Pier Cod, Whiting- Winter, Mackerel- Summer

9 Monkstown Wall Summer: Mackerel, winter: dabs, conger, Cod, whiting (winter = October to February)

10 11 & 12 Conger, 3-bearded rockling (close in by rocks and quays) cod, whiting, dogfish, dab (winter) farther off, mackerel – summer.

13 Small bay east of Cobh (farther east from the Pilot Station which cannot be accessed any more. Mullet, Bass, Flounder (the latter from March to November – they go to sea to spawn in November and the spent females return in March). They are usually left to fatten up till later in the season when they tend to be more targeted. They are sometimes retained for the pan and tend to taste better after being left in the fridge for a day.

14 East Ferry Mouth: Thornback ray, Bass and flounder.

15 Browns Island (North Channel) Mullet (in particular), flounder, small bass and occasional thornback.

Back of Fota: Mullet at high water

Blackrock; Mullet, occ seatrout, flounder

16 East Ferry _ Gold Point : Bass, seatrout occ flounder

17 Lower Aghada: Mullet, bass, flounder, occ seatrout

18 Whitegate Bay: Golden grey mullet, Thick-lipped, Bass, Flounder, gilt-head bream

19 Corkbeg Strand: Dabs, dogfish, ray, occ bass

20 & 21 Carlisle Pier Winter codling, summer dabs, thornback, occ bass.

22 Carlisle Head (SW tip) Bass (lots), Pollack, mackerel in the summer

23 Whitebay: Bass, flounder, plaice, dab, dogfish, rays.

24 Canavan's Point (we called this Weavers Point as kids) Bass, wrasse, Pollack, mackerel

25 Roches Point - Wrasse, conger, bass, Pollack, mackerel

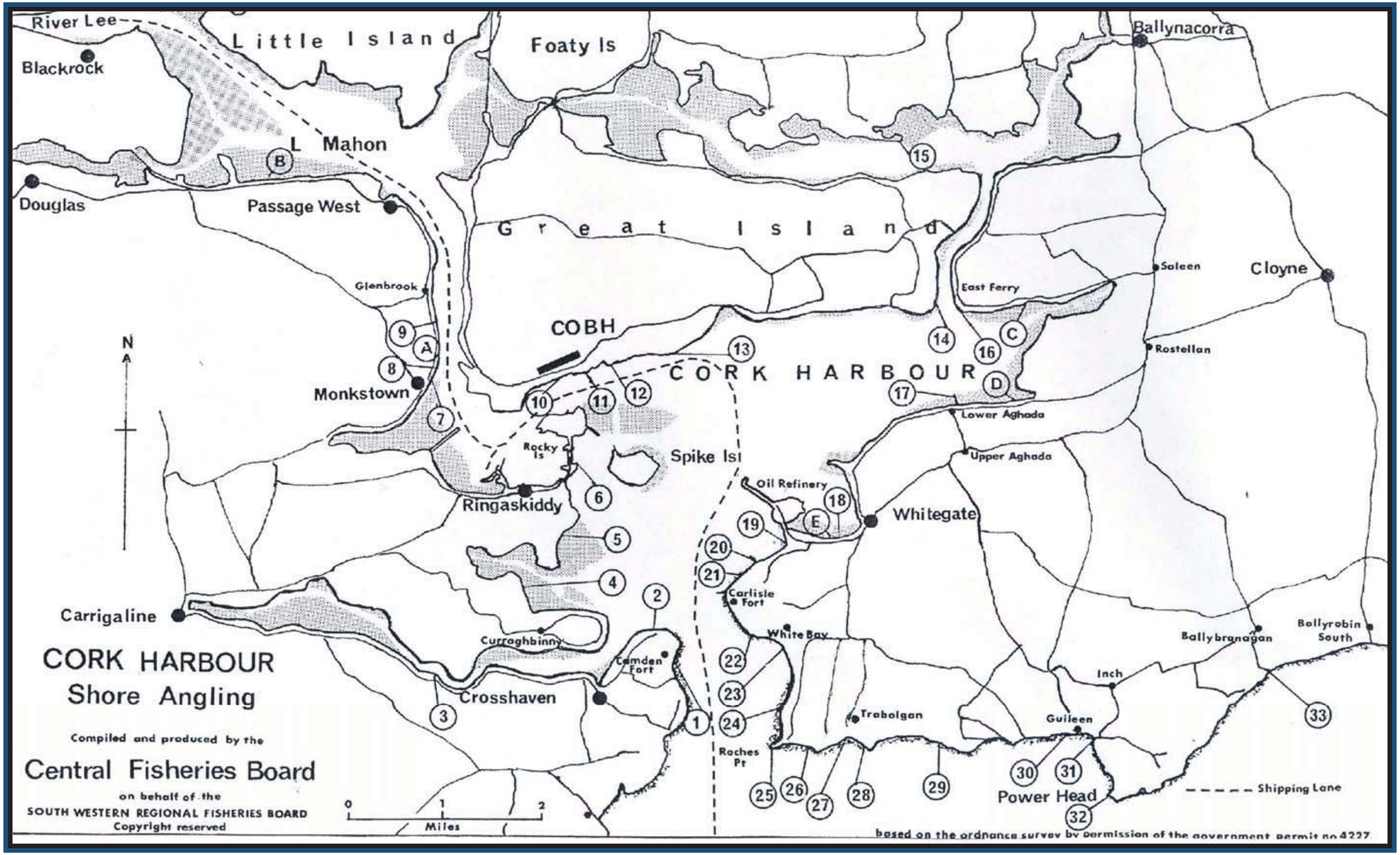



**Figure A1** Map of Cork Harbour showing locations of angling marks referred to in the text (14.2.3.5) Vol I

# APPENDIX 7.1 WATER FRAMEWORK DIRECTIVE ASSESSMENT

# Water Framework Directive Assessment

Port of Cork Redevelopment

12 October 2024

Revision 00

Port of Cork

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# [1] Introduction

The purpose of this Water Framework Directive assessment is to determine if any specific components or activities associated with the Port Redevelopment will compromise WFD objectives or cause a deterioration in the status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status . This assessment will determine the water bodies with the potential to be impacted, describe the proposed mitigation measures and determine if the project is in compliance with the objectives of the WFD.

This WFD Assessment is intended to supplement the EIAR submitted as part of the planning application.

# [2] Water Framework Directive

The Water Framework Directive (WFD) (2000/60/EC) is a substantial piece of water legislation with the main purpose being to establish a framework for the protection and sustainable use of the water environment. The Directive sets Environmental Objectives for all surface waters (rivers, transitional, lakes and coastal waters at the water body scale, the effective unit of management and monitoring defined under the WFD. The Objectives, set out in Article 4 of the Directive, include the prevention of deterioration of Ecological Status within the water body.

Article 4(7) outlines exemptions from these objectives including an exemption for: “Deterioration or failure to achieve good status/potential as a result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or status deterioration of a body of surface water from high status to good status as a result of new sustainable human development activities”. These exemptions would require an Article 4(7) Test to be done (CIS, 2017).

WFD requires regular examination of the biological, chemical and hydromorphological status of all waterbodies in the European Union. Under the WFD, a waterbody must receive high status in biology, chemistry and hydromorphology is it is to be considered a of High Ecological Status. If all other quality elements are at high status, but hydromorphological status is not high, then a waterbody is classified as Good Ecological Status (GES), rather than High.

In heavily modified water bodies the hydromorphological or physical character of the water body cannot be restored sufficiently to support Ecological Status, without impacting on the specified use. As a result, these water bodies are set an alternative environmental objective of ‘*Good Ecological Potential’*, this is the best ecological condition they can achieve allowing for the fact that their hydromorphology has been modified to facilitate the specified use.

However, heavily modified water bodies are still expected to meet the required standards for all the other water quality elements, such as physicochemical conditions, nutrients, specified pollutants and chemicals. Typically, the ecology of a HMWB is altered because the physical habitat has changed significantly. For example, where a significant impoundment is constructed on a river the habitat upstream can be more similar to a lake or a pond. Therefore, the ecology changes in response. Measures are also required to mitigate the impacts on hydromorphology to the greatest extent possible given the specified use.

The objectives of the WFD are:

- To prevent deterioration in the ecological status/potential of the waterbody
- To prevent the introduction of impediments to the attainment of Good WFD status for the waterbody
- To ensure that the attainment of the WFD objectives for the waterbody are not compromised
- To ensure the achievement of the WFD objectives in other waterbodies within the same catchment are not permanently excluded or compromised.

## [3] Scoping Assessment

In the absence of national guidance, the following scoping assessment was informed by UK Environment Agency guidance, Clearing the Waters for All (Environment Agency, 2016). The below sections are taken from this template to record the findings of the WFD Assessment for an activity in coastal water.

| Your activity | Description, notes or more information |
|---|---|
| Applicant name | *Port of Cork* |
| Application reference number (where applicable) | *PA0035* |
| Name of activity | *Port Redevelopment* |
| Brief description of activity | *Ringaskiddy East:*<br><br>*The construction and operation of a container berth, including the dredging of the seabed, installation of a link-span comprising a floating pontoon and access bridge and the installation of container handling cranes.*<br><br>*Ringaskiddy West:*<br><br>*The construction and operation of a deepwater berth extension comprising a filled quay structure facilitated by dredging works for navigational access.*<br><br>*Road Improvements:*<br><br>*Improvements to internal road network at Ringaskiddy East* |
| Location of activity (central point XY coordinates or national grid reference) | *177726, 064637 (50k raster – Tile OS1606)* |
| Footprint of activity (ha) | *>16ha* |
| Timings of activity (including start and finish dates) | *2024-2028* |
| Extent of activity (for example size, scale frequency, expected volumes of output or discharge) | *The following are required as part of the Port of Cork Environmental Management Plan and shall be adhered to with* |

| | |
|---|---|
| | *respect to vessels at berth or travelling through the Port of Cork:*<br>• *Bilge water shall be treated in accordance with Marpol standards.*<br>• *De-ballasting shall be undertaken offshore in accordance with International Maritime Organisation (IMO) guidelines.*<br>• *Vessels shall be equipped with oil-water separation systems in accordance with Marpol requirements.*<br>• *Spills on deck shall be contained and controlled using absorbing materials.*<br>• *Vessels without sewage treatment systems shall have suitable holding tanks and will bring waste onshore for treatment by licensed contractors.*<br>• *Chemicals shall be stored appropriately in suitably bunded areas and with material safety data sheets.* |
| Use or release of chemicals (state which ones) | *N/A* |

| **Water body** | **Description, notes or more information** |
|---|---|
| WFD water body name | *Cork Harbour* |
| Water body ID | *IE_SW_060_0000* |
| River basin district name | *South-Western* |
| Water body type (estuarine or coastal) | *Coastal* |
| Water body total area (ha) | *N/A (source: catchments.ie)* |
| Overall water body status (2016-2021) | *Moderate* |
| Ecological status | *Moderate* |
| Chemical status | *Failing to achieve good* |
| Target water body status and deadline | *Good Ecological Potential* |
| Hydromorphology status of water body | *Moderate* |
| Heavily modified water body and for what use | *Yes, Port* |
| Higher sensitivity habitats present | *mussel beds, including blue and horse mussel* |
| Lower sensitivity habitats present | *intertidal soft sediments like sand and mud* |

| | |
|---|---|
| | *subtidal soft sediments like sand and mud* |
| Phytoplankton status | *Good* |
| History of harmful algae | *N* |
| WFD protected areas within 2km | *Cork Harbour -Coastal*<br>*Lough Mahon - Transitional* |

## [3.1] Specific risk information

The potential risks of the port redevelopment have been considered in relation to each of the following receptors:

- hydromorphology,
- biology (habitats and fish),
- water quality
- protected areas
- invasive non-native species (INNS).

### [3.1.1] Hydromorphology

| Consider if your activity: | Yes | No | Hydromorphology risk issue(s) |
|---|---|---|---|
| Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status | Requires impact assessment | Impact assessment not required | *N/A Waterbody is not high status.* |
| Could significantly impact the hydromorphology of any water body | Requires impact assessment | Impact assessment not required | *N/A Any additional impacts from the port redevelopment would not be significant as it is already a HMWB.* |
| Is in a water body that is heavily modified for the same use as your activity | Requires impact assessment | Impact assessment not required | *Cycle 3 designation review shows land claim, dredging, use of dredging material, FSM, shoreline alteration, fishing/aquaculture as contributors of significant changes to hydromorphology. This will continue with construction of Port Redevelopment.* |

## [3.1.2] Biology

**Habitats**

| Higher sensitivity habitats [2] | Lower sensitivity habitats [3] |
|---|---|
| chalk reef | cobbles, gravel and shingle |
| clam, cockle and oyster beds | intertidal soft sediments like sand and mud |
| intertidal seagrass | rocky shore |
| maerl | subtidal boulder fields |
| mussel beds, including blue and horse mussel | subtidal rocky reef |
| polychaete reef | subtidal soft sediments like sand and mud |
| saltmarsh | |
| subtidal kelp beds | |
| subtidal seagrass | |

[2] *Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.*

[3] *Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.*

| Consider if the footprint[4] of your activity is: | Yes | No | Biology habitats risk issue(s) |
|---|---|---|---|
| $0.5km^2$ or larger | Yes to one or more – requires impact assessment | No to all – impact assessment not required | *N/A* |
| 1% or more of the water body's area | | | *N/A* |
| Within 500m of any higher sensitivity habitat | | | *Dredging will impact upon mussel beds located proximal to ADM Jetty.* |
| 1% or more of any lower sensitivity habitat | | | *N/A* |

[4] *Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.*

**Fish**

| Consider if your activity: | Yes | No | Biology fish risk issue(s) |
|---|---|---|---|
| Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary | Continue with questions | Go to next section | *N/A* |
| Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow) | Requires impact assessment | Impact assessment not required | *N/A* |
| Could cause entrainment or impingement of fish | Requires impact assessment | Impact assessment not required | *N/A* |

## [3.1.3] Water quality

| Consider if your activity: | Yes | No | Water quality risk issue(s) |
|---|---|---|---|
| Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days) | Requires impact assessment | Impact assessment not required | *Water quality is potentially at risk during construction. There are imperceptible risks during operation.* |
| Is in a water body with a phytoplankton status of moderate, poor or bad | Requires impact assessment | Impact assessment not required | *N/A* |
| Is in a water body with a history of harmful algae | Requires impact assessment | Impact assessment not required | *N/A* |

| If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if: | Yes | No | Water quality risk issue(s) |
|---|---|---|---|
| The chemicals are on the Environmental Quality Standards Directive (EQSD) list | Requires impact assessment | Impact assessment not required | *N/A* |
| It disturbs sediment with contaminants above Cefas Action Level 1 | Requires impact assessment | Impact assessment not required | *N/A sediment disturbance will not result in release of contaminants.* |

| If your activity has a mixing zone (like a discharge pipeline or outfall) consider if: | Yes | No | Water quality risk issue(s) |
|---|---|---|---|
| The chemicals released are on the Environmental Quality Standards Directive (EQSD) list | Requires impact assessment[5] | Impact assessment not required | *N/A* |

### [3.1.4] WFD protected areas

WFD protected areas include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

| Consider if your activity is: | Yes | No | Protected areas risk issue(s) |
|---|---|---|---|
| Within 2km of any WFD protected area[6] | Requires impact assessment | Impact assessment not required | Cork Harbour SPA supports water-dependent birds.<br>Lee Estuary is a Nutrient Sensitive Area |

### [3.1.5] Invasive non-native species (INNS)

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

| Consider if your activity could: | Yes | No | INNS risk issue(s) |
|---|---|---|---|
| Introduce or spread INNS | Requires impact assessment | Impact assessment not required | Yes, due to the transient nature of Port activities, there is a risk of introduction/spread of invasive species. |

### [3.1.6] Summary

| Receptor | Potential risk to receptor? | Note the risk issue(s) for impact assessment |
|---|---|---|
| Hydromorphology | Yes | *Cycle 3 designation review shows land claim, dredging, use of dredging material, FSM, shoreline alteration, fishing/aquaculture as contributors of significant changes to hydromorphology. This will continue with construction of Port Redevelopment.* |

| | | |
|---|---|---|
| Biology: habitats | Yes | Dredging activities will disturb lower sensitivity habitats |
| Biology: fish | No | N/A |
| Water quality | Yes | *Water quality is potentially at risk during construction. There are imperceptible risks during operation* |
| Protected areas | Yes | Cork Harbour SPA supports water-dependent birds |
| Invasive non-native species | Yes | Due to the transient nature of Port activities, there is a risk of introduction/spread of invasive species. |

## [4] WFD Assessment

Considering the above summary, each receptor at risk from the Port Redevelopment must be considered. Table 1 below outlines the various receptors at risk, the activities and pathways that have the potential to impact upon the receptor. Mitigation measures that are in place are outlined which will lessen impacts from the activities associated with the Port Redevelopment.

**Table 1 WFD Assessment**

| Receptor | Activity – Construction | Activity – Operation |
|---|---|---|
| | **Ringaskiddy East (Container Berth and Multipurpose Berth)** | |
| **Hydromorphology** | **Dredging**<br>Removal of sediment can have significant impacts on hydromorphology. The use of suction dredging where feasible was a mitigation measure recommended for Cork Harbour during the HMWB designation process. In addition the HMWB designation process recommended the deepening of the channel at Ringaskiddy to minimise bed scouring impacts associated with large vessels. These mitigation measures have been included within the mitigation strategy for the proposed development where feasible. Further mitigation measures are outlined in Chapter 13 of the EIAR.<br><br>**Coastal processes**<br>On the basis of the limited indirect impact (through negligible changes in the coastal process) the need for mitigation in terms of the morphology is not required and the development will not result in a deterioration in the morphological status of the Cork Harbour water body. | **Dredging**<br>Maintenance of port by way of dredging will be required. Removal of sediment can have significant impacts on hydromorphology. The use of suction dredging where feasible was a mitigation measure recommended for Cork Harbour during the HMWB designation process. In addition the HMWB designation process recommended the deepening of the channel at Ringaskiddy to minimise bed scouring impacts associated with large vessels. These mitigation measures have been included within the mitigation strategy for the proposed development where feasible. Further mitigation measures are outlined in Chapter 13 of the EIAR<br><br>**Coastal processes**<br>Design of MPB has been undertaken to ensure disruption to the coastal processes has been minimised.<br><br>The reclamation for the MPB coincides with an already modified section of the coastline where historical land reclamation has already been undertaken and the coastal processes modelling has demonstrated that this will not have a significant impact on the morphological status.<br><br>Container berth 1 was constructed so it does not impinge on the existing deepwater basin navigable space. The linkspsan accommodating RoRo freight will be comprised of a floating pontoon of steel construction which will rise and fall with variations in tidal level.<br><br>0.8 ha of new land will be created and will alter the hydromorphology of the quays. An open-piled structure has been incorporated into the design to minimise hydrodynamic effects. The coastline will be slightly realigned. Construction of Berth 2 is aligned to coincide with the shape of the existing reclaimed land.<br><br>Speed limits will be introduced to reduce wash-induced erosion. |
| **Biology - habitats** | No impacts expected from this activity. | No impacts expected from this activity. |
| **Water Quality** | **Construction spills/leaks**<br>Mitigation to address the construction impact associated with suspended solids (particularly from dredging), oil, fuel, chemicals, concrete, will ensure that the biological and physico-chemical elements will not be impacted by the proposal.<br><br>Mitigation includes the employment of best practice techniques and adherence to Pollution Prevention Guidelines (PPGs), and CIRIA guidance on the control of water pollution on construction sites.<br><br>**Dredging**<br>Dredging disturbance of sediments can result in suspended sediment into the water column. The impacts of this have been found to be temporary. | **Pollution control**<br>Surface water from the main quay and working areas will be collected by a system of drainage channels and gullies. The surface water will be discharged to sea via oil and sludge interceptors to ensure that no pollution is released into the harbour or surrounding waters.<br><br>**Vessel Waste Disposal**<br>Discharges from vessels to the harbour waters will not be permitted.<br><br>**Maintenance activities**<br>Mitigation to address operation impacts from maintenance, oil and chemical use and storage and discharges from vessels are detailed in the EIAR and will ensure no deterioration in status.<br><br>**Dredging**<br>Dredging disturbance of sediments can result in suspended sediment into the water column. The impacts of this have been found to be temporary. |
| **Protected Areas** | **Natura Sites**<br>The protected area objectives for the SPA and the designated shellfish areas in Cork Harbour will remain unaffected by the proposed works. This has been demonstrated through the coastal modelling which concludes that the deposition of sediment from the dredging will be negligible within the SPA and the concentrations of suspended solids will be at background levels in the shellfish areas during construction works. | **Natura Sites**<br>A Natura Impact Statement has been undertaken and outlines the mitigation measures that will be taken to minimise impacts to Cork Harbour SPA.<br><br>The proposed development will not introduce impediments to achieving good ecological potential as the key failing elements of the ecological status are DIN and the SPA unfavourable conservation status. |

| | | |
|---|---|---|
| | A Natura Impact Statement has been undertaken and outlines the mitigation measures that will be taken to minimise impacts to Cork Harbour SPA. | |
| **Invasive Species** | | |
| | **Ringaskiddy West (Deepwater Berth Extension)** | |
| **Hydromorphology** | Mitigation measures employed for Ringaskiddy East will also be followed for this activity. | Mitigation measures employed for Ringaskiddy East will also be followed for this activity. |
| **Biology - habitats** | **Habitat Loss**<br>Dredging will result in the loss of mussel bed habitat proximal to the ADM Jetty, within the boundary proposed for dredging. Mitigation measures are outlined in Chapter 15 of the EIAR. Mitigation measures would include the reseeding of mussel beds to ensure the long-term survival of this habitat. | **Habitat Loss**<br>Maintenance dredging will be ongoing for the operation of this project. This will result in the loss of mussel bed habitat proximal to the ADM Jetty. Mitigation measures are outlined in Chapter 15 of the EIAR. |
| **Water Quality** | Mitigation measures employed for Ringaskiddy East will also be followed for this activity. | Mitigation measures employed for Ringaskiddy East will also be followed for this activity. |
| **Protected Areas** | Mitigation measures employed for Ringaskiddy East will also be followed for this activity. | Mitigation measures employed for Ringaskiddy East will also be followed for this activity. |
| **Invasive Species** | | |
| | **Road Improvements** | |
| **Hydromorphology** | No impacts expected from this activity. | No impacts expected from this activity. |
| **Biology - habitats** | No impacts expected from this activity. | No impacts expected from this activity. |
| **Water Quality** | Mitigation to address the construction impact associated with the construction of the new roads including suspended solids, oil, fuel, chemicals, concrete, as detailed in the EIS will ensure that the biological and physico-chemical elements will not be impacted by the proposal. | Operational road drainage from the new internal roads will be treated through an oil and sediment interceptor prior to discharge to Cork Harbour. This represents an improvement when compared to the existing situation. |
| **Protected Areas** | Mitigation measures employed for Ringaskiddy East will also be followed for this activity. | Mitigation measures employed for Ringaskiddy East will also be followed for this activity. |
| **Invasive Species** | | |

# [5] Conclusion

With the implementation of the outlined mitigation measures, the port redevelopment will not cause a deterioration in status in any waterbody, nor will it prevent it from achieving Good Ecological Potential. There are no cumulative impacts with other schemes and it is compliant with other environmental legislation.

It can be concluded that the Port Redevelopment complies with all requirements of the WFD.

Taking into consideration the impacts of the Port Redevelopment on hydromorphology, biology and water quality elements, it is concluded that following the implementation of design and mitigation measures, it can be concluded that it will not compromise progress towards achieving Good Ecological Potential (GEP) or cause a deterioration of the overall status of Cork Harbour. It also will not compromise the qualifying features of protected areas. It can therefore be concluded that the port redevelopment is fully compliant with WFD and therefore does not require assessment under Article 4.7 of the WFD.

# APPENDIX 7.2 SEDIMENT SAMPLING

IRISH HYDRODATA Ltd.

Document Ref. no. 1456-1/24

# SEDIMENT SAMPLING IN SUPPORT OF DAS LICENCE FOR CAPITAL DREDGING AT RINGASKIDDY

## December 2023

Report Date: January 22nd 2024

Document Ref. No. 1456-1/24

# SEDIMENT SAMPLING IN SUPPORT OF DAS LICENCE FOR CAPITAL DREDGING AT RINGASKIDDY

## December 2023


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# 1 INTRODUCTION

## 1.1 Background

Port of Cork Company (PoCC) have plans to extend the Cork Container Terminal (CCT) and Deep-Water Berth (DWB) at Ringaskiddy. This would require capital dredging to the tune of about 315,000$m^3$ of marine sediment. A Dumping at Sea (DAS) Licence is required from the Environmental Protection Agency to allow the dredge spoil to be dumped at a designated dump site at sea.

The EPA (in conjunction with the Marine Institute (MI)) requires that marine sediment samples be taken and analysed for a range of parameters. The results of the analysis are then used in the determination of the DAS licence conditions.

For this licence application, the EPA recommended that a total of 20no. samples should be taken from within the Ringaskiddy Basin area and analysed according to a MI derived Sampling and Analysis Plan[1] (SAP).

The SAP indicated the proposed sampling locations and the analytical requirements for each sample. It is included in full in Appendix A.

While most of the samples are surface samples and could be acquired using a grab sampler, some are sub-bottom and are acquired using a vibrocorer.

[1] Sampling and Analysis Plan – Port of Cork, Ringaskiddy Capital Dredging – November 2023 – Pre-dredging Analytical Requirements

# 2 SAMPLING AND ANALYSIS PLAN

## 2.1 Proposed sampling locations

The information presented in this section has been extracted from the SAP. 20no. samples are required from 14no. geographical sampling locations as presented in Figure 2-1. The coordinates of the proposed locations are listed in Table 2-1. This table also indicates the depth at which each sample is to be taken. In the table, 'VC' indicates a sample to be taken by the vibrocorer and 'G' indicates a sample to be taken using a grab sampler.

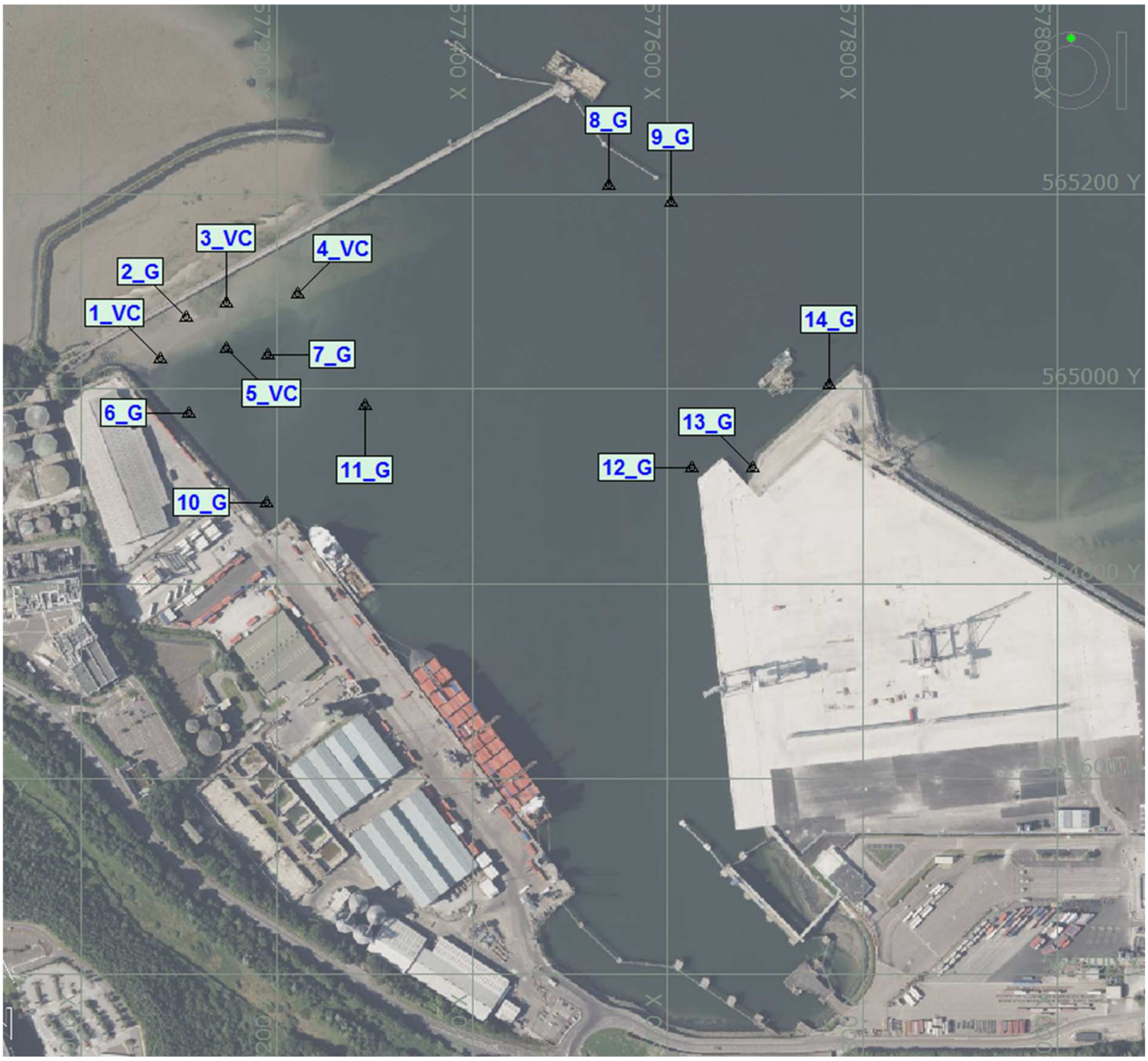


Figure 2-1 Proposed sample locations (from SAP)

### Table 2-1 Proposed sample locations (from SAP)

| Sample No | Name | Depth | Longitude | Latitude | Parameters for analysis |
|---|---|---|---|---|---|
| 1 | 1_VC_a | Surface | -8.33258 | 51.83704 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 2 | 1_VC_b | -4 | -8.33258 | 51.83704 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 3 | 1_VC_c | -8 | -8.33258 | 51.83704 | 1, 2, 3, 4a, 4b, 4c |
| 4 | 2_G | Surface | -8.33220 | 51.83742 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 5 | 3_VC_a | Surface | -8.33160 | 51.83755 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 6 | 3_VC_b | -6 | -8.33160 | 51.83755 | 1, 2, 3, 4a, 4b, 4c |
| 7 | 4_VC_a | Surface | -8.33054 | 51.83764 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 8 | 4_VC_b | -3 | -8.33054 | 51.83764 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 9 | 5_VC_a | Surface | -8.33160 | 51.83713 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 10 | 5_VC_b | -3 | -8.33160 | 51.83713 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 11 | 5_VC_c | -6 | -8.33160 | 51.83713 | 1, 2, 3, 4a, 4b, 4c |
| 12 | 6_G | Surface | -8.33216 | 51.83653 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 13 | 7_G | Surface | -8.33098 | 51.83707 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 14 | 8_G | Surface | -8.32592 | 51.83866 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 15 | 9_G | Surface | -8.32500 | 51.8385 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 16 | 10_G | Surface | -8.33099 | 51.83572 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 17 | 11_G | Surface | -8.32953 | 51.83661 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 18 | 12_G | Surface | -8.32466 | 51.83605 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 19 | 13_G | Surface | -8.32376 | 51.83606 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 20 | 14_G | Surface | -8.32262 | 51.83683 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |

* Positions given in decimal degrees, WGS84

## 2.2 Sample analytical requirements

The parameters for analysis of each sample are listed in Table 2-1 via parameter codes. The codes are described in Table 2-2. Maximum limits of detection for various parameters are listed in Table 2-3.

## Table 2-2 Analysis parameter codes

**2.0 Parameter Code:**

1. Visual inspection, to include colour, texture, odour, presence of animals etc
2. Water content, density (taking into account sample collection and handling)
3. Granulometry including % gravel (> 2mm fraction), % sand (< 2mm fraction) and % mud (< 63µm fraction).
4. The following determinants in the sand-mud (< 2mm) fraction * :
   a) total organic carbon
   b) carbonate
   c) mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
   d) organochlorines HCH and γ-HCH (Lindane), and PCBs (to be reported as the 7 individual CB congeners: 28, 52, 101, 118, 138, 153, 180).
   e) total extractable hydrocarbons.
   f) tributyltin (TBT) and dibutyltin (DBT)
   g) Polycyclic aromatic hydrocarbons (PAH) - Acenaphthene, Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene, Benzo (k) fluoranthene, Chrysene, Dibenz (a,h) anthracene, Flourene, Fluoranthene, Indeno 1,2,3 – cd pyrene, Naphthalene, Phenanthrene, Pyrene.
   h) Toxicity tests (Microtox or whole sediment bioassay) using appropriate representative aquatic species. (This requirement will depend on the results of the chemical analyses.)

**where the gravel fraction (> 2mm) constitutes a significant part of the total sediment, this should be taken into account in the calculation of the concentrations.*

**3.0 Important notes:**

3.1 Details of the methodologies used must be furnished with the results. This should include sampling, sub sampling and analytical methods used for each determinant

3.2 Appropriate marine CRM are to be analysed during each batch of analyses and the results to be reported along with sample results.

3.3 The required detection limits for the various determinants are given in Table 2. below.

Table 2-3 Analysis limits of detection

| Contaminant | Concentration | Units (dry wt) |
|---|---|---|
| Mercury | 0.05 | mg $kg^{-1}$ |
| Arsenic | 1.0 | mg $kg^{-1}$ |
| Cadmium | 0.1 | mg $kg^{-1}$ |
| Copper | 5.0 | mg $kg^{-1}$ |
| Lead | 5.0 | mg $kg^{-1}$ |
| Zinc | 10 | mg $kg^{-1}$ |
| Chromium | 5.0 | mg $kg^{-1}$ |
| Nickel | 15 | mg $kg^{-1}$ |
| Total extractable hydrocarbons | 10.0 | mg $kg^{-1}$ |
| TBT and DBT (not organotin) | 0.01 | mg $kg^{-1}$ |
| PCB – individual congener | 0.1 | µg $kg^{-1}$ |
| OCP – individual compound | 1.0 | µg $kg^{-1}$ |
| PAH – individual compound | 20 | µg $kg^{-1}$ |

## 2.3 Sediment parameter guidance levels

The following table and excerpt are from "*GUIDELINES FOR THE ASSESSMENT OF DREDGE MATERIAL FOR DISPOSAL IN IRISH WATERS (April 2006)*"[2] produced by the Marine Institute.

*The parameters and proposed lower and upper guidance level values to be considered in assessing the suitability of dredged material for disposal at sea are listed in Table 1.2 (*Table 2-4 of this report*). These values are based on a*

[2] GUIDELINES FOR THE ASSESSMENT OF DREDGE MATERIAL FOR DISPOSAL IN IRISH WATERS (April 2006)

*standardised sediment with organic carbon content of 3%, aluminium content of 6.5% and lithium content of 0.2%.*

An addendum to the 2006 guidelines was issued in 2019[3]. Lower action levels for Arsenic and Nickel were revised as per Table 2-5 (Table 3 of Addendum to 2006 Guidelines).

### Table 2-4 Parameters and proposed guidance values for sediment quality

**Table 1.2** Parameters and proposed guidance values for sediment quality guidelines.

| Parameters | Units (dry wt[a]) | Lower level | Upper level[b] |
|---|---|---|---|
| Arsenic | mg kg$^{-1}$ | 9[c] | 70* |
| Cadmium | mg kg$^{-1}$ | 0.7 | 4.2 |
| Chromium | mg kg$^{-1}$ | 120 | 370 |
| Copper | mg kg$^{-1}$ | 40 | 110[d] |
| Lead | mg kg$^{-1}$ | 60 | 218 |
| Mercury | mg kg$^{-1}$ | 0.2 | 0.7 |
| Nickel | mg kg$^{-1}$ | 21 | 60 |
| Zinc | mg kg$^{-1}$ | 160 | 410 |
| | | | |
| Σ TBT & DBT | mg kg$^{-1}$ | 0.1 | 0.5 |
| | | | |
| γ – HCH (Lindane) | µg kg$^{-1}$ | 0.3 | 1 |
| HCB | µg kg$^{-1}$ | 0.3 | 1 |
| | | | |
| PCB (individual congeners of ICES 7) | µg kg$^{-1}$ | 1 | 180 |
| PCB (Σ ICES 7) | µg kg$^{-1}$ | 7 | 1260 |
| | | | |
| PAH (Σ 16) | µg kg$^{-1}$ | 4000 | |
| | | | |
| Total extractable hydrocarbons | g kg$^{-1}$ | 1.0 | |

[a] total sediment <2mm
[b] ERM (rounded up)
[c] ERL (rounded up) – No background Irish data available
[d] PEL as ERM considered high

[3] Addendum to 2006 Guidelines for the Assessment of Dredged material in Irish Waters (Cronin et al.)

### Table 2-5 Amended lower action levels for Arsenic and Nickel from OSPAR Contracting Parties

**Table 3.** Lower action levels for Arsenic and Nickel from OSPAR Contracting Parties

| ***Country*** | **Arsenic (mg $kg^{-1}$)** | **Nickel (mg $kg^{-1}$)** | **Fraction tested** |
|---|---|---|---|
| *Belgium* | 20 | 70 | |
| *Denmark* | 20 | 30 | |
| *Finland* | 15 | 45 | 10% OM, 25% clay |
| *France* | 25 | 37 | |
| *Germany* | 30 | 50 | <20um |
| *Ireland (existing)* | 7 | 21 | <2mm |
| *Ireland (proposed)* | 20 | 40 | <2mm |
| *Netherlands* | 29 | 35 | No correction |
| *Norway* | 80 | 130 | Whole sediment |
| *Spain* | 80 | 100 | <63 um |
| *Sweden* | 10 | 15 | |
| *UK* | 20 | 30 | |

# 3 SURVEY

## 3.1 Survey vessel

The survey was carried out from the Port of Cork Company's Multi Cat '*Denis Murphy*' (Figure 3-1). This vessel is 18.85m in length with a beam of 8.36m. It also has a deck crane and winch.


Figure 3-1 PoC Multi Cat - 'Denis Murphy'

## 3.2 Grab sampler

The grab sampling was carried out using a Day Grab (Figure 3-2). The recovered samples are fully enclosed to reduce disturbance and can obtain up to 15 litres (0.1$m^2$ sample area) of a well-preserved sample in most silts and sandy substrates.

Figure 3-2 Day Grab

## 3.3 Grab Sampling method

The grab was lowered from the deck crane to the seabed and after a sample was taken, raised again using the winch. The grab was then opened on a landing tray and portions of the sample were put in labelled containers for analysis.

The landing tray, grab sampler and the scoops used to pot the samples were all hosed down between samples to avoid cross-contamination.

## 3.4 Vibrocorer

A Geo-Corer 6000 6m vibrocorer was sourced from the Marine Institute. It was delivered to Tivoli docks by truck and loaded to the 'Denis Murphy' by crane on December $8^{th}$ 2023.

The Geo-Corer 6000 is a high frequency (28 Hz), electrically driven vibrocoring system. It can penetrate fast (thereby enhancing the quality of the core) into all common unconsolidated sediments, including compact sands and stiff clays, and even unconsolidated chalk. The configuration is designed to take high quality cores of 6m, in ordinary PVC liners with an internal diameter of 106 mm. Some photos of the vibrocorer on Tivoli docks are shown in Figure 3-3 to Figure 3-6. The specification for the vibrocorer is presented in Appendix B.

Figure 3-3 VC being assembled at Tivoli using a crane

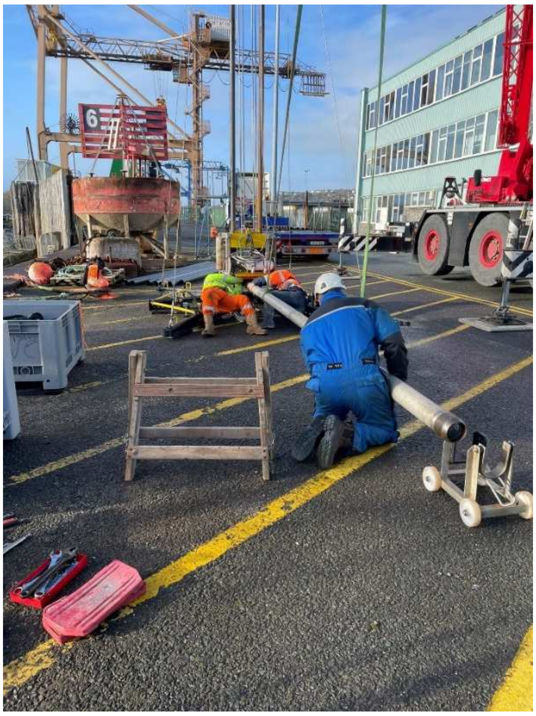

Figure 3-4 6m core casing being attached to VC

Figure 3-5 Core barrel being lifted in place by crane

Figure 3-6 PVC Core liners on quay

## 3.5 Vibrocoring method

The vibrocorer was lowered from the deck crane to the seabed (Figure 3-7) and after a core was taken, it was raised again using the winch. The core liner was pulled from the barrel (Figure 3-8) and cut into 1m lengths, capped at top and bottom, and labelled. The relevant section of core liner for the required sample depth, was then opened on a landing tray and portions of the sample put in labelled containers for analysis.

The landing tray and the scoops used to pot the samples were all hosed down between samples to avoid cross-contamination.

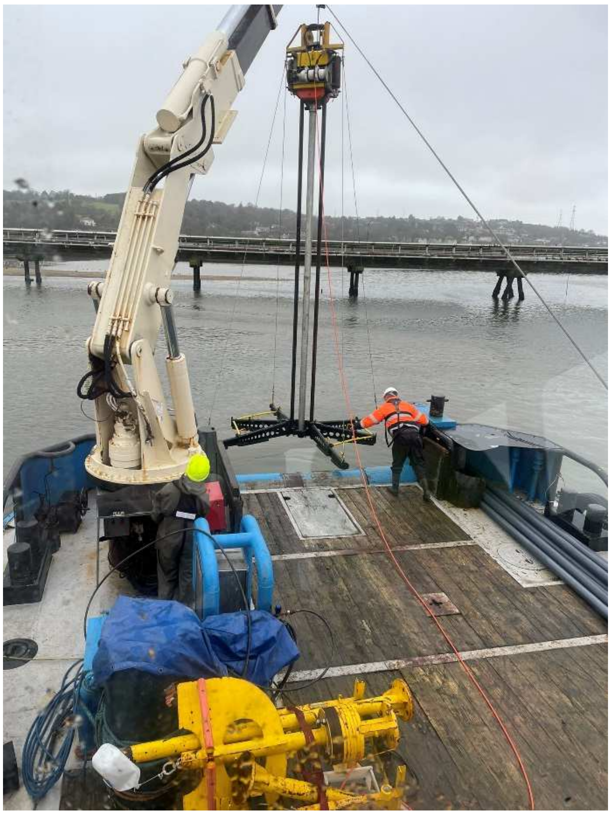

Figure 3-7 VC being lowered to seabed

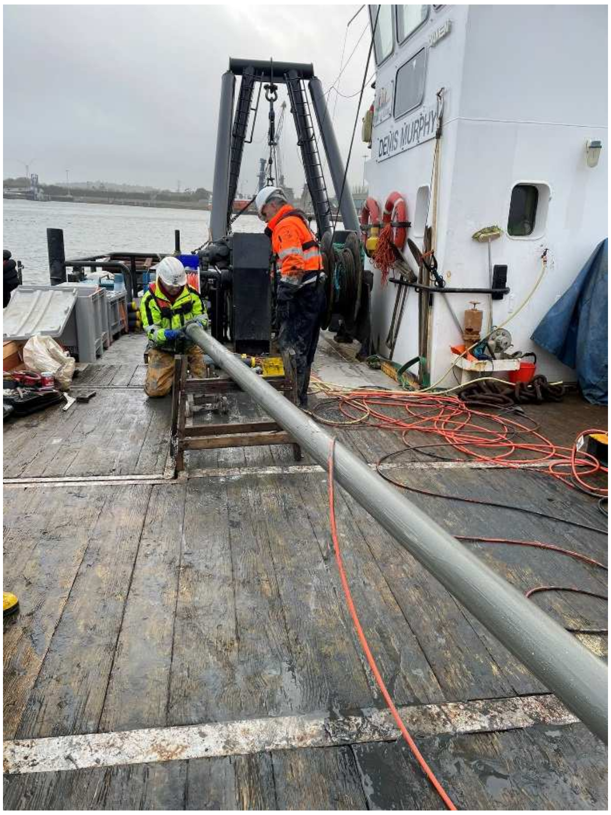

Figure 3-8 Core liner being pulled from core barrel after recovery of core

## 3.6 Sampling dates

The vibrocore samples were taken on Dec. 11th 2023 and the grab samples taken on December 12th 2023. The sample dates are summarised in Table 3-1.

All samples were couriered to SOCOTEC Labs. UK on Dec. 12th and arrived there on December 13th .

Table 3-1 Sample dates

| Sample ID for SOCOTEC | Sample Date | SAP Sample Name | Proposed sample depth (m) | Achieved Sample Depth (m) |
|---|---|---|---|---|
| RB1 | 11-Dec-23 | 1_VC_a | Surface | Surface |
| RB2 | 11-Dec-23 | 1_VC_b | -4 | -4 |
| RB3 | 11-Dec-23 | 1_VC_c | **-8** | **-6** |
| RB4 | 12-Dec-23 | 2_G | Surface | Surface |
| RB5 | 11-Dec-23 | 3_VC_a | Surface | Surface |
| RB6 | 11-Dec-23 | 3_VC_b | -6 | -6 |
| RB7 | 11-Dec-23 | 4_VC_a | Surface | Surface |
| RB8 | 11-Dec-23 | 4_VC_b | -3 | -3 |
| RB9 | 11-Dec-23 | 5_VC_a | Surface | Surface |
| RB10 | 11-Dec-23 | 5_VC_b | -3 | -3 |
| RB11 | 11-Dec-23 | 5_VC_c | -6 | -6 |
| RB12 | 12-Dec-23 | 6_G | Surface | Surface |
| RB13 | 12-Dec-23 | 7_G | Surface | Surface |
| RB14 | 12-Dec-23 | 8_G | Surface | Surface |
| RB15 | 12-Dec-23 | 9_G | Surface | Surface |
| RB16 | 12-Dec-23 | 10_G | Surface | Surface |
| RB17 | 12-Dec-23 | 11_G | Surface | Surface |
| RB18 | 12-Dec-23 | 12_G | Surface | Surface |
| RB19 | 12-Dec-23 | 13_G | Surface | Surface |
| RB20 | 12-Dec-23 | 14_G | Surface | Surface |

## 3.7 Sampling considerations

For a variety of reasons, it was not always possible to acquire every sample at its proposed location. Lack of water depth was a factor on occasion, as was the presence of vessels at berth at the precise proposed location. Some of the original samples returned small amounts of hard material or shell, preventing the grab jaws from closing. Samples '*13-G*' and '*14-G*' were originally located on a rock embankment. A decision was therefore made to move nearby where better samples could be obtained.

The proposed sample depth at location *'1_VC_c'* was -8m. However, it was not possible to source a vibrocorer of that length. The only available one in the country was the Marine Institute's, which is 6m in length.

The final achieved sample locations are shown in Figure 3-9 and the co-ordinates are listed in Table 3-2.

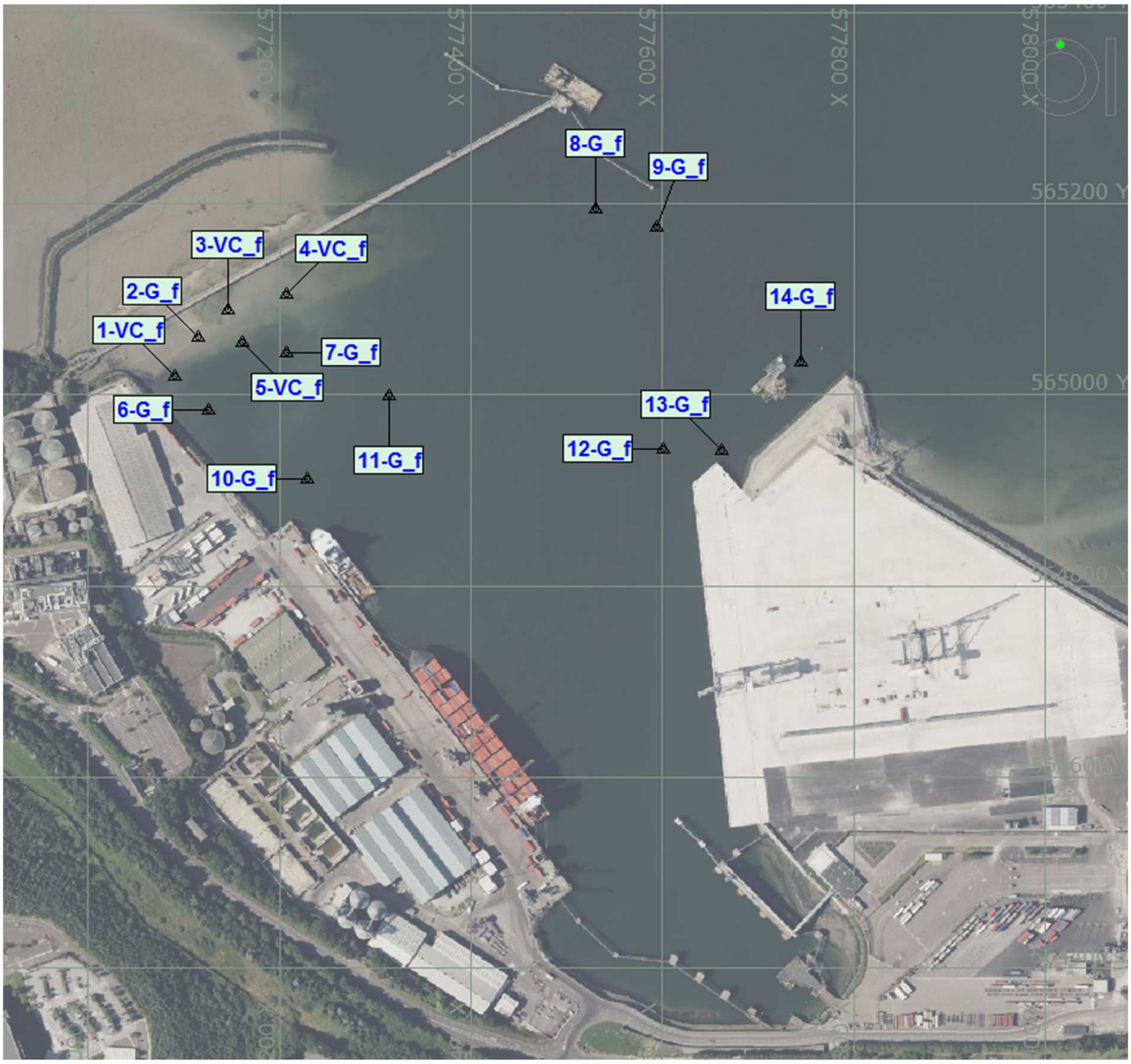


Figure 3-9 Final achieved sample locations

Table 3-2 Final achieved sampling locations and depths

| Sample ID for SOCOTEC | SAP Sample Name | Depth (m) | Longitude (WGS84) | Latitude (WGS84) | IRENET95-East | IRENET95-North |
|---|---|---|---|---|---|---|
| RB1 | 1_VC_a | surface | -8.33244 | 51.83693 | 577090.34 | 565019.49 |
| RB2 | 1_VC_b | -4 | -8.33244 | 51.83693 | 577090.34 | 565019.49 |
| RB3 | 1_VC_c | -6 | -8.33244 | 51.83693 | 577090.34 | 565019.49 |
| RB4 | 2_G | surface | -8.33208 | 51.83730 | 577114.88 | 565060.31 |
| RB5 | 3_VC_a | surface | -8.33164 | 51.83755 | 577145.70 | 565088.10 |
| RB6 | 3_VC_b | -6 | -8.33164 | 51.83755 | 577145.70 | 565088.10 |
| RB7 | 4_VC_a | surface | -8.33075 | 51.83771 | 577206.83 | 565105.47 |
| RB8 | 4_VC_b | -3 | -8.33075 | 51.83771 | 577206.83 | 565105.47 |
| RB9 | 5_VC_a | surface | -8.33141 | 51.83725 | 577160.89 | 565054.60 |
| RB10 | 5_VC_b | -3 | -8.33141 | 51.83725 | 577160.89 | 565054.60 |
| RB11 | 5_VC_c | -6 | -8.33141 | 51.83725 | 577160.89 | 565054.60 |
| RB12 | 6_G | surface | -8.33193 | 51.83662 | 577125.31 | 564984.15 |
| RB13 | 7_G | surface | -8.33075 | 51.83716 | 577206.47 | 565043.99 |
| RB14 | 8_G | surface | -8.32607 | 51.83852 | 577529.67 | 565194.48 |
| RB15 | 9_G | surface | -8.32514 | 51.83836 | 577593.96 | 565175.78 |
| RB16 | 10_G | surface | -8.33041 | 51.83597 | 577229.20 | 564912.13 |
| RB17 | 11_G | surface | -8.32919 | 51.83676 | 577313.71 | 564999.51 |
| RB18 | 12_G | surface | -8.32502 | 51.83627 | 577601.00 | 564943.66 |
| RB19 | 13_G | surface | -8.32414 | 51.83626 | 577661.57 | 564941.55 |
| RB20 | 14_G | surface | -8.32294 | 51.83710 | 577744.78 | 565034.77 |

## 3.8 Core descriptions

After the samples had been potted and despatched to SOCOTEC labs. in the UK, the vibrocores were stored on land for a number of days before they were cut open to get a visual representation of the sediment profile. Photographs of the cores are shown in Figure 3-10 to Figure 3-13 with description provided in Table 3-3.

VC-1 revealed very shelly material throughout with significant organic content in the deeper 5-6m section. VC-3 and VC-4 were similar with a soft brown grey Mud and occasional shell throughout. VC-5 showed very soft black mud to 4.85m from where the lower underlying layer was similar in composition to that observed in VC-3 and VC-4.

### Table 3-3 Core descriptions

| Core Depth (m) | VC-1 | VC-3 | VC-4 | VC-5 |
|---|---|---|---|---|
| 0-1 | Soft black Mud | Soft light brown/grey Mud with occasional shell fragments 0.25 to 0.5 | Soft light brown/grey Mud with occ. whole shell layer 0.8 to 0.9 | Very soft black Mud |
| 1-2 | Soft black/grey Mud<br>Whole shell layer 1.15 to 1.20 & 1.45 to 1.5m | Soft light brown/grey Mud with occasional shell fragments 1.25 to 1.45 | Soft light brown/grey Mud with occ whole shell layer 1.15 to 1.2 | Very soft black Mud |
| 2-3 | Soft black/grey Mud<br>Whole shell layer 2.05 to 2.15<br>Soft black Mud with broken shell 2.6 to 3.0 | Soft light brown/grey Mud with occasional shell fragments<br>Whole shell layer 3.9 to 4.0 | Soft light brown/grey Mud | Very soft black Mud |
| 3-4 | Soft black Mud with broken shell 3.0 to 3.1<br>Soft black Mud occasional whole and broken shell layer 3.1 to 3.9<br>Soft black Mud 3.9 to 4.0 | Soft light brown/grey Mud whole shell layer 3.3 to 3.45 | Soft light brown/grey Mud | Very soft black Mud |
| 4-5 | Soft light brown/grey Mud 4.0 to 4.2<br>Soft light brown Mud with freq. whole broken shell 4.2 to 5.0 | Soft light brown/grey Mud with occ. shell fragments 4.8 to 4.9 | Soft light brown/grey Mud with whole shell layer 4.15 to 4.2 and occ. shell fragments 4.2 to 5.0 | Very soft black Mud to 4.85m<br>Soft light brown/grey mud with occ. shell |
| 5-6 | Soft black Mud with freq. broken shell 5.0 to 5.35<br>5.35 to 6.0 soft light brown Mud with organic seaweed material and shell and stone layer 5.7 to 5.75 | Soft light brown/grey Mud with occ. shell fragments 5.5 to 5.6 and 5.85 to 5.95 | Soft light brown/grey Mud<br>5.8 to 6.0 with occasional shell fragments | Soft light brown/grey Mud with occasional shell fragments |

Figure 3-10 Core (VC-1)

Figure 3-11 Core (VC-3)

Figure 3-12 Core (VC-4)

Figure 3-13 Core (VC-5)

# 4 RESULTS OF ANALYSIS

## 4.1 Testing Laboratory

The samples were analysed in SOCOTEC Labs. UK. SOCOTEC has established a long-standing reputation for technical expertise in marine sediment testing. The company's robust extraction and analytical procedures have been developed specifically for complex marine samples.

The SOCOTEC Marine Sediment analytical services are approved by all UK and Ireland regulators for dredging disposal applications, with all results conforming to Marine Management Organisation (MMO), Marine Scotland, Natural Resource Wales (NRW), Department of Agriculture, Environment and Rural Affairs (DAERA - Northern Ireland) and Marine Institute (Republic of Ireland Regulations).

## 4.2 Analysis reporting requirements

The analysis reporting requirements as outlined in the SAP are listed in Table 4-1.

### Table 4-1 Analysis reporting requirements

**4.0 Reporting requirements**

Reports should include the following information

4.1 Results of testing should be reported in EPA spreadsheet format, which can be found here.

4.2 Spreadsheet results to include:

- 4.2.1 Tabulated geophysical/chemical test results
- 4.2.2 Clear expression of units
- 4.2.3 Indication of wet weight or dry weight basis
- 4.2.4 Location of samples in decimal degrees WGS84 (latitude/longitude).
- 4.2.5 Date of sampling
- 4.2.6 Treatment of samples and indication of sub sampling, compositing etc.
- 4.2.7 Summary method details
- 4.2.8 CRM results
- 4.2.9 QA /QC
- 4.2.10 Other quality assurance information (e.g. accreditation status)
- 4.2.11 Project details.

4.3 If determinant is not detected, report less than values, and indicate LoD/ LoQ used.

4.4 Testing laboratories may be asked to provide additional details of method performance including limit of detection, precision, bias.

## 4.3 Analysis results

The results of the analysis were received from SOCOTEC on 18th January 2024. The results were provided in the Excel spreadsheet format required by the EPA as well as in SOCOTEC's own test report format.

The results as received from SOCOTEC in the EPA required format accompany this report as an external Excel file.

The results in the lab's own test report format are presented in Appendix C.

# 5 CONCLUSION

20no. samples of marine sediment were taken from Ringaskiddy in Cork Harbour in December 2023 using a combination of grab sampler and 6m vibrocorer, in support of a Dumping at Sea licence application for capital dredging.

The samples were analysed to EPA requirements by SOCOTEC Lab. UK.

The results were provided by SOCOTEC in the format specified by EPA.

# 6 APPENDIX A - SAMPLING AND ANALYSIS PLAN

Rinville
Oranmore
Co Galway
Tel: 091 387200

Tadgh O Keeffe
Port of Cork Company
Tivoli Dock & Industrial Estate,
Tivoli,
Cork.

27 November, 2023

Re: Sampling and Analysis Plan – Port of Cork, Ringaskiddy Capital Dredging

Dear Tadgh,

A sampling and analysis plan is detailed below for capital dredging of 315,000 $m^3$ of sediment at Ringaskiddy. Twenty samples are recommended, including some at depth from the shallower areas, where possible.

Your selected analysing laboratory must be able to meet the quality requirements for this project. You should give your contractor a copy of this plan. You will need to draw their attention especially to Section 3 and Section 4 to confirm that they are capable of meeting the quality assurance standards.

Results of testing should be reported in EPA spreadsheet format, which can be found here.

If you need clarification on anything, please don't hesitate to contact me.

Best regards,

MCronin

____________________

Margot Cronin
Marine Environment Chemist

## 1.0 Sample location and analyses required:

Twenty nine surface samples should be taken for chemical analysis, as detailed in Table 1 (below)[1]. Sample locations are mapped in Figures 1a, 1b, 1c at the end of this document.

**Table 1**. Locations and details of proposed samples

| Sample No | Name | Depth | Longitude | Latitude | Parameters for analysis |
|---|---|---|---|---|---|
| 1 | 1_VC_a | Surface | -8.33258 | 51.83704 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 2 | 1_VC_b | -4 | -8.33258 | 51.83704 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 3 | 1_VC_c | -8 | -8.33258 | 51.83704 | 1, 2, 3, 4a, 4b, 4c |
| 4 | 2_G | Surface | -8.33220 | 51.83742 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 5 | 3_VC_a | Surface | -8.33160 | 51.83755 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 6 | 3_VC_b | -6 | -8.33160 | 51.83755 | 1, 2, 3, 4a, 4b, 4c |
| 7 | 4_VC_a | Surface | -8.33054 | 51.83764 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 8 | 4_VC_b | -3 | -8.33054 | 51.83764 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 9 | 5_VC_a | Surface | -8.33160 | 51.83713 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 10 | 5_VC_b | -3 | -8.33160 | 51.83713 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 11 | 5_VC_c | -6 | -8.33160 | 51.83713 | 1, 2, 3, 4a, 4b, 4c |
| 12 | 6_G | Surface | -8.33216 | 51.83653 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 13 | 7_G | Surface | -8.33098 | 51.83707 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 14 | 8_G | Surface | -8.32592 | 51.83866 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 15 | 9_G | Surface | -8.32500 | 51.8385 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 16 | 10_G | Surface | -8.33099 | 51.83572 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 17 | 11_G | Surface | -8.32953 | 51.83661 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 18 | 12_G | Surface | -8.32466 | 51.83605 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 19 | 13_G | Surface | -8.32376 | 51.83606 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |
| 20 | 14_G | Surface | -8.32262 | 51.83683 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g |

* Positions given in decimal degrees, WGS84

[1] Further sampling and analysis, at depth if necessary, may be required in the event that problem areas of heavy contamination are identified as a result of the initial testing.

## 2.0 Parameter Code:

1. Visual inspection, to include colour, texture, odour, presence of animals etc
2. Water content, density (taking into account sample collection and handling)
3. Granulometry including % gravel (> 2mm fraction), % sand (< 2mm fraction) and % mud (< 63µm fraction).
4. The following determinants in the sand-mud (< 2mm) fraction * :
   a) total organic carbon
   b) carbonate
   c) mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
   d) organochlorines HCH and γ-HCH (Lindane), and PCBs (to be reported as the 7 individual CB congeners: 28, 52, 101, 118, 138, 153, 180).
   e) total extractable hydrocarbons.
   f) tributyltin (TBT) and dibutyltin (DBT)
   g) Polycyclic aromatic hydrocarbons (PAH) - Acenaphthene, Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene, Benzo (k) fluoranthene, Chrysene, Dibenz (a,h) anthracene, Flourene, Fluoranthene, Indeno 1,2,3 – cd pyrene, Naphthalene, Phenanthrene, Pyrene.
   h) Toxicity tests (Microtox or whole sediment bioassay) using appropriate representative aquatic species. (This requirement will depend on the results of the chemical analyses.)

**where the gravel fraction (> 2mm) constitutes a significant part of the total sediment, this should be taken into account in the calculation of the concentrations.*

## 3.0 Important notes:

3.1 Details of the methodologies used must be furnished with the results. This should include sampling, sub sampling and analytical methods used for each determinant

3.2 Appropriate marine CRM are to be analysed during each batch of analyses and the results to be reported along with sample results.

3.3 The required detection limits for the various determinants are given in Table 2. below.

**Table 2**. Maximum limits of detection required

| Contaminant | Concentration | Units (dry wt) |
|---|---|---|
| Mercury | 0.05 | mg $kg^{-1}$ |
| Arsenic | 1.0 | mg $kg^{-1}$ |
| Cadmium | 0.1 | mg $kg^{-1}$ |
| Copper | 5.0 | mg $kg^{-1}$ |
| Lead | 5.0 | mg $kg^{-1}$ |

| | | |
|---|---|---|
| Zinc | 10 | mg $kg^{-1}$ |
| Chromium | 5.0 | mg $kg^{-1}$ |
| Nickel | 15 | mg $kg^{-1}$ |
| | | |
| Total extractable hydrocarbons | 10.0 | mg $kg^{-1}$ |
| TBT and DBT (not organotin) | 0.01 | mg $kg^{-1}$ |
| | | |
| PCB – individual congener | 0.1 | μg $kg^{-1}$ |
| OCP – individual compound | 1.0 | μg $kg^{-1}$ |
| | | |
| PAH – individual compound | 20 | μg $kg^{-1}$ |

## 4.0 Reporting requirements

Reports should include the following information

4.1 Results of testing should be reported in EPA spreadsheet format, which can be found here.

4.2 Spreadsheet results to include:

- 4.2.1 Tabulated geophysical/chemical test results
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- 4.2.10 Other quality assurance information (e.g. accreditation status)
- 4.2.11 Project details.

4.3 If determinant is not detected, report less than values, and indicate LoD/ LoQ used.

4.4 Testing laboratories may be asked to provide additional details of method performance including limit of detection, precision, bias.


**Figure 1a**: Sampling stations, Ringaskiddy Capital Dredging. Co-ordinates given in Table 1.

# 7 APPENDIX B– VIBROCORER SPECIFICATION SHEET

# Geo-Vibro Corer 3000 + 6000

## High Frequency Vibro Coring System

## Operational Features

- Proven performance & high quality cores
- 30 kN impulse at 30 Hz for fast penetration
- Reliable, lightweight & cost effective
- Modular construction (cores of 3 m or 6 m)
- Pivoting core barrel for horizontal retrieval
- Water injection for deep cores of 12 m and applications onshore & in transition zone
- Optional pre-pressured or compensated model for deep water operation

## Applications

- Geotechnical surveys
- Stratigraphic studies
- Geological mapping
- Mineral exploration
- Environmental surveys
- Pollution investigations

### High Frequency Vibration

The Geo-Corer 3000 + 6000 is a high frequency (28 Hz), electrically driven vibrocoring system. It can penetrate fast (thereby enhancing the quality of the core) into all common unconsolidated sediments, including compact sands and stiff clays, and even unconsolidated chalk.

### Variable Coring Parameters

The two standard configurations are designed to take high quality cores of 6 m or 3 m length, in ordinary PVC liners with an internal diameter of 106 mm.
The penetration force can be adjusted by varying the deadweights on the vibrator head.

### Proven Performance

The Geo-Corer 3000 + 6000 has a proven performance over many years, even in extreme conditions. The very fast penetration rate results in high quality cores with a minimum of sediment disturbance.

### Lightweight Structure & Small Vessel Operation

This modular system can be assembled manually in two hours (a crane is required to bring it upright) and can be deployed from a relatively small vessel. Because of its lightweight construction and smart pull-out system, it requires a limited hoisting power of five tonnes maximum. Also, its low overall weight minimizes transportation costs.

### Pivoting Core Barrel Head

The pivoting head allows rapid change-out of the core barrel and easy retrieval of the core liner, while the vibrocorer remains in the upright position.

### Deep Water Operation

The Geo-Corer, new models built after 2010, is rated to a maximum water depth of 300 m. It can be upgraded to the pressure-compensated version for operation in water depths down to 600 m and more.... The new deep sea version for oceanic depths is expected in 2012

# Geo-Vibro Corer 3000 + 6000

## Technical Specifications

| | |
|---|---|
| Type | Geo-Corer 3000 + 6000 |
| Manufacturer | Geo Marine Survey Systems |
| Maximum weight in air<br>Maximum weight in water | 1000-1200 kg, depending on ballast weights<br>850-1050 kg, depending on ballast weights |
| Fully containerized system (optional) | The system is designed to fit into a standard 20-foot container. The same container is used for the storage of barrels / liners during operation offshore. |
| Total height | 7.4 m (6 m core barrel)<br>4.5 m (3 m core barrel) |
| Footprint base frame | Diameter 4.7 m (6 m core barrel)<br>Diameter 3.2 m (3 m core barrel) |
| Corrosion protection / maintenance | All structural steel parts are hot-dip galvanised |
| Vibro motor<br>Vibrating frequency<br>Vibration swing force<br>Dead weights on vibrator head | Electrically driven double vibrator (5.5 kVA)<br>28 Hz<br>30 kN<br>Adjustable, from 100 kg to 300 kg |
| Electric power | 380 /440 V AC, 3 Phase, 50 / 60Hz<br>Running power 2 A to 6 A, depending on soil type.<br>Minimum Generator Power: 7.5 kVA |
| Electric power umbilical | Standard 250 m, Kevlar-reinforced, polyurethane insulated on reel, Optional 100 m version for shallow water, hand deployed |
| Hand operated cable reel | Overall diameter 0.9 m, width 0.5 m, mounted on steel A-frame (hot-dip galvanized), with four wheels for easy maneuverability on deck. |
| Electric constant tension cable reel | Option, Special constant tension winch with 750 m umbilical for deep water operations |
| Electrical control unit | Rugged HMPE housing, protecting a watertight suspended electric power control unit that contains ampere meter, fuses, start and stop buttons, and green (ON) and red (OFF) LEDs.<br>Automatic end switch when fully penetrated. |
| ROP measurement | Acoustic Height Transducer with digital output via USB on control unit |
| Core barrel and accessories | ID / OD: 113 mm / 121 mm (stainless steel 316)<br>Length: 6 m or 3 m<br>Core catcher ( stainless steel 316)<br>Cutting shoe (carbon steel)<br>Special anti-return valve<br>Pivoting core barrel head |
| Core liner | ID / OD: 106 mm / 110 mm, PVC or transparent PVC<br>length: 5.9 m (6 m barrel), 3.0 m (3 m barrel) |
| Operational depth | 300 m for Geo-Corer built after 2010<br>600 m for the pressure-compensated version, using two 5 liter / 200 bar compressed air bottles |
| Hoisting requirements | Minimum 5 t crane or A-frame<br>14 mm anti-twist steel cable, type 35 x 7<br>(N.B. The provision of a hoisting cable is optional) |
| Required height below A-frame | 8.5 m minimum (6 m core barrel)<br>5.5 m minimum (3 m core barrel) |
| Required deck space | Minimum 12 m length for placing the core barrel into horizontal position to extract the core liner |

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Sheffieldstraat 8
3047 AP Rotterdam
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info@geomarinesurveysystems.com
Website: www.geo-spark.com

# Geo-Vibro Corer 3000 + 6000

## Working Principle (& Pressure Compensation)

### Working Principle & Functionality

(The system main parts and their identifying numbers are given in the diagram overleaf.)

- The main structure of the vibrocorer consists of the 'spider' base frame (2), which can be folded together for transportation; the two guiding poles (5); the sliding frame (11) with the vibromotor (12); and up to six deadweights (13) that allow the adjustment of the downward penetration force. A high density polyethylene block (4), in the base frame, guides the core barrel during penetration.
- The standard length of the guiding poles for 3 m coring is 4.5 m; for 6 m coring, a shorter pole of 2.9 m is added to the standard pole. (N.B. The maximum pole length of 4.5 m fits easily into a 20-foot container.) Both guiding poles are connected at their top to a rigging head (15), which is kept in place by four stainless steel stays (6) secured to the spider base frame.
- The vibromotor is driven by a 5.5 kVA / 3-phase AC motor located in the centre of its housing, and is powered from the vessel via the underwater power umbilical (17). Two gearboxes, with gearwheels of eccentric weights, are mounted at the sides of the housing. The vertical vibration force is created by the centrifugal force of the rotating eccentric weights; the horizontal components of the centrifugal force cancel each other out, but the vertical components reinforce each other. The resulting up/down motion (a sinusoidal motion of 28 Hz) of the vibromotor is transmitted by two springs (14) to the sliding frame and deadweights, thereby providing the downward penetrative force.
- The core barrel (7) is made of stainless steel 316, and contains a PVC liner of 106 mm inner diameter and wall thickness of 2 mm. The core barrel is connected to the barrel pivot (10) by two locking bolts - this pivotal connection allows the core barrel to be positioned horizontally for extracting the core liner.
- The core barrel is provided with a carbon steel cutting shoe (3), which fixes the core catcher and core liner in position. The liner and its core sample can be easily extracted after unscrewing the cutting head. Liner caps are used to close the liner sections.
- The combined effect of the vibration motion and the non-return valve (9) at the top of the core barrel produce an under-pressure directly above the core sample. This is the 'suction effect'.
- Once the barrel has penetrated the seabed, this closing of the upper part of the core barrel helps to prevent the core sample from moving backwards during the pull-out from the seabed.
- Thanks to the unique internal core extraction system, the available force for pulling the core barrel out of the seabed is four times the hoisting force. This is achieved by passing the steel hoisting cable through two sheaves in the sliding frame and one sheave in the rigging head - resulting in a fourfold increase of the hoisting force available for extraction.
- For example, a three-tonne total hoisting force gives a two-tonne net hoisting force, (after correction for the system's own weight), which would increase fourfold to an eight-tonne extraction force. This increased force also means that the system is much less sensitive to bending of the core barrel during extraction - the main extraction force is always applied vertically, even if the vessel is not directly above the corer.
- A galvanised anti-twist steel hoisting cable diameter 14 mm (16) is used to deploy and recover the vibrocorer from the vessel, using a suitable crane or an A-frame plus winch, depending on available means, water depth, etc.
- The electric motor of the vibrator unit is operated (switched on/off) from the surface via the power cable and the control unit. The performance of the vibrator can be monitored via the ampere meter on the control unit.

### Pressure Compensation for Deep Water Operation

- Pressure compensation for the vibromotor housing becomes necessary at water depths greater than 300 m - the pressure within the housing must be able to withstand the pressure from the surrounding water column.
- Two standard 5 liter diving bottles are installed on the sliding frame; each bottle is connected to the vibromotor housing via a high pressure hose and pressure-compensated valve. As the vibrocorer is lowered through the water column, the valve opens in response to the increase in the ambient water pressure, allowing the air from the diving bottles to flow into the vibromotor housing and equalise the interior/exterior pressures.
- When the vibrocorer is recovered to the surface, the high pressure air inside the vibromotor housing is released through an over-pressure bleed valve.

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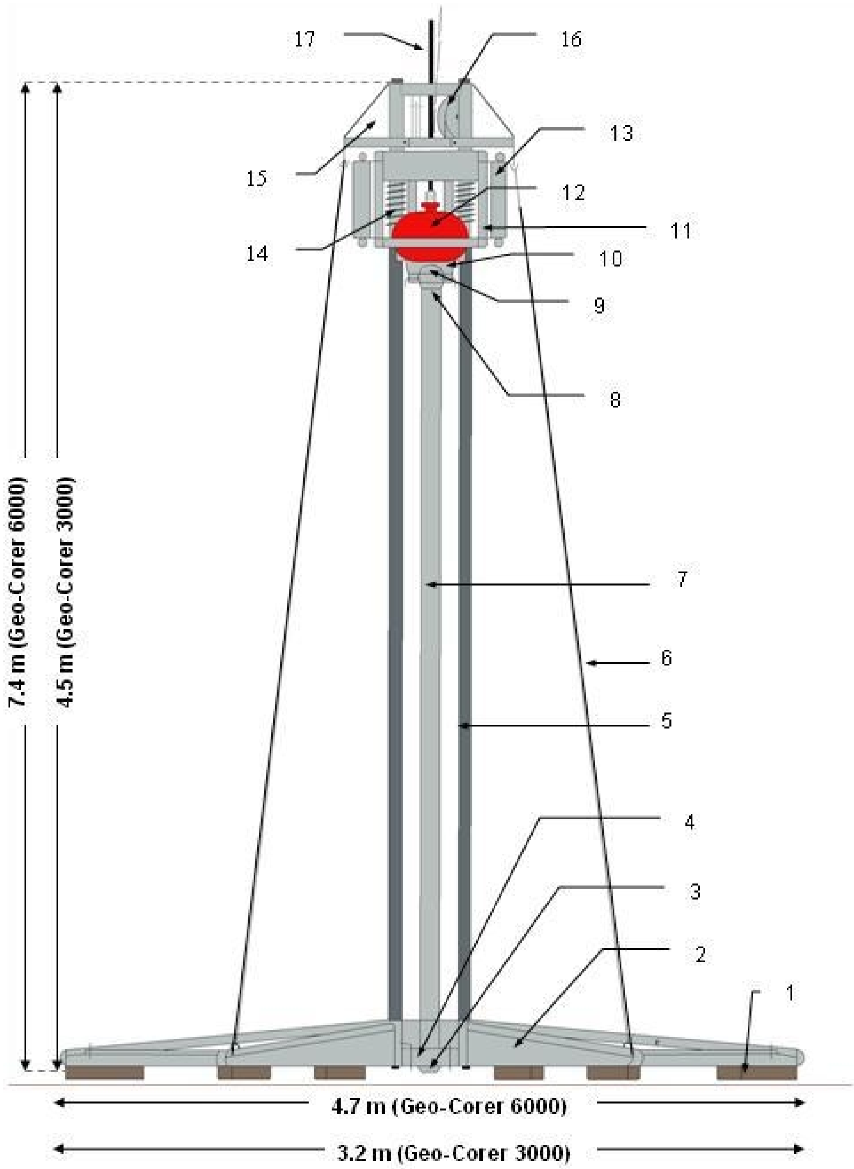
# Geo-Vibro Corer 3000 + 6000

## Main Parts




| No. | Item | Material |
|---|---|---|
| 1 | protective anti-slip blocks | high quality waterproof plywood |
| 2 | spider base frame | carbon steel, hot-dip galvanised (can be folded) |
| 3 | core barrel cutting shoe | replaceable cutting shoe, carbon steel, with stainless steel core catcher |
| 4 | core barrel guiding block | HMPE |
| 5 | guiding poles | high strength steel |
| 6 | stays to rigging head | stainless steel 316 |
| 7 | core barrel | ID/OD 113 x 121 mm stainless steel 316 |
| 8 | pivoting core barrel head | stainless steel 316 |
| 9 | non-return valve | Delrin and stainless steel |
| 10 | core barrel pivot | stainless steel, hot-dip galvanised |
| 11 | sliding frame | stainless steel, hot-dip galvanised |
| 12 | vibromotor | 3-phase AC motor, 5.5 kVA |
| 13 | dead weights | adjustable to six pieces of 50 kg each (on vibrator head) |
| 14 | springs | transferring resonant vibration motion to 30 kN |
| 15 | rigging head | hot-dip galvanised |
| 16 | hoisting wire | anti-torsion 14 mm steel cable, type 35 x 7 |
| 17 | underwater power cable | polyurethene, Kevlar-reinforced (12 x 1 mm$^2$) |

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Website: www.geo-spark.com

# Geo-Vibro Corer 3000 + 6000

## Deployment Solutions

From the stern using the A-frame plus hoisting winch

### Deployment Solutions

The Geo-Corer 6000 has a variable footprint and a pivoting barrel, which allows deployment in all kinds of situations:

Deployment from a barge or multi-cat using big crane

### Deployment and Hoisting by Crane

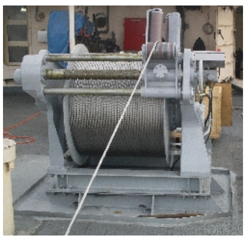
The 1:4 pulley system of the Geo-Corer generates an barrel extraction force equals to 4 times the hoisting force. This means that a 5 ton crane will meet the maximum design criteria of 20 ton. Most cranes have enough drum capacity to accommodate 100- 200 m. However, the use of an adequate cable is imperative:

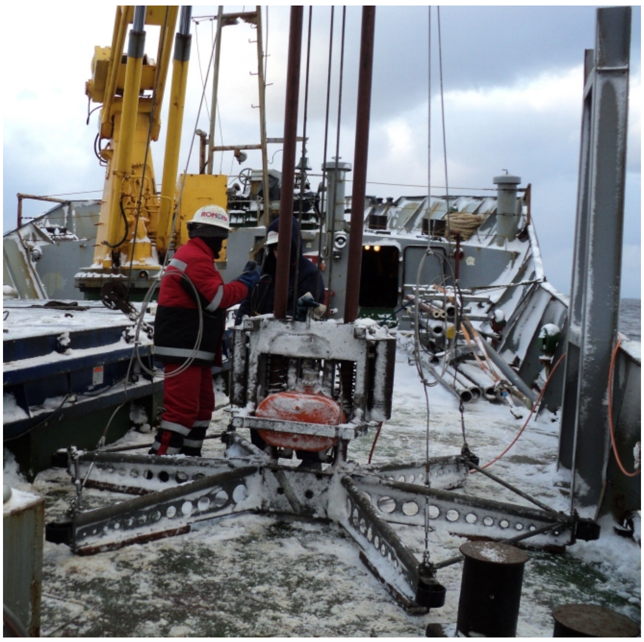
- 14 mm, 35 x 7, anti twist steel cable
- 18 mm, Dynema, floating kevlar cable

### Custom built Hoisting Winches

In collaboration with various specialized manufacturers we able to offer a full range of hydraulic winches, all custom designed to meet the requirements of geotechnical and oceanographic survey.

- from shelf down to oceanic depths
- autonomous mobile units
- fixed installations
- fully certified



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# 8 APPENDIX C – RESULTS OF ANALYSIS IN SOCOTEC TEST REPORT FORMAT

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

**Test Report ID MAR02152**

Issue Version: 1

Customer: Irish Hydrodata Ltd, Rathmacullig West, Ballygarvan. Co. Cork

Customer Reference: Port of Cork - Marine Institute Analysis

Date Sampled: 11-12-Dec-23

Date Samples Received: 13-Dec-23

Test Report Date: 18-Jan-24

Condition of samples: Ambient Satisfactory

Opinions and Interpretations expressed herein are outside the scope of our UKAS accreditaion
The results reported relate only to the sample tested
The results apply to the sample as received

JMColbourne

Authorised by: Jane Colbourne

Position: Customer Service Specialist

UKAS TESTING
1252

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR02152
Issue Version 1
Customer Reference Port of Cork - Marine Institute Analysis

| | | **Method No** | SUB_02* |
|---|---|---|---|
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Visual Description** |
| RB1 | MAR02152.001 | Sediment | Grey clayey SILT |
| RB2 | MAR02152.002 | Sediment | Grey slightly sandy slightly gravelly CLAY |
| RB3 | MAR02152.003 | Sediment | Grey slightly sandy CLAY |
| RB4 | MAR02152.004 | Sediment | Grey clayey SILT |
| RB5 | MAR02152.005 | Sediment | Grey slightly sandy CLAY |
| RB6 | MAR02152.006 | Sediment | Grey clayey SILT |
| RB7 | MAR02152.007 | Sediment | Grey slightly sandy CLAY |
| RB8 | MAR02152.008 | Sediment | Grey slightly sandy CLAY |
| RB9 | MAR02152.009 | Sediment | Grey clayey SILT |
| RB10 | MAR02152.010 | Sediment | Brownish grey silty CLAY |
| RB11 | MAR02152.011 | Sediment | Grey slightly sandy slightly gravelly CLAY |
| RB12 | MAR02152.012 | Sediment | Grey clayey SILT |
| RB13 | MAR02152.013 | Sediment | Grey slightly sandy clayey SILT |
| RB14 | MAR02152.014 | Sediment | Grey clayey SAND |
| RB15 | MAR02152.015 | Sediment | Grey clayey SAND |
| RB16 | MAR02152.016 | Sediment | Grey slightly clayey SAND |
| RB17 | MAR02152.017 | Sediment | Grey clayey SILT |
| RB18 | MAR02152.018 | Sediment | Grey clayey SILT |
| RB19 | MAR02152.019 | Sediment | Grey clayey SILT |
| RB20 | MAR02152.020 | Sediment | Grey Clayey SILT |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | **Units** | % | % | % | % | % | Mg/m3 |
|---|---|---|---|---|---|---|---|---|
| | | **Method No** | ASC/SOP/303 | ASC/SOP/303 | SUB_01* | SUB_01* | SUB_01* | SUB_02* |
| | | **Limit of Detection** | 0.2 | 0.2 | N/A | N/A | N/A | N/A |
| | | **Accreditation** | UKAS | UKAS | N | N | N | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Total Moisture @ 120°C** | **Total Solids** | **Gravel (>2mm)** | **Sand (63-2000 µm)** | **Silt (<63 µm)** | **Particle Density** |
| RB1 | MAR02152.001 | Sediment | 45.2 | 54.8 | 0.00 | 13.87 | 86.13 | 2.65 |
| RB2 | MAR02152.002 | Sediment | 30.4 | 69.6 | 8.16 | 22.49 | 69.35 | 2.67 |
| RB3 | MAR02152.003 | Sediment | 32.7 | 67.3 | 5.02 | 25.56 | 69.42 | 2.66 |
| RB4 | MAR02152.004 | Sediment | 45.4 | 54.6 | 0.00 | 17.08 | 82.92 | 2.67 |
| RB5 | MAR02152.005 | Sediment | 42.3 | 57.7 | 1.28 | 9.69 | 89.02 | 2.66 |
| RB6 | MAR02152.006 | Sediment | 36.0 | 64.0 | 2.42 | 7.68 | 89.90 | 2.67 |
| RB7 | MAR02152.007 | Sediment | 35.3 | 64.7 | 3.25 | 19.61 | 77.14 | 2.78 |
| RB8 | MAR02152.008 | Sediment | 34.6 | 65.4 | 0.63 | 16.10 | 83.27 | 2.68 |
| RB9 | MAR02152.009 | Sediment | 57.0 | 43.0 | 0.00 | 12.58 | 87.42 | 2.67 |
| RB10 | MAR02152.010 | Sediment | 41.4 | 58.6 | 0.00 | 15.04 | 84.96 | 2.63 |
| RB11 | MAR02152.011 | Sediment | 34.0 | 66.0 | 1.91 | 15.83 | 82.26 | 2.69 |
| RB12 | MAR02152.012 | Sediment | 57.6 | 42.4 | 0.00 | 13.42 | 86.58 | 2.75 |
| RB13 | MAR02152.013 | Sediment | 56.3 | 43.7 | 0.00 | 14.45 | 85.55 | 2.67 |
| RB14 | MAR02152.014 | Sediment | 35.3 | 64.7 | 0.00 | 64.31 | 35.69 | 2.61 |
| RB15 | MAR02152.015 | Sediment | 55.3 | 44.7 | 0.00 | 28.69 | 71.31 | 2.70 |
| RB16 | MAR02152.016 | Sediment | 56.2 | 43.8 | 0.00 | 17.84 | 82.16 | 2.77 |
| RB17 | MAR02152.017 | Sediment | 52.9 | 47.1 | 0.00 | 16.53 | 83.47 | 2.68 |
| RB18 | MAR02152.018 | Sediment | 61.0 | 39.0 | 0.00 | 20.58 | 79.42 | 2.67 |
| RB19 | MAR02152.019 | Sediment | 57.1 | 42.9 | 0.00 | 18.54 | 81.46 | 2.73 |
| RB20 | MAR02152.020 | Sediment | 50.3 | 49.7 | 8.17 | 23.19 | 68.65 | 2.75 |
| | | Reference Material (% Recovery) | NA | NA | NA | NA | NA | NA |
| | | QC Blank | NA | NA | NA | NA | NA | NA |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | | | |
|---|---|---|---|---|
| | | **Units** | % m/m | %m/m |
| | | **Method No** | WSLM59* | ANC* |
| | | **Limit of Detection** | 0.02 | 0.12 |
| | | **Accreditation** | UKAS | No |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **TOC** | **Carbonate Equivalent (%CO3)** |
| RB1 | MAR02152.001 | Sediment | 1.61 | 11.8 |
| RB2 | MAR02152.002 | Sediment | 1.14 | 11.3 |
| RB3 | MAR02152.003 | Sediment | 1.52 | 7.92 |
| RB4 | MAR02152.004 | Sediment | 1.64 | 12.2 |
| RB5 | MAR02152.005 | Sediment | 1.23 | 18.7 |
| RB6 | MAR02152.006 | Sediment | 1.05 | 8.9 |
| RB7 | MAR02152.007 | Sediment | 1.15 | 9.4 |
| RB8 | MAR02152.008 | Sediment | 0.90 | 7.2 |
| RB9 | MAR02152.009 | Sediment | 1.72 | 13.7 |
| RB10 | MAR02152.010 | Sediment | 1.33 | 12.0 |
| RB11 | MAR02152.011 | Sediment | 1.04 | 10.8 |
| RB12 | MAR02152.012 | Sediment | 1.82 | 13.4 |
| RB13 | MAR02152.013 | Sediment | 1.76 | 11.8 |
| RB14 | MAR02152.014 | Sediment | 0.89 | 12.7 |
| RB15 | MAR02152.015 | Sediment | 1.15 | 12.2 |
| RB16 | MAR02152.016 | Sediment | 1.84 | 12.7 |
| RB17 | MAR02152.017 | Sediment | 1.54 | 12.7 |
| RB18 | MAR02152.018 | Sediment | 1.83 | 12.2 |
| RB19 | MAR02152.019 | Sediment | 1.66 | 12.5 |
| RB20 | MAR02152.020 | Sediment | 1.08 | 14.4 |
| | | Reference Material (% Recovery) | 88 | 98 |
| | | QC Blank | <0.02 | <0.12 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | Units | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|
| | | **Method No** | ICPMS-MWSED* | ICPMS-MWSED* | ICPMS-MWSED* | ICPMS-MWSED* | ICPMS-MWSED* | ICPMS-MWSED* | ICPMS-MWSED* |
| | | **Limit of Detection** | 0.14 | 0.03 | 1 | 0.7 | 0.6 | 0.01 | 0.4 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Arsenic as As** | **Cadmium as Cd** | **Chromium as Cr** | **Copper as Cu** | **Lead as Pb** | **Mercury as Hg** | **Nickel as Ni** |
| RB1 | MAR02152.001 | Sediment | 22.7 | 0.68 | 121 | 37.4 | 63.1 | 0.29 | 50.0 |
| RB2 | MAR02152.002 | Sediment | 20.3 | 0.97 | 90.9 | 14.1 | 26.8 | 0.49 | 40.1 |
| RB3 | MAR02152.003 | Sediment | 21.5 | 0.58 | 104 | 16.2 | 27.1 | 0.13 | 48.6 |
| RB4 | MAR02152.004 | Sediment | 22.9 | 0.64 | 120 | 28.6 | 52.1 | 0.29 | 50.7 |
| RB5 | MAR02152.005 | Sediment | 14.8 | 0.44 | 90.6 | 9.2 | 19.1 | 0.21 | 37.0 |
| RB6 | MAR02152.006 | Sediment | 28.9 | 0.46 | 131 | 19.1 | 34.0 | <0.10 | 59.2 |
| RB7 | MAR02152.007 | Sediment | 23.0 | 0.40 | 94.7 | 9.3 | 19.4 | <0.10 | 38.6 |
| RB8 | MAR02152.008 | Sediment | 15.8 | 0.49 | 118 | 13.1 | 24.0 | <0.10 | 49.5 |
| RB9 | MAR02152.009 | Sediment | 23.0 | 0.62 | 131 | 34.8 | 57.3 | 0.30 | 53.6 |
| RB10 | MAR02152.010 | Sediment | 28.3 | 0.84 | 118 | 40.8 | 79.2 | 0.23 | 57.0 |
| RB11 | MAR02152.011 | Sediment | 19.3 | 0.51 | 120 | 11.9 | 23.4 | 0.13 | 48.0 |
| RB12 | MAR02152.012 | Sediment | 23.2 | 0.61 | 137 | 30.8 | 57.6 | 0.26 | 55.0 |
| RB13 | MAR02152.013 | Sediment | 25.6 | 0.47 | 117 | 30.4 | 50.4 | 0.14 | 47.4 |
| RB14 | MAR02152.014 | Sediment | 24.4 | 0.39 | 74.4 | 22.3 | 34.8 | 0.19 | 34.8 |
| RB15 | MAR02152.015 | Sediment | 26.8 | 0.42 | 102 | 24.5 | 43.0 | 0.29 | 42.9 |
| RB16 | MAR02152.016 | Sediment | 27.7 | 1.11 | 150 | 39.4 | 65.8 | 1.08 | 59.8 |
| RB17 | MAR02152.017 | Sediment | 27.8 | 1.12 | 136 | 35.6 | 58.9 | 0.72 | 54.4 |
| RB18 | MAR02152.018 | Sediment | 22.2 | 0.60 | 117 | 31.5 | 51.8 | 0.25 | 47.1 |
| RB19 | MAR02152.019 | Sediment | 25.5 | 0.57 | 129 | 33.7 | 58.7 | 0.25 | 52.7 |
| RB20 | MAR02152.020 | Sediment | 20.5 | 0.52 | 57.5 | 17.8 | 24.8 | <0.01 | 28.9 |
| CRM1 | MAR02152.021 | Sediment | 24.0 | 0.25 | 86.3 | 31.0 | 21.5 | <0.01 | 40.1 |
| Certified Reference Material 2702 (Measured Value) | | | 42.57 | 0.828 | 285 | 128.2 | 113.4 | 0.596 | 68.17 |
| Certified Reference Material 2702 (Certified Value) | | | 45.3 | 0.817 | 352 | 117.7 | 132.8 | 0.447 | 75.4 |
| Certified Reference Material 2702 (% Recovery) | | | 93 | 73 | 82 | 93 | 83 | 78 | 94 |
| QC Blank | | | <0.14 | <0.03 | <1 | <0.7 | <0.6 | <0.01 | <0.4 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR02152
Issue Version 1
Customer Reference Port of Cork - Marine Institute Analysis

| | | | | | |
|---|---|---|---|---|---|
| | | **Units** | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) |
| | | **Method No** | ICPMS-MWSED* | ICPOES-MWSED* | ICPOES-MWSED* |
| | | **Limit of Detection** | 3.5 | 1750 | 2 |
| | | **Accreditation** | UKAS | UKAS | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Zinc as Zn** | **Aluminium as Al** | **Lithium as Li** |
| RB1 | MAR02152.001 | Sediment | 219 | 58800 | 55.7 |
| RB2 | MAR02152.002 | Sediment | 134 | 44200 | 45.7 |
| RB3 | MAR02152.003 | Sediment | 150 | 53800 | 46.1 |
| RB4 | MAR02152.004 | Sediment | 199 | 59100 | 49.9 |
| RB5 | MAR02152.005 | Sediment | 107 | 42500 | 39.1 |
| RB6 | MAR02152.006 | Sediment | 164 | 68900 | 55.9 |
| RB7 | MAR02152.007 | Sediment | 112 | 49400 | 44.5 |
| RB8 | MAR02152.008 | Sediment | 139 | 57800 | 46.6 |
| RB9 | MAR02152.009 | Sediment | 216 | 64000 | 56.5 |
| RB10 | MAR02152.010 | Sediment | 214 | 55800 | 47.1 |
| RB11 | MAR02152.011 | Sediment | 133 | 55100 | 45.2 |
| RB12 | MAR02152.012 | Sediment | 208 | 65500 | 55.8 |
| RB13 | MAR02152.013 | Sediment | 191 | 55200 | 54.5 |
| RB14 | MAR02152.014 | Sediment | 169 | 35800 | 35.9 |
| RB15 | MAR02152.015 | Sediment | 171 | 42200 | 43.9 |
| RB16 | MAR02152.016 | Sediment | 239 | 65000 | 53.4 |
| RB17 | MAR02152.017 | Sediment | 221 | 64400 | 50.9 |
| RB18 | MAR02152.018 | Sediment | 197 | 54100 | 54.4 |
| RB19 | MAR02152.019 | Sediment | 210 | 60700 | 58.5 |
| RB20 | MAR02152.020 | Sediment | 124 | 52200 | 46.9 |
| CRM1 | MAR02152.021 | Sediment | 141 | 91500 | 63.4 |
| Certified Reference Material 2702 (Measured Value) | | | 443.3 | 95634 | 83.15 |
| Certified Reference Material 2702 (Certified Value) | | | 485.3 | 84000 | 78.2 |
| Certified Reference Material 2702 (% Recovery) | | | 81 | 104 | 78 |
| QC Blank | | | <3.5 | <1750 | <2 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | | | |
|---|---|---|---|---|
| | | **Units** | µg/Kg (Dry Weight) | |
| | | **Method No** | ASC/SOP/301 | |
| | | **Limit of Detection** | 1 | 1 |
| | | **Accreditation** | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Dibutyltin (DBT)** | **Tributyltin (TBT)** |
| RB1 | MAR02152.001 | Sediment | <5 | 10.4 |
| RB2 | MAR02152.002 | Sediment | <5 | <5 |
| RB4 | MAR02152.004 | Sediment | <5 | <5 |
| RB5 | MAR02152.005 | Sediment | <5 | <5 |
| RB7 | MAR02152.007 | Sediment | <5 | <5 |
| RB8 | MAR02152.008 | Sediment | <5 | <5 |
| RB9 | MAR02152.009 | Sediment | <5 | <5 |
| RB10 | MAR02152.010 | Sediment | <5 | <5 |
| RB12 | MAR02152.012 | Sediment | <5 | <5 |
| RB13 | MAR02152.013 | Sediment | <5 | <5 |
| Certified Reference Material BCR-646 (Measured Value) | | | 667 | 265 |
| Certified Reference Material BCR-646 (Certified Value) | | | 770 | 480 |
| Certified Reference Material BCR-646 (% Recovery) | | | 87 | 55 |
| QC Blank | | | <1 | <1 |

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | | | |
|---|---|---|---|---|
| | | **Units** | µg/Kg (Dry Weight) | |
| | | **Method No** | ASC/SOP/301 | |
| | | **Limit of Detection** | 1 | 1 |
| | | **Accreditation** | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Dibutyltin (DBT)** | **Tributyltin (TBT)** |
| RB14 | MAR02152.014 | Sediment | <5 | <5 |
| RB15 | MAR02152.015 | Sediment | <5 | <5 |
| RB16 | MAR02152.016 | Sediment | <5 | <5 |
| RB17 | MAR02152.017 | Sediment | <5 | <5 |
| RB18 | MAR02152.018 | Sediment | <5 | <5 |
| RB19 | MAR02152.019 | Sediment | <5 | <5 |
| RB20 | MAR02152.020 | Sediment | <5 | <5 |
| CRM3 | MAR02152.023 | Sediment | 357 | 301 |
| Certified Reference Material BCR-646 (Measured Value) | | | 582 | 307 |
| Certified Reference Material BCR-646 (Certified Value) | | | 770 | 480 |
| Certified Reference Material BCR-646 (% Recovery) | | | 76 | 64 |
| QC Blank | | | <1 | <1 |

# Certificate of Analysis

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SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|
| | | **Method No** | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 |
| | | **Limit of Detection** | 1 | 1 | 1 | 1 | 1 | 1 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **ACENAPTH** | **ACENAPHY** | **ANTHRACN** | **BAA** | **BAP** | **BBF** |
| RB1 | MAR02152.001 | Sediment | <5 | <5 | 13.2 | 44.9 | 57.2 | 80.1 |
| RB2 | MAR02152.002 | Sediment | <5 | <5 | <5 | 26.3 | 34.4 | 43.0 |
| RB4 | MAR02152.004 | Sediment | <5 | <5 | <5 | 35.3 | 41.6 | 57.4 |
| RB5 | MAR02152.005 | Sediment | <5 | <5 | <5 | <5 | <5 | <5 |
| RB7 | MAR02152.007 | Sediment | <5 | <5 | <5 | <5 | <5 | <5 |
| RB8 | MAR02152.008 | Sediment | <5 | <5 | <5 | <5 | <5 | <5 |
| RB9 | MAR02152.009 | Sediment | <5 | <5 | <5 | 20.1 | 27.3 | 40.6 |
| RB10 | MAR02152.010 | Sediment | <5 | <5 | 14.8 | 50.5 | 62.0 | 89.6 |
| RB12 | MAR02152.012 | Sediment | <5 | <5 | <5 | 34.9 | 46.7 | 72.8 |
| RB13 | MAR02152.013 | Sediment | <5 | <5 | <5 | 27.1 | 32.0 | 48.8 |
| RB14 | MAR02152.014 | Sediment | <5 | <5 | <5 | 21.5 | 27.2 | 45.7 |
| RB15 | MAR02152.015 | Sediment | <5 | <5 | <5 | 27.6 | 33.3 | 56.4 |
| RB16 | MAR02152.016 | Sediment | <5 | <5 | <5 | 32.5 | 40.0 | 64.5 |
| RB17 | MAR02152.017 | Sediment | <5 | <5 | <5 | 37.2 | 34.7 | 50.4 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 33.2 | 58.9 | 124 | 246 | 238 | 414 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 38.4 | 53.3 | 184 | 335 | 358 | 453 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 86 | 110 | 67 | 73 | 66 | 91 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Units** | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
| | | **Method No** | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 |
| | | **Limit of Detection** | 1 | 1 | 1 | 1 | 1 | 1 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | N* |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **BENZGHIP** | **BKF*** | **CHRYSENE*** | **DBENZAH** | **FLUORANT** | **FLUORENE** |
| RB1 | MAR02152.001 | Sediment | 58.1 | 66.9 | 54.8 | 12.4 | 94.4 | 10.5 |
| RB2 | MAR02152.002 | Sediment | 30.4 | 36.3 | 33.5 | <5 | 50.3 | <5 |
| RB4 | MAR02152.004 | Sediment | 39.6 | 53.2 | 47.5 | 9.25 | 89.2 | 9.55 |
| RB5 | MAR02152.005 | Sediment | <5 | <5 | <5 | <5 | <5 | <5 |
| RB7 | MAR02152.007 | Sediment | <5 | <5 | <5 | <5 | <5 | <5 |
| RB8 | MAR02152.008 | Sediment | <5 | <5 | <5 | <5 | <5 | <5 |
| RB9 | MAR02152.009 | Sediment | 30.2 | 34.7 | 27.9 | 5.76 | 47.2 | <5 |
| RB10 | MAR02152.010 | Sediment | 59.1 | 75.3 | 67.8 | 12.8 | 111.0 | 13.4 |
| RB12 | MAR02152.012 | Sediment | 53.4 | 63.6 | 41.9 | <5 | 72.3 | <5 |
| RB13 | MAR02152.013 | Sediment | 36.5 | 43.1 | 35.4 | <5 | 54.3 | <5 |
| RB14 | MAR02152.014 | Sediment | 30.2 | 39.4 | 26.7 | <5 | 46.5 | <5 |
| RB15 | MAR02152.015 | Sediment | 38.1 | 50.9 | 34.7 | <5 | 59.5 | <5 |
| RB16 | MAR02152.016 | Sediment | 44.4 | 55.5 | 41.9 | <5 | 70.8 | <5 |
| RB17 | MAR02152.017 | Sediment | 35.5 | 45.5 | 53.3 | <5 | 63.8 | <5 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 230 | 368 | 359 | 65.3 | 554 | 46.1 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 307 | 225 | 399 | 53.0 | 651 | 85.0 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 75 | 164 | 90 | 123 | 85 | 54 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Units** | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
| | | **Method No** | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/306 |
| | | **Limit of Detection** | 1 | 1 | 1 | 1 | 100 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **INDPYR** | **NAPTH** | **PHENANT** | **PYRENE** | **THC** |
| RB1 | MAR02152.001 | Sediment | 69.8 | 18.0 | 40.7 | 86.2 | 16200 |
| RB2 | MAR02152.002 | Sediment | 31.5 | 7.26 | 25.7 | 50.0 | 165000 |
| RB4 | MAR02152.004 | Sediment | 48.4 | 16.1 | 57.2 | 72.8 | 98200 |
| RB5 | MAR02152.005 | Sediment | <5 | <5 | <5 | <5 | 19600 |
| RB7 | MAR02152.007 | Sediment | <5 | <5 | <5 | <5 | 7260 |
| RB8 | MAR02152.008 | Sediment | <5 | <5 | <5 | <5 | 10200 |
| RB9 | MAR02152.009 | Sediment | 40.3 | 15.2 | 26.1 | 40.6 | 106000 |
| RB10 | MAR02152.010 | Sediment | 73.8 | 20.8 | 54.1 | 101 | 208000 |
| RB12 | MAR02152.012 | Sediment | 68.1 | 18.4 | 35.2 | 61.7 | 105000 |
| RB13 | MAR02152.013 | Sediment | 45.9 | 18.6 | 29.6 | 48.2 | 131000 |
| RB14 | MAR02152.014 | Sediment | 35.5 | 11.4 | 18.3 | 43.3 | 85700 |
| RB15 | MAR02152.015 | Sediment | 51.0 | 23.3 | 30.2 | 52.0 | 74400 |
| RB16 | MAR02152.016 | Sediment | 52.5 | 18.4 | 35.6 | 63.1 | 143000 |
| RB17 | MAR02152.017 | Sediment | 45.4 | 19.5 | 32.0 | 56.8 | 107000 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 296 | 499 | 314 | 432 | 1624 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 341 | 848 | 406 | 581 | 1400 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 87 | 59 | 77 | 74 | 116~ |
| QC Blank | | | <1 | <1 | <1 | <1 | <100 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|
| | | **Method No** | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 |
| | | **Limit of Detection** | 1 | 1 | 1 | 1 | 1 | 1 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **ACENAPTH** | **ACENAPHY** | **ANTHRACN** | **BAA** | **BAP** | **BBF** |
| RB18 | MAR02152.018 | Sediment | <5 | <5 | 13.3 | 38.8 | 47.7 | 70.8 |
| RB19 | MAR02152.019 | Sediment | <5 | <5 | 7.21 | 25.0 | 30.7 | 63.8 |
| RB20 | MAR02152.020 | Sediment | <5 | <5 | 5.15 | 18.0 | 24.5 | 40.7 |
| CRM2 | MAR02152.022 | Sediment | 7.03 | 8.47 | 18.1 | 62.3 | 69.7 | 118 |
| CRM4 | MAR02152.024 | Sediment | 37.0 | 56.3 | 129 | 258 | 258 | 422 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 33.9 | 57.7 | 130 | 222 | 206 | 383 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 38.4 | 53.3 | 184 | 335 | 358 | 453 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 88 | 108 | 70 | 66 | 58 | 85 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Units** | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
| | | **Method No** | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 |
| | | **Limit of Detection** | 1 | 1 | 1 | 1 | 1 | 1 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | N* |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **BENZGHIP** | **BKF*** | **CHRYSENE*** | **DBENZAH** | **FLUORANT** | **FLUORENE** |
| RB18 | MAR02152.018 | Sediment | 45.4 | 54.3 | 50.6 | 10.0 | 83.9 | <5 |
| RB19 | MAR02152.019 | Sediment | 42.4 | 50.4 | 36.1 | 8.82 | 53.0 | <5 |
| RB20 | MAR02152.020 | Sediment | 27.3 | 31.4 | 24.2 | <5 | 38.7 | <5 |
| CRM2 | MAR02152.022 | Sediment | 102 | 62.5 | 81.0 | 17.7 | 128 | 13.4 |
| CRM4 | MAR02152.024 | Sediment | 242 | 222 | 372 | 56.1 | 534 | 51.4 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 200 | 366 | 353 | 50.4 | 525 | 46.6 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 307 | 225 | 399 | 53.0 | 651 | 85.0 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 65 | 163 | 88 | 95 | 81 | 55 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries

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As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR02152
Issue Version 1
Customer Reference Port of Cork - Marine Institute Analysis

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Units** | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
| | | **Method No** | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/306 |
| | | **Limit of Detection** | 1 | 1 | 1 | 1 | 100 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **INDPYR** | **NAPTH** | **PHENANT** | **PYRENE** | **THC** |
| RB18 | MAR02152.018 | Sediment | 57.6 | 23.5 | 44.9 | 73.8 | 145000 |
| RB19 | MAR02152.019 | Sediment | 50.8 | 22.4 | 29.1 | 47.3 | 99000 |
| RB20 | MAR02152.020 | Sediment | 33.5 | 14.0 | 21.8 | 35.8 | 88600 |
| CRM2 | MAR02152.022 | Sediment | 104 | 39.9 | 82.7 | 121 | NA |
| CRM4 | MAR02152.024 | Sediment | 278 | 507 | 318 | 430 | NA |
| Certified Reference Material Nist 1941b (Measured Value) | | | 237 | 510 | 320 | 409 | 1494 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 341 | 848 | 406 | 581 | 1400 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 69 | 60 | 79 | 70 | 107~ |
| QC Blank | | | <1 | <1 | <1 | <1 | <100 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.
* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Units** | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
| | | **Method No** | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 |
| | | **Limit of Detection** | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **PCB28** | **PCB52** | **PCB101** | **PCB118** | **PCB138** | **PCB153** | **PCB180** |
| RB1 | MAR02152.001 | Sediment | 0.30 | 0.27 | 0.29 | 0.37 | 0.39 | 0.48 | 0.20 |
| RB2 | MAR02152.002 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| RB4 | MAR02152.004 | Sediment | 0.28 | 0.39 | 0.39 | 0.47 | 0.58 | 0.55 | 0.45 |
| RB5 | MAR02152.005 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| RB7 | MAR02152.007 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| RB8 | MAR02152.008 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | 0.08 | <0.08 |
| RB9 | MAR02152.009 | Sediment | 0.14 | 0.11 | 0.18 | 0.26 | 0.31 | 0.31 | 0.13 |
| RB10 | MAR02152.010 | Sediment | 0.28 | 0.37 | 0.28 | 0.30 | <0.08 | 0.25 | <0.08 |
| RB12 | MAR02152.012 | Sediment | 0.09 | 0.09 | 0.12 | 0.20 | 0.22 | 0.22 | 0.11 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 2.75 | 4.93 | 5.35 | 4.15 | 3.59 | 5.40 | 3.17 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 4.52 | 5.24 | 5.11 | 4.23 | 3.60 | 5.47 | 3.24 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 61 | 94 | 105 | 98 | 100 | 99 | 98 |
| QC Blank | | | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | **Units** | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|
| | | **Method No** | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 |
| | | **Limit of Detection** | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **PCB28** | **PCB52** | **PCB101** | **PCB118** | **PCB138** | **PCB153** | **PCB180** |
| RB13 | MAR02152.013 | Sediment | 0.12 | 0.09 | 0.12 | 0.17 | 0.17 | 0.19 | <0.08 |
| RB14 | MAR02152.014 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| RB15 | MAR02152.015 | Sediment | 0.10 | 0.12 | 0.14 | 0.16 | 0.11 | 0.25 | <0.08 |
| RB16 | MAR02152.016 | Sediment | 0.12 | 0.09 | 0.13 | 0.21 | 0.16 | 0.22 | 0.12 |
| RB17 | MAR02152.017 | Sediment | 0.13 | 0.09 | 0.14 | 0.14 | 0.16 | 0.19 | <0.08 |
| RB18 | MAR02152.018 | Sediment | 0.12 | 0.09 | 0.12 | 0.09 | 0.15 | 0.25 | <0.08 |
| RB19 | MAR02152.019 | Sediment | 0.13 | 0.09 | 0.12 | 0.18 | 0.22 | 0.22 | 0.14 |
| RB20 | MAR02152.020 | Sediment | 0.10 | 0.08 | 0.08 | 0.11 | 0.15 | 0.16 | <0.08 |
| CRM2 | MAR02152.022 | Sediment | 0.34 | 0.54 | 0.46 | 0.31 | 0.78 | 0.58 | 0.24 |
| CRM4 | MAR02152.024 | Sediment | 3.51 | 5.33 | 5.05 | 4.19 | 3.65 | 5.47 | 3.26 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 2.80 | 5.02 | 4.81 | 4.04 | 3.71 | 5.16 | 3.17 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 4.52 | 5.24 | 5.11 | 4.23 | 3.60 | 5.47 | 3.24 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 62 | 96 | 94 | 95 | 103 | 94 | 98 |
| QC Blank | | | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | **Units** | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Method No** | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 |
| | | **Limit of Detection** | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **AHCH** | **BHCH** | **GHCH** | **DIELDRIN** | **HCB** | **DDE** | **DDT** | **DDD** |
| RB1 | MAR02152.001 | Sediment | <0.1 | <0.1 | <0.1 | 0.18 | 3.19 | 0.12 | <0.1 | 0.20 |
| RB2 | MAR02152.002 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.80 | <0.1 | <0.1 | 0.14 |
| RB4 | MAR02152.004 | Sediment | 0.10 | 0.34 | 0.21 | 0.36 | 0.95 | 0.40 | 0.53 | 0.82 |
| RB5 | MAR02152.005 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.12 | <0.1 | <0.1 | <0.1 |
| RB7 | MAR02152.007 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.15 | <0.1 | <0.1 | <0.1 |
| RB8 | MAR02152.008 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.11 | <0.1 | <0.1 | <0.1 |
| RB9 | MAR02152.009 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.12 | <0.1 | 0.15 |
| RB10 | MAR02152.010 | Sediment | <0.1 | <0.1 | <0.1 | 0.11 | 0.14 | <0.1 | <0.1 | 0.12 |
| RB12 | MAR02152.012 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.23 | 0.15 | <0.1 | 0.20 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 41.5 | 38.0 | 43.6 | 40.1 | 5.92 | 2.90 | 0.45 | 4.50 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 40.0 | 40.0 | 40.0 | 40.0 | 5.83 | 3.22 | 1.12 | 4.66 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 104~ | 95~ | 109~ | 100~ | 101 | 90 | 41 | 97 |
| QC Blank | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Method No** | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 |
| | | **Limit of Detection** | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | N* | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **AHCH** | **BHCH** | **GHCH** | **DIELDRIN** | **HCB** | **DDE** | **DDT** | **DDD** |
| RB13 | MAR02152.013 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.15 | 0.13 | <0.1 | 0.10 |
| RB14 | MAR02152.014 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| RB15 | MAR02152.015 | Sediment | <0.1 | <0.1 | <0.1 | 0.14 | <0.1 | <0.1 | <0.1 | 0.12 |
| RB16 | MAR02152.016 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.19 | 0.11 | <0.1 | 0.13 |
| RB17 | MAR02152.017 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.16 | <0.1 | <0.1 | 0.13 |
| RB18 | MAR02152.018 | Sediment | <0.1 | <0.1 | <0.1 | 0.22 | <0.1 | 0.13 | <0.1 | 0.15 |
| RB19 | MAR02152.019 | Sediment | <0.1 | <0.1 | <0.1 | 0.13 | <0.1 | 0.11 | <0.1 | 0.13 |
| RB20 | MAR02152.020 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.15 | <0.1 | <0.1 | <0.1 |
| CRM2 | MAR02152.022 | Sediment | <0.1 | <0.1 | 0.19 | 0.13 | <0.1 | 0.51 | 0.28 | 1.69 |
| CRM4 | MAR02152.024 | Sediment | <0.1 | <0.1 | <0.1 | 0.55 | 7.83 | 3.27 | 0.52 | 4.93 |
| Certified Reference Material Nist 1941b (Measured Value) | | | 41.6 | 34.4 | 46.6 | 37.9 | 6.04 | 2.58 | 0.38 | 4.35 |
| Certified Reference Material Nist 1941b (Certified Value) | | | 40.0 | 40.0 | 40.0 | 40.0 | 5.83 | 3.22 | 1.12 | 4.66 |
| Certified Reference Material Nist 1941b (% Recovery) | | | 104~ | 86~ | 117~ | 95~ | 104 | 80 | 34 | 93 |
| QC Blank | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR02152
Issue Version 1
Customer Reference Port of Cork - Marine Institute Analysis

**REPORT NOTES**

| Method Code | Sample ID | The following information should be taken into consideration when using the data contained within this report |
|---|---|---|
| WSLM59* | MAR02152.001-020 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| ANC* | MAR02152.001-020 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| ICPMS-MWSED* | MAR02152.001-021 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| ICPOES-MWSED* | MAR02152.001-021 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| SUB_01* | MAR02152.001-020 | Analysis was conducted by an approved subcontracted laboratory. |
| SUB_02* | MAR02152.001-020 | Analysis was conducted by an approved subcontracted laboratory. |
| ASC/SOP/301 | MAR02152.001-002, .004-005, .006-010, .012-020 | The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated. |
| ASC/SOP/302 | MAR02152.013-020, .022, .024 | The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected.However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (HCB) . These circumstances should be taken into consideration when utilising the data. |
| ASC/SOP/303/304 | MAR02152.001-002, .004-005, .006-010, .012-020 | The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated. |
| ASC/SOP/303/304 | MAR02152.001-002, .004-005, .006-010, .012-020, .022, .024 | Benzo[k]fluoranthene is known to coelute with Benzo[j]fluoranthene and these peaks can not be resolved. It is believed Benzo[j]fluoranthene is present in these samples therefore it is suggested that the Benzo[k]fluoranthene results should be taken as a Benzo[k]fluoranthene (inc. Benzo[j]fluoranthene). Benzo[j]fluoranthene is not UKAS accredited. This should be taken into consideration when utilising the data. |
| ASC/SOP/303/304 | MAR02152.001-002, .004-005, .006-010, .012-020, .022, .024 | Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene).This should be taken into consideration when utilising the data. |
| ASC/SOP/303/304 | MAR02152.001, 004, .010, .022, .024 | The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected.However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (Fluorene) . These circumstances should be taken into consideration when utilising the data. |

**DEVIATING SAMPLE STATEMENT**

| Deviation Code | Deviation Definition | Sample ID | Deviation Details. The following information should be taken into consideration when using the data contained within this report |
|---|---|---|---|
| D1 | Holding Time Exceeded | N/A | N/A |
| D2 | Sample Contaminated through Damaged Packaging | N/A | N/A |
| D3 | Sample Contaminated through Sampling | N/A | N/A |
| D4 | Inappropriate Container/Packaging | N/A | N/A |
| D5 | Damaged in Transit | N/A | N/A |
| D6 | Insufficient Quantity of Sample | N/A | N/A |
| D7 | Inappropriate Headspace | N/A | N/A |
| D8 | Retained at Incorrect Temperature | N/A | N/A |
| D9 | Lack of Date & Time of Sampling | N/A | N/A |
| D10 | Insufficient Sample Details | N/A | N/A |
| D11 | Sample integrity compromised or not suitable for analysis | N/A | N/A |

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR02152 |
| Issue Version | 1 |
| Customer Reference | Port of Cork - Marine Institute Analysis |

| Method | Sample and Fraction Size | Method Summary |
|---|---|---|
| Total Solids | Wet Sediment | Calculation (100%-Moisture Content).Moisture content determined by drying a portion of the sample at 120°C to constant weight. |
| Particle Size Analysis | Wet Sediment | Wet and dry sieving followed by laser diffraction analysis. |
| Total Organic Carbon (TOC) | Air dried and seived to <2mm | Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR. |
| Carbonate | Air dried and seived to <2mm | Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7 |
| Metals | Air dried and seived to <2mm | Microwave assisted HF/Boric extraction followed by ICP analysis. |
| Organotins | Wet Sediment | Solvent extraction and derivatisation followed by GC-MS analysis. |
| Polyaromatic Hydrocarbons (PAH) | Wet Sediment | Solvent extraction and clean up followed by GC-MS analysis. |
| Total Hydrocarbon Content (THC) | Wet Sediment | Solvent extraction and clean up followed by GC-FID analysis. |
| Polychlorinated Biphenyls (PCBs) | Air dried and seived to <2mm | Solvent extraction and clean up followed by GC-MS-MS analysis. |
| Organochlorine Pesticides (OCPs) | Air dried and seived to <2mm | Solvent extraction and clean up followed by GC-MS-MS analysis. |

| Analyte Definitions | | | | | |
|---|---|---|---|---|---|
| Analyte Abbreviation | Full Analyte name | Analyte Abbreviation | Full Analyte name | Analyte Abbreviation | Full Analyte name |
| ACENAPTH | Acenaphthene | C2N | C2-naphthalenes | THC | Total Hydrocarbon Content |
| ACENAPHY | Acenaphthylene | C3N | C3-naphthalenes | AHCH | alpha-Hexachlorcyclohexane |
| ANTHRACN | Anthracene | CHRYSENE | Chrysene | BHCH | beta-Hexachlorcyclohexane |
| BAA | Benzo[a]anthracene | DBENZAH | Dibenzo[ah]anthracene | GHCH | gamma-Hexachlorcyclohexane |
| BAP | Benzo[a]pyrene | FLUORANT | Fluoranthene | DIELDRIN | Dieldrin |
| BBF | Benzo[b]fluoranthene | FLUORENE | Fluorene | HCB | Hexachlorobenzene |
| BEP | Benzo[e]pyrene | INDPYR | Indeno[1,2,3-cd]pyrene | DDD | p,p'-Dichlorodiphenyldichloroethane |
| BENZGHIP | Benzo[ghi]perylene | NAPTH | Naphthalene | DDE | p,p'-Dichlorodiphenyldichloroethylene |
| BKF | Benzo[k]fluoranthene | PERYLENE | Perylene | DDT | p,p'-Dichlorodiphenyltrichloroethane |
| C1N | C1-naphthalenes | PHENANT | Phenanthrene | | |
| C1PHEN | C1-phenanthrene | PYRENE | Pyrene | | |