Dún Laoghaire Harbour Master Plan

Environmental Report

October 2011

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TOWN PLANNING | URBAN ECONOMICS & DESIGN

Prepared by: JB	Checked by: TD
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CONTENTS

NON TECHNICAL SUMMARY

Introduction

This is the Non Technical Summary of the Environmental Report for the Strategic Environmental Assessment relating to the proposed Dun Laoghaire Harbour Masterplan.

The purpose of the Non Technical Summary is to explain to the public in non technical language the purpose, contents and results of the Environmental Report related to the Dun Laoghaire Harbour Masterplan.

The Plan, which has been commissioned by the Dun Laoghaire Harbour Company, covers the area of the entire harbour defined by the East and West piers. In addition, it also contains part of ''the Gut'' which lies outside the West pier, but which falls under the ownership of the Dun Laoghaire Harbour Company. The remainder of ''the Gut'' is under separate ownership.

Description of the Development

The Plan itself proposes the provision of harbour/port facilities in the form of ferry services (car only) and a cruise liner facility, with an emphasis on the development of small craft marine leisure facilities. Alongside the development of harbour/port facilities, the Plan proposes to develop on a limited scale, mixed use residential, services, hotels, cultural and recreational development. There is also a proposal to develop, on a significantly limited scale, residential development on ''the Gut''.

A cultural attraction would be incorporated on the Carlisle Pier without residential development. The principal residential component would be on St. Michael's Pier, along with a mix of other uses including retail, restaurants, leisure, cultural attractions in addition to the ferry/cruise liner terminal facilities.

SEA Methodology

The Strategic Environmental Assessment of the proposed Masterplan is a requirement under Directive 2001/42/EC, known as the Strategic Environmental Assessment Directive. The purpose of the SEA is to assess the potential effects of the Masterplan on the environment and determine the significance of these effects. Once any potential effects have been identified the report also outlines mitigation measures which can prevent, reduce, and as fully as possible offset any significant adverse impacts on the environment which would be caused by the implementation of the proposed Masterplan.

The SEA process for this Masterplan includes:

1. Screening- To determine which plans and programmes have a significant impact on the environment.
2. Scoping- To liaise with statutory consultees to identify key issues to be addressed in the SEA.
3. Draft Environmental Report - Assesses the environmental impacts of implementing the Draft Masterplan.
4. Consultation-Consulting the public, statutory and public authorities on the draft environmental report and draft plan, allowing time for the receipt of submissions.
5. Final Environmental Report- Taking account of the findings of the draft report and consultations to produce the final report.
6. SEA Statement-Once the plan is adopted it should be made known how the SEA findings were integrated into the plan.

7. Monitoring- Monitoring of the plan and preparation of a Monitoring Report.

Relationship with Plans and Programmes

The Environmental Report will identify relevant plans and programmes at international, national, regional and local levels which may have an effect on the Plan.

Examples of such plans and programmes include: The EC Birds Directive, The National Spatial Strategy 2002-2020, Regional Planning Guidelines for the Greater Dublin Area 2010-2022 and The Dun Laoghaire Rathdown County Development Plan 2010-2016.

A full list of plans and programmes relevant to the Masterplan can be found in Appendix I of this report.

The proposed Masterplan must have regard to these plans and programmes to ensure the proper planning and sustainable development of the area.

Baseline Environment

This section of the report shall provide a description of the present state of the environment of the area. It is this description that allows the report to assess the potential effects of the proposed Masterplan.

The present environment is described under the following main headings:

1. Biodiversity (including flora, fauna, habitats, protected species, birds, terrestrial and marine mammals)
2. Population and Human Health
3. Soils and Geology
4. Water (including surface water, ground water and flooding)
5. Air, Noise and Climate
6. Landscape (including character, height, views and prospects)
7. Archaeological Heritage
8. Architectural Heritage
9. Material Assets (including waste water, drinking water, waste management, traffic and transport)

For each of the above headings a description of the current environment is provided alongside the key issues, which the Masterplan must have regard to, are identified.

Strategic Environmental Objectives, Targets and Indicators

This section outlines the environmental objectives that have been identified for the environmental assessment process. These objectives are designed using the information provided in the Baseline Environment section.

For each of the Strategic Environmental Objectives a Target and Indicators are created to help achieve the objective. The SEA objectives, targets and indicators are outlined in Table 5.1 of this report.

Considerations of Alternatives

The SEA objectives, targets and indicators can be used to assess a number of different alternatives for the Masterplan. Once each alternative has been examined using the same set of SEA objectives, the preferred alternative can be chosen.

The assessment of each alternative is presented in matrix form, once each option has been assessed they can be scored and compared (see Table 6.4) to assess which is the preferred alternative.

In total there were four different alternatives considered for the Masterplan. The alternatives considered included a "Do Nothing" scenario and three other alternative options, one where the emphasis is on harbour/port development, another with the emphasis on urban development and a third option that provides for a mix of harbour and urban development uses.

Given the statutory remit of the Dun Laoghaire Harbour Company and the provisions of the Dun Laoghaire Rathdown County Development Plan 2010-2016, a 'Do Nothing' scenario is not a reasonable alternative. A 'Do Nothing' scenario would not be keeping with the principle of the proper planning and sustainable development of the area.

Option 1 explores the approach of developing predominantly the Port and Harbour related facilities.

Option 2 considers the alternative where the emphasis is on urban development on the waterfront areas, including the Carlisle Pier, St. Michaels and ''The Gut''.

Option 3 represents a mixture between Option 1 and 2. It proposes the limited provision of harbour/port facilities alongside the development of mixed use residential, retail and recreational development. This option also includes residential development on ''The Gut'' although this would be limited to a significant extent to prevent any adverse impacts on the environment.

After assessing each of the alternatives against the environmental objectives the results showed that Option 1 had the poorest result, reflecting the sensitive natural and cultural heritage within which development would occur. Option 2 showed a better result, as most of the development is on land, and thus any impacts are pre-dominantly related to the built environment. Option 3 obtained the highest score/rating making it the preferred option. This option maximises the positive benefits and minimises the negative ones, reflecting that it is a combination of both Options 1 and 2.

Assessment of Preferred Alternative

Following the environmental assessment of the three alternative development scenarios, the preferred alternative is described in greater detail and a further assessment is carried out including the identification of any significant environmental impacts of implementing this alternative.

This further assessment is carried out using the information outlined in the Baseline Environment section. The information is assessed alongside the proposed Masterplan to establish the possible impacts of the Plan on the environment.

A Strategic Flood Risk Assessment (SFRA) has been undertaken and has found that there is no significant risk of flooding. The findings of the SFRA have been integrated into the SEA.

Each objective of the draft Masterplan is tested for compatibility with the Strategic Environmental Objectives. As before, the testing of the objectives was undertaken using a matrix recording positive, negative, uncertain and neutral impacts. The results of this matrix are presented in Table 7.1 of this report. This process was carried out so that it could inform the Harbour Company of required mitigation measures to be undertaken.

Overall it is fair to say that the cumulative effects on the environment are not considered to be negative and any negative impacts that do exist under the individual headings can be minimised through the use of mitigation measures.

Mitigation Measures

Mitigation Measures are measures envisaged to prevent, reduce and as fully as possible, offset any significant adverse impacts on the environment.

Where possible, top priority is given to preventing any negative effects on the environment. However if prevention is not possible, the next step is to lessen or offset these effects. Mitigation Measures can be divided up into those that:

1. Avoid effects
2. Reduce the magnitude or extent of the effects
3. Repair effects after they have occurred
4. Compensate effects i.e. balance out negative impacts with other positive ones

Once again the proposed Mitigation Measures use the same headings that are found in the Baseline Environment section of this report. Under these headings the current environmental state and the possible effects outlined in the assessment of the preferred alternative are taken into account when creating Mitigation Measures.

The Mitigation Measures outlined not only take into account the operational phase of the proposed Masterplan but also the construction phase.

Overall the Mitigation Measures outlined in this report seek to encourage responsibility and accountability. The measures outlined in the report encourage a responsible approach to the implementation of the proposed Masterplan. There is a clear emphasis on compliance with the related plans and programmes outlined earlier in the report. An example of this compliance includes ensuring that development within the Masterplan area complies with the implementation of the Regional Waste Management Plans together with any future National or Regional Waste Management Plans.

The measures also ensure that the perpetrators of any harmful effects on the environment will be held accountable. An example of this accountability includes the enforcement of the polluter pays principle, in full cooperation with the EPA.

Monitoring

A preliminary monitoring programme is included, which considers when, by whom and how each of the indicators will be utilised.

1 INTRODUCTION

1.1 Background

This is the Environmental Report of the Strategic Environmental Assessment (SEA) for the proposed Dun Laoghaire Harbour Masterplan, which has been commissioned by Dun Laoghaire Harbour Company. The following report has been prepared to comply with the provisions of Article 12 of European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I 435 of 2004) and European Communities (Environmental Assessment of Certain Plans and Programmes) (Amendment) Regulations 2011 (S.I 200 of 2011).

The Report has also had due regard to the SEA Guidelines[1], in particular: -

- The current knowledge and methods of assessment
- The contents and level of detail in the Plan
- The stage of the Plan in the decision making process
- The extent to which certain matters are more appropriately assessed at different levels in the decision making process in order to avoid duplication of the environmental assessment

The EPA's SEA Pack (Version 28/0/2010) was also used as a source of information.

This report should be read in conjunction with the Dun Laoghaire Harbour Masterplan and Appropriate Assessment.

1.2 Requirement for a Strategic Environmental Assessment

Under Directive 2001/42/EC - Assessment of Effects of Certain Plans and Programmes on the Environment, certain plans and programmes require an environmental assessment. This is known as the Strategic Environmental Assessment (SEA) Directive. This Directive has been transposed into Irish Statute by S.I No. 435 of 2004 – European Communities (Environmental Assessment and Certain Plans and Programmes).

The SEA Directive, as set out in Article 1 of Directive 2001/42/EC of 27th June 2001 states that: -

> *"the objective of the Directive is to provide for a high level of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development, by ensuring that, in accordance with the Directive, an environmental assessment is carried out of certain plans and programmes which are likely to have significant effects on the environment".*

The SEA process is designed to ensure that significant environmental effects arising from plans are: -

- properly identified and assessed;
- subject to public participation;
- taken into account by decision makers;
- regularly monitored.

[1] Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans or Programmes on the Environment, Guidelines for Regional and Planning Authorities, Department of Environment, Heritage and Local Government, November 2004

SEA is an important instrument to help to achieve sustainable development in public planning and policy making. Particular benefits of SEA include: -

- To support sustainable development;
- To improve the evidence base for strategic decisions;
- To facilitate and respond to consultation with stakeholders;
- To streamline other processes such as Environmental Impact Assessments of individual development projects.

The SEA Directive and SEA Regulations require that competent authorities determine whether the implementation of plans or programmes, or modifications thereof, will be likely to have significant effects on the environment. This determination process is referred to as an Environmental Assessment and defined as:

> *"…the preparation of an environmental report, the carrying out of consultations, the taking into account of the environmental report and the results of the consultations in decision-making and the provision of information on the decision…"*[2]

1.3 Purpose of the Environmental Report

Dun Laoghaire Harbour Company has determined that the making of the Masterplan will be subject to undertaking an SEA to assess the likely significant effects on the environment of its implementation. The SEA process comprises a number of distinct stages.

The preparation of the Environmental Report, which is the principal document produced during the SEA process, is one of the most important of these stages. The Environmental Report presents the environmental assessment of the Masterplan involving the identification, where relevant and possible, of mitigation measures against significant effects on the environment of implementing the Plan.

Through the SEA process, the Masterplan will be assessed in order to evaluate the strategic environmental implications of developing within the Harbour Area. The Environmental Report will outline the alternatives considered for the development of the lands. With regard to the different components of the environment, it is considered that there are a number of aspects of the environment that require detailed consideration and analysis within the Environmental Report.

Section 2 of this Report outlines the procedural methodology employed in undertaking a SEA for the Masterplan.

1.4 Appropriate Assessment

Habitats Directive Assessment (HDA) is an assessment of the potential effects of a proposed Plan, on its own or in combination with other Plans or projects, on one or more Natura 2000 sites (Special Protection Areas (SPA) for birds, Special Areas of Conservation (SAC) for habitats and species (Ramsar wetland sites). The HDA findings must be taken into account by the competent authority in adopting a Masterplan. A final statement on whether or not the Dun Laoghaire Harbour Masterplan, on its own or in combination with other Plans or

2 Article 2b of Directive 2001/42/EC, European Union, Article 2 c of EC (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 S.I No. 435 of 2004

projects, will affect the integrity of Natura 2000 sites, is also required, prior to adoption of the Plan.

Relationship to Strategic Environmental Assessment

Habitats Directive Assessment (HDA) specifically aims to ensure that the Plan will not have an adverse effect on the integrity of Natura 2000 sites, whereas Strategic Environmental Assessment (SEA) has a broader objective to ensure land-use plans contribute to sustainable development by integrating social, environmental and economic considerations into Plan preparation and incorporating the requirements of the SEA Directive (2001/42/EC). A comparison between the HDA and SEA process is set out in Table 1.1.

Table 1.1- Comparison of AA and SEA

	HDA	SEA
Aim of process is to:	Maintain the integrity of the Natura 2000 network and its features: SPA for birds, cSAC for habitats and species, Ramsar sites	Provide for a high level of protection of the environment
Emphasis on:	Prevent activities that could have significant adverse effects on Natura 2000 sites 'Protection led',	Provide information on environmental impacts, consultation, documenting decisions 'Baseline led'
Detail:	Narrow focus on a few designated sites	Focus on the environment 'rebalancing in favour of the environment'

Adapted from 'Appropriate Assessment of Plans, September 2006', Authors: Scott Wilson, Levett – Therivel Sustainability Consultants, Treweek Environment Consultants and Land Use Consultants, p14 (based on Therivel, 2006)

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures to be addressed in the AA process.

1. Firstly, a plan should aim to avoid any negative impacts on Natura 2000 sites by identifying possible impacts early in plan making, and writing the plan in order to avoid such impacts.
2. Secondly, mitigation measures should be applied during the AA process to the point where no adverse impacts on the site(s) remain.
3. Under a worst-case scenario, a plan may have to undergo an assessment of alternative solutions. Under this stage of the assessment, compensatory measures are required for any remaining adverse effects, but they are permitted only if (a) there are no alternative solutions and (b) the plan is required for imperative reasons of overriding public interest (the 'IROPI test'). European case law highlights that consideration must be given to alternatives outside the plan boundary area in carrying out the IROPI test. It is a rigorous test which plans are generally considered unlikely to pass.

The SEA and AA may run alongside each other or information pertaining to the Appropriate Assessment may form part of the SEA process. In this case it has been decided to run the two processes in parallel so that the AA findings can be differentiated from those of the general SEA.

A Stage 1 (Screening) and Stage 2 (Appropriate Assessment) has been undertaken and this is available separately. The assessment concluded that with the mitigation measures proposed the Masterplan will not have any significant adverse effects on the adjoining designated Natura 2000 sites - the South Dublin Bay cSAC and Sandymount Strand/Tolka Estuary SPA.

1.5 Dun Laoghaire Harbour Masterplan

The area of the Masterplan includes the entire harbour area defined by the East and West Piers. In addition, it also contains part of the "The Gut" which lies outside the West Pier, but which falls under ownership of the Dun Laoghaire Harbour Company. The remainder of the "Gut" is in separate ownership. The area of the Masterplan is outlined in Figure 1.

Figure 1.1 – Masterplan Area

The Plan itself proposes the provision of harbour/port facilities in the form of ferry services (car only) and a cruise liner facility, with an emphasis on the development of small craft marine leisure facilities. Alongside the development of harbour/port facilities, the Plan proposes to develop on a limited scale, mixed use residential, services, hotels, cultural and recreational development. There is also a proposal to develop, on a significantly limited scale, residential development on ''the Gut''.

A cultural attraction would be incorporated on the Carlisle Pier without residential development. The principal residential component would be on St. Michael's Pier, along with a mix of other uses including retail, restaurants, leisure, cultural attractions in addition to the ferry/cruise liner terminal facilities.

2 SEA METHODOLOGY

2.1 SEA Process

The SEA process for this Masterplan includes: -

1. Screening: To determine which plans and programmes are likely to have a significant impact on the environment.
2. Scoping: To liaise with statutory consultees to identify key issues of concern that should be addressed in the environmental assessment of the Plan.
3. Draft Environmental Report: Where the likely significant environmental effects of implementing the Draft Masterplan are identified and evaluated.
4. Consultation: Consulting the public, statutory and public authorities, on the Draft Environmental Report and Draft Masterplan, giving adequate time for the receipt of submissions.
5. Final Environmental Report: Taking account of the findings of the draft report and the outcome of consultations in deciding whether to adopt or modify the Draft Masterplan.
6. SEA Statement: Make known on adoption of the Plan how SEA process influenced the outcome. Identify how environmental considerations have been integrated into the final Plan.
7. Monitoring: Monitoring of the plan and preparation of a Monitoring Report.

In addition to complying with the procedures set out in the relevant regulations, the methodology used in preparing this Environmental Report is in accordance with the Guidelines issued by the Department of the Environment, Heritage and Local Government in November 2004 entitled "*Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment, Guidelines for Regional and Planning Authorities.*"

2.2 Screening Stage

A Stage 1 Screening Report has been prepared and circulated to relevant environmental authorities. Dun Laoghaire Harbour Company determined on the 28th January 2011 that a full Strategic Environmental Assessment of the proposed Masterplan was required[3].

2.3 Scoping Stage

Dun Laoghaire Harbour Company prepared a Stage 2 Scoping Report for the Draft Masterplan in March 2011[4]. The Scoping Report: -

- Identifies the study area and the likely scale of development on the lands
- Provides a basis for consultation with environmental authorities
- Identifies plans and programmes which are relevant to the Dun Laoghaire Harbour Masterplan
- Assesses the Baseline Environment
- Identifies the key environmental issues arising from the baseline data

[3] For details see link: http://www.dlharbour.ie/files/downloads/document_sea_screening_decision.pdf
[4] For details see link: http://www.dlharbour.ie/files/downloads/document_sea_scoping.pdf

- Consider any information gaps

2.4 Statutory Consultations

Environmental authorities have been designated under the terms of Article 11 of the EC (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I 435 of 2004), as amended by EC (Environmental Assessment of Certain Plans and Programmes) Regulations 2011 (S.I 200 of 2011) as follows: -

- The Environmental Protection Agency (EPA)
- The Minister for the Environment, Communities and Local Government
- The Minister for Agriculture, Fisheries and Food
- The Minister for Communications, Energy and Natural Resources
- The Department of Arts, Heritage and the Gaeltacht

In addition, the local planning authority, Dun Laoghaire Rathdown County Council, was consulted at Screening, Scoping and Draft Environmental Report stages.

The following observations, in summary, have been received:

The Environmental Protection Agency (EPA)

- There is a need to determine whether any future proposed amendments to the Draft Plan would be likely to have significant effects on the environment.
- Adequate wastewater treatment, water supply, surface water and storm water drainage, transport, waste management, community services and amenities should be phased to address deficits and cater for increased population
- There is an obligation to respect national plans, policies and EU environmental legislation.
- The Plan should include, where appropriate, the policies and recommendations of
  - The Dun Laoghaire Rathdown County Development Plan and associated SEA and AA. In this regard, consideration should be given to amending Local objective 14 of the Development Plan, *"....to encourage the appropriate redevelopment of the Gut..."*
  - The Greater Dublin Area Regional Planning Guidelines 2010-2022
  - The Draft Offshore Renewable Energy Development Plan.
- It should be an objective of the Plan, through a specific objective/policy, to require AA screening be carried out for projects which may impact upon the designated Natura 2000 sites.
- In promoting water leisure facilities, consideration should be given to minimising the impact upon designated conservation sites.
- Consideration should be given to carrying out a flood risk assessment, in accordance with the Flood Risk Management Guidelines.

Environment, Communities and Local Government

- Architectural heritage will be a significant issue for Dun Laoghaire Harbour, which has a unique history, form and character.
- There is potential for archaeological remains.
- The impact upon Natura 2000 sites should be specifically taken into account.
- The impacts upon otters, bats, black guillemots, seals and cataceans should be assessed.
- The Plan should be screened for Appropriate Assessment

The Minister for Communications, Marine and Natural Resources

The submissions indicated that there were no observations.

The Minister for Agriculture, Fisheries and Food was only designated an environmental authority in May 2011.

Department of Arts, Heritage and the Gaeltacht

This submission highlighted the following:

- The reuse of the elements of the former Train Shed on the Carlisle Pier should be required in the final Masterplan.
- The Mitigating Measures in the Environmental Report and the AA should be included in the Final Plan.

Each of the above points has been specifically addressed in the Masterplan.

2.5 Baseline Data

There is a range of information sources included in this Environmental Report that have been used to provide an insight into the different components of the environment and the potential effects of implementing the Masterplan.

Baseline data was collected based on the indicators described in the SEA Directive, namely population and human health, biodiversity, fauna, flora, soil, water, air, climate factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship of these factors. Some of the indicators were combined to avoid duplication and in some instances, indicators were combined where the environmental impacts of the Plan are considered to be minimal to an indicator. Existing data sources were utilised where available, with additional primary studies also carried out. Background architectural heritage, archaeological, ecological, transport, water, air and noise reports have been prepared as part of this SEA and have informed the Masterplan.

2.6 Layout of the Report

The layout of this Environmental Report follows the format recommended in the Guidelines on SEA prepared by the DoEHLG[5]. This is outlined in Table 2.1

Table 2.1 – Layout of Report

SEA GUIDELINES RECOMMENDED LAYOUT FOR AN ENVIRONMENTAL REPORT	LAYOUT FOR THIS ENVIRONMENTAL REPORT
i) Non-technical summary (may also be provided separately)	Non-technical Summary
ii) Introduction (brief description of the plan and the area; purpose of report)	1.0 Introduction
iii) SEA methodology (including authors, methods used, technical difficulties encountered, list of environmental authorities consulted, etc)	2.0 SEA methodology
iv) Relationship of the plan with other relevant plans and programmes	3.0 Relationship with other Plans and Programmes

[5] *Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment, Guidelines for Regional and Planning Authorities*, page 39, Dept of the Environment, Heritage and Local Government, November 2004.

v) Summary of the baseline environment	4.0 Baseline Environment
vi) SEA Objectives and indicators	5.0 SEA Objectives and indicators
vii) Assessment of alternatives and selection of preferred alternative	6.0 Consideration of Alternatives 7.0 Assessment of Preferred Alternative
viii) Incorporation of mitigation measures and assessment results into the plan	8.0 Mitigation Measures
ix) Monitoring proposals	9.0 Monitoring

2.7 SEA Team

The Environmental Report was prepared by a study team led by MacCabe Durney Barnes, Town Planning Consultants, who were responsible for the overall study management and co-ordination and editing. Other consultants prepared background reports. The members of the study team and their respective inputs are detailed in Table 2.2.

Table 2.2 – SEA Team

SEA Section	EIS Consultant
Introduction	MacCabe Durney Barnes, Metropolitan Workshop
SEA Methodology	MacCabe Durney Barnes
Relationship with Plans and Progammes	MacCabe Durney Barnes
Aspects of the Environment	
- Biodiversity (Including Flora & Fauna)	Natura
- Population and Human Health	MacCabe Durney Barnes
- Soils, Geology, Water, Air Quality, Climate, Noise, Vibration	Arups
- Landscape	MacCabe Durney Barnes, Metropolitan Workshop, Mitchell & Associates
- Cultural Heritage - Archaeology	The Archaeological Diving Company Ltd
- Cultural Heritage – Architectural Heritage	Shaffrey & Associates
- Wastewater, Drinking Water, Waste Management	Arups
- Transport	Aecom
- Flood Risk	Arups
Environmental Objectives	MacCabe Durney Barnes
Alternatives	MacCabe Durney Barnes
Mitigation	All
Monitoring	All

2.8 Difficulties Encountered

During the preparation of the Environmental Report, existing data was not always available at the appropriate scale for the Masterplan area, so a mix of local, county and regional baseline data has been used. Having determined the scope of the environmental report, there were deficiencies in information in relation to areas where significant environmental impacts were identified. This was largely overcome by the undertaking of primary studies in the areas of archaeology, ecology and flood risk. Further studies may be required during the life-time of the plan, or at planning application stage, but this will be dealt with at the monitoring stage.

3 RELATIONSHIP WITH PLANS AND PROGRAMMES

3.1 Introduction

Under the SEA Directive, the environmental report will provide information on (inter alia): -

- *"the relationship of the plan… with other relevant plans and programmes"* (Annex 1(a) of the Directive); and
- *"the environmental protection objectives, established at international, European Community or national level, which are relevant to the plan… and the way those objectives and any environmental considerations have been taken into account during its preparation"* (Annex I (e)).

The scoping stage identified the relevant plans and programmes and these are detailed below in sections 3.1 to 3.3 below. Appendix I summarises the relevance of the Masterplan to these plans and programmes.

3.2 EU Directives and Policy

Those of relevance include:

- EC Birds Directive
- EC Habitats Directive
- EC Water Framework Directive
- The European Commission Recommendation on Integrated Coastal Zone Management (ICZM)
- The Ports Policy Communication
- Maritime Spatial Planning in the EU
- Integrating Biodiversity and Nature Protection into Port Development
- The Implementation of the Birds and Habitats Directive in Estuaries and Coastal Zones

3.3 National Plans and Programmes

Relevant plans and programmes include:

- The National Spatial Strategy 2002-2020
- The National Development Plan 2007-2013
- Smarter Travel - A Sustainable Transport Future
- The Ports Policy Statement, Department of Transport
- The Ports Policy Review Consultation Document, Department of Transport
- Draft Offshore Renewable Energy Development Plan
- Ministerial Guidelines
  - Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas, and accompanying document Urban Design Manual – A Best Practice Guide (2009)
  - Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities (2007)
  - Retail Planning - Guidelines for Planning Authorities (2005)

- The Planning System and Flood Risk Management - Guidelines for Planning Authorities (2009)
- Architectural Heritage Protection – Guidelines for Planning Authorities (2004)

3.4 Regional Plans and Programmes

The following are of relevance:

- Regional Planning Guidelines for the Greater Dublin Area 2010-2022 (2010)
- Retail Strategy for the Greater Dublin Area, 2008-2016 (2008).
- Dublin Transportation Office - Platform for Change - Strategy, 2000-2016 (2000).
- Greater Dublin Area Draft Transportation Strategy, 2011-2030.
- Greater Dublin Strategic Drainage Study (GDSDS) (2005).
- Greater Dublin Water Supply Strategic Study 1996-2016
- Waste Management Plan for the Dublin Region 2005-2010
- Air Quality Plan for the Dublin Region (1999)

3.5 Local Plans and Programmes

The following are of relevance:

- Dun Laoghaire Rathdown County Development Plan 2010-2016
- Dun Laoghaire Rathdown County Development Plan 2010-2016 SEA
- County Development Board – An Integrated Strategy for Social, Economic and
- Cultural Development 2002-2012
- Draft Traveller Accommodation Programme (2008)
- Dun Laoghaire-Rathdown Arts Strategy 2007-2010
- Dun Laoghaire-Rathdown Heritage Plan (2004)
- Dun Laoghaire-Rathdown Biodiversity Plan (2008)
- Dun Laoghaire Rathdown Building Heights Study (2007)
- The Local Coastal Plan Booterstown to Sandycove (2002)
- The Vision – Tourism Masterplan for Dun Laoghaire-Rathdown (2008)
- Sutton to Sandycove Cycleway, Dublin Regional Authority (2006)
- Dublin Bay Task Force,DoEHLG (2008)
- Dublin Port Study (Department of Transport, 2008)
- The Potential for Growing Marine Leisure (Inter Reg 2005-2007)
- Dun Laoghaire Baths Proposal, Dun Laoghaire Rathdown County Council (2010)
- Dun Laoghaire DART Station Interchange, DTO (2006)

4 BASELINE ENVIRONMENT

4.1 Biodiversity (including Flora and Fauna)

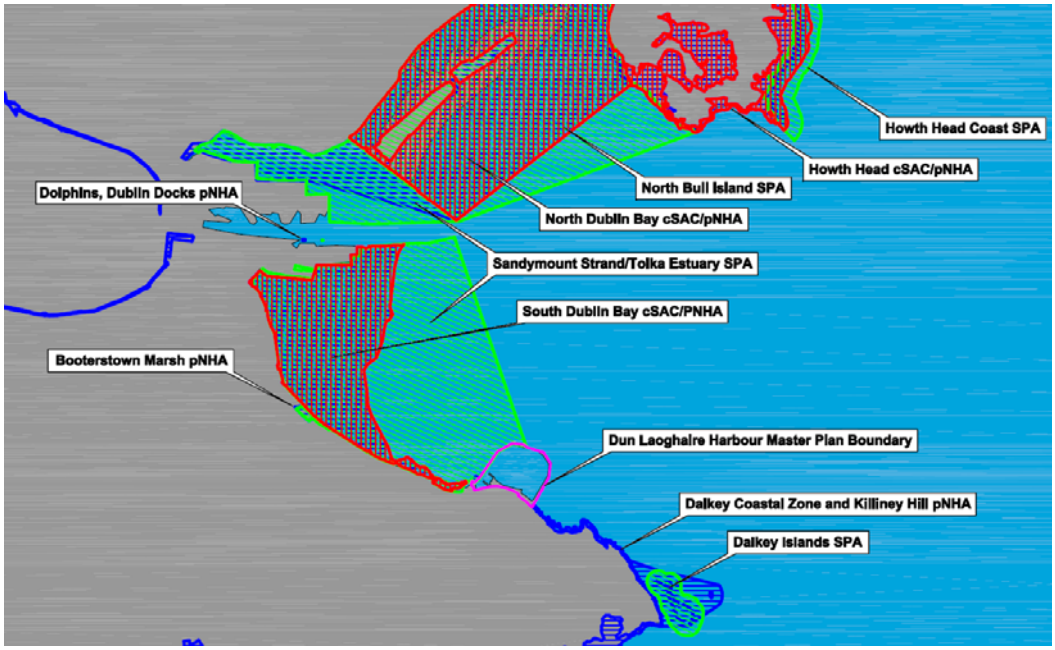
Designated Areas

The Sandymount Strand and Tolka Estuary SPA is located immediately west of the West Pier encompassing the intertidal area between the River Liffey and Dún Laoghaire. An internationally important population of light-bellied brent geese occurs regularly. South Dublin Bay supports important populations of a range of other species (see below). It is also an important site for wintering gulls, especially black-headed gull, common gull and herring gull. The south bay is an important tern roost in the autumn (mostly late July to September), with over 10,000 terns recorded in recent studies.

South Dublin Bay cSAC is located west of The Gut and extends as far as the South Wall encompassing an extensive area of sand and mud flats, with habitats listed on Annex I of the E.U. Habitats Directive.

Dalkey Coastal Zone and Killiney Hill pNHA lies to the east of the East Pier and includes the intertidal area from Scotsman's Bay to south of White Rock (Killiney Bay). The amenity area above high water mark in Scotsmans Bay is excluded from the pNHA. The principal marine interests in the pNHA are in Dalkey Sound and environs which have been highly regarded as a valuable marine collecting area for many years. The pNHA site synopsis does not mention any marine interests from Scotsman's Bay.

Figure 4.1 – Designated Areas



The implications of a pNHA designation are as follows. Proposed NHAs are habitats or sites of national importance for nature conservation, which have been identified by the National Parks and Wildlife Service. These sites become NHAs once they have been formally advertised and land owners have been notified of their designation. NHAs are protected under the Wildlife (Amendment) Act, 2000, from the date they are formally proposed. The

Wildlife (Amendment) Act 2000 requires prior consultation with the National Parks and Wildlife Service if any development is likely to impact negatively on a pNHA.

Habitats

Marine and terrestrial habitats on the site are as follows (codes are those given by Fossitt[6]):

- Sea walls piers and jetties (CC1)
- Stone walls and other stonework (BL1);
- Buildings and artificial surfaces (BL3) ;
- Ornamental non-native shrub (WS3);
- Amenity grassland (GA2).

Marine and terrestrial habitats adjacent to the site are classified as follows:

- Exposed rocky shores (LR1);
- Moderately exposed rocky shores (LR2);
- Sheltered rocky shores (LR3).

These habitats correspond to the following biotope categories in the classification of Connor et al[7].

- Exposed littoral rock (mussel/barnacle shores) – ELR B Pat.Sem;
- Moderately exposed littoral rock (barnacle/fucoid shores) – MLR. Ent;
- Sheltered littoral rock (fucoid shores) – SLR.Fspi.

There is very little information on fish or the intertidal or benthic (seabed) marine life of the harbour.

Protected Species

Under the European Communities (Natural Habitats) Regulations 1997 and amendments many species receive protection wherever they occur throughout the wider landscape. In particular bats, otters and cetaceans are strictly protected by the Regulations as they are listed on Annex IV of the Habitats Directive. In addition many species of flora and fauna are protected by the Wildlife Act (1976) and the Wildlife (Amendment) Act 2000 in the wider countryside.

Otters and bats occur throughout the harbour area although there is limited information on the species of bats present. Additional surveys of these species at project design stage would be required to determine baseline status and appropriate mitigation where necessary.

Birds

Dun Laoghaire Harbour is a long-established feature of South Dublin Bay. The granite piers and the rock armoury, that protects them, are important as roosting and feeding sites for

[6] Fossitt, J.A. 2000. *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny.

[7] Connor, D.W., Brazier, D.P., Hill, T.O. & Northen, K.O. 1997. *Marine Nature Conservation Review: Marine biotope classification for Britain and Ireland. Volume 1. Littoral Biotopes.* Joint Nature Committee. Peterborough.

birds. In strong winds and big seas the harbour walls provide shelter for seabirds, waders, divers and some small song birds. The West Pier, in particular, is well known as a landfall for rare and unusual migrants, mainly in the autumn months. Waders are frequently seen feeding on the West Pier in winter and at high spring tides there can be a large mixed flock of up to 500 waders roosting here including Ringed Plover, Sanderling, Dunlin and Redshank. Scotsman's Bay and the East Pier are especially important for gulls in winter (information from R. Coombes, BirdWatch Ireland).

South Dublin Bay (from Poolbeg to Dalkey Island) is internationally important for birds, especially in the non-breeding season[8]. It holds very large numbers of water birds, especially Brent Geese, waders, gulls and terns. Sandymount Strand and Merrion Strand together, are of very significant value for roosting gulls and terns, from colonies all over the Irish Sea, in late summer and autumn[9]. Twenty six species of birds have been noted from the immediate area of Dun Laoghaire Harbour by R. Coombes (BirdWatch Ireland).

- *Great Northern Diver:* A few birds may be present in winter off the West Pier.
- *Red-throated Diver*: Up to 10 birds are seen in winter feeding off the outside of the West Pier.
- *Great Crested Grebe:* Up to 10 birds are seen in winter feeding off the outside of the West Pier.
- *Red-Necked Grebe:* An unusual vagrant seen in the Harbour in winter 2010-11.
- *Pale-bellied Brent Goose:* Small flocks feed on seaweeds in the intertidal areas of Scotsman's Bay and Salthill during the period from September to April.
- *Red-breasted Merganser:* These ducks are usually present in winter around the West Pier and occasionally inside the Harbour.
- *Cormorant:* Frequently feed in the harbour and roost on the piers and intertidal rocks in Salthill and Scotsmans Bay.
- *Grey Heron:* Some birds frequently present on the outside of the West Pier and on the intertidal areas of Salthill and Scotsmans Bay.
- *Little Egret:* Often present on the intertidal areas of Salthill and Scotsmans Bay.
- *Ringed Plover:* Present in a mixed flock of roosting waders on the outside of the West Pier in winter.
- *Sanderling:* Present in a mixed flock of roosting waders on the outside of the West Pier in winter.
- *Dunlin:* Present in a mixed flock of roosting waders on the outside of the West Pier in winter.

[8] Crowe, O. 2005. *Ireland's Wetlands and their Waterbirds: Status and Distribution*. Newcastle. BirdWatch Ireland.

[9] Merne. O.J., Madden, B., Archer, B. and Porter, B. 2008. Autumn roosting by terns in South Dublin Bay. *Irish Birds* 8, 335-340.

- *Redshank:* Present in a mixed flock of roosting waders on the outside of the West Pier in winter.
- *Purple Sandpiper:* 10-20 birds occur on the East Pier and may move to the West Pier when disturbed.
- *Turnstone:* Up to 50 birds may be present on the East and West Piers and around the Coal Harbour.
- *Northern Razorbill:* Small numbers often present in the Harbour in winter.
- *Common Guillemot:* Small numbers often present in the Harbour in winter.
- *Black Guillemot:* Small numbers often present in the Harbour in winter. Small numbers nested in the structure beneath the Carlisle Pier but their current status is unknown.
- *Black-headed Gull:* Up to 500 birds present in Scotsman's Bay, especially near the East Pier in winter.
- *Common Gull:* Present in Scotsman's Bay, especially near the East Pier in winter.
- *Herring Gull:* Present Scotsman's Bay, especially near the East Pier in winter.
- *Mediterranean Gull:* Up to 70 birds present in Scotsman's Bay, especially near the East Pier in the period July to March. These birds breed in Holland, Belgium and Germany. This is one of the largest wintering concentrations of this species in Ireland.
- *Great Black-backed Gull:* Present Scotsman's Bay, especially near the East Pier in winter.
- *Common Tern:* Flocks feed in the Harbour in summer and autumn. Earliest migrants often recorded from the piers in spring.
- *Rock Pipit:* Common breeding bird on the main piers, among the rock armoury.
- *Black Redstart:* A rare vagrant species present in winter on the West Pier and Coal Harbour area.

Terrestrial Mammals

There are no specific records available as to the presence or distribution of otters in the Dun Laoghaire area. The National Parks and Wildlife Service on-line database shows a record within the 10km grid square containing Dun Laoghaire harbour – O22. However, the record relates to Ballybetegh, Kiltiernan which is 8.5km to the south west.

There are no records of bat populations in the Dun Laoghaire area from the NPWS on-line database or in the National Biodiversity Data Centre. In the course of previous survey work carried out by Natura in Moran Park, Dun Laoghaire (adjacent to the Masterplan boundary) two bat species were recorded - Leisler's (Nyctalis leisleri) and common pipistrelle (*Pipistrellus pipistrellus*).

Marine Mammals

Dun Laoghaire is an important area for marine mammals, particularly harbour porpoise, as recorded in the sightings database of the Irish Whale and Dolphin Group (IWDG). Other dolphin and whale species are occasionally reported from the Dublin Bay area and may feed in proximity to Dun Laoghaire Harbour. Occasional small numbers of seals (both grey seal and harbour seal) have been recorded hauling out on intertidal rocks in Scotsman's Bay, which is located to the east of the Masterplan area. Grey seals are often present in the Marina and the Coal Harbour where they are fed by users. Marine animals are vulnerable to loud underwater noises such as blasting, pile-driving or rock armouring.

Site Evaluation

The Masterplan area lies in close proximity to a number of Natura 2000 sites. Dublin Bay provides an excellent example of a coastal system with extensive sand and mudflats, and with all the main coastal habitats represented, many of which are listed on Annex I of the E.U. Habitats Directive. Dublin Bay as a whole is among the most important sites for wintering water birds in Ireland. Numbers have remained relatively stable since the mid-1990s, despite encroaching development and increased levels of disturbance from recreational activities[10]. The habitats present within the site are generally common and widespread on the south coast of Dublin and are of moderate to high conservation value.

Key Issues

A critical issue will be the protection of the designated areas that lie immediately adjacent to, or in the vicinity of the Masterplan area. These are: Sandymount Strand and Tolka Estuary SPA, South Dublin Bay cSAC, and Dalkey Coastal Zone and Killiney Hill pNHA.

The issue of disturbance to habitats and species will need to be adequately addressed to ensure that there are no negative impacts on key habitats or species during the construction or operation phases of the plan. Impacts on Natura 2000 sites (SPAs, SACs) will require assessment according to Article 6 of the Habitats Directive and an Appropriate Assessment Screening Report will be required in the first instance.

The Masterplan area lies in close proximity to a number of Natura 2000 sites. The proposed Masterplan should be subject to an Appropriate Assessment Screening in accordance with Article 6 of the EU Habitats Directive and Guidelines issued by Department of the Environment, Heritage and Local Government[11].

4.2 Population and Human Health

The County's population stands at c.206,995 or 16% of Dublin's population[12]. The 2006 Census revealed a trend of relatively low population growth. However, population growth picked up considerably in the five years to 2011. The population grew by 2,250 persons (1.2%) between 2002 and 2006 and 12,957 persons between 2006 and 2011 (6.7%). In the last five years, national population growth rate was 8.1%. The lower growth rate when compared to the national average can be explained by an ageing population.

[10] Phalan, B. and Nairn, R.G.W. 2007. Disturbance to waterbirds in South Dublin Bay. *Irish Birds* 8: 223-230.

[11] Department of the Environment, Heritage and Local Government 2010. *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. Dublin. DoEHLG.

[12] Preliminary Census 2011 results

Key Issues

Dún Laoghaire-Rathdown is vulnerable to adverse effects from small changes in sea level combined with changes in the occurrence of severe rainfall events and associated flooding of the rivers and streams in the Plan area. Flooding is an environmental phenomenon which in certain circumstances could pose a risk to human health. Human health has the potential to be impacted upon by environmental vectors (i.e. environmental components such as air, water or soil through which contaminants or pollutants, which have the potential to cause harm, can be transported so that they come into contact with human beings). Hazards or nuisances to human health can arise as a result of exposure to these vectors arising from incompatible adjacent land uses for example. It will also be important to avoid affects on the existing and new population associated with noise, vibration and emissions to air during both construction and operational phases at Dun Laoghaire Harbour.

4.3 Soils and Geology

Dun Laoghaire Rathdown County

Urban soils make up the Northern, most built up areas of Dún Laoghaire Rathdown however the majority of the county is covered by grey brown podzols with areas of brown podzolics, peaty podzols and litosols and outcropping rock existing to the south west.

The soils of Dún Laoghaire- Rathdown have been influenced by the area's underlying geology. The North of the County is underlain with the Ballysteen formation. Moving south, Type 2p microline porphyritic extends from the west to the coast and is present in a band around the coastline and down to the south of the county.

Type 2e equigranular exists as the lands begin to rise to the south west; this is interspersed with Type 1 grandoiorite. A large area of Type 3 muscovite porphyritic surrounds around and area of Type 4 muscovite/microline porphyritic which underlies the most elevated part of the Plan area. The Maulin Formation underlies lands in the south east; this is interlocked with the Bray Head Formation and Quartzite.

Dun Laoghaire Harbour

Figures 4.2 and 4.3 illustrate the existing soils and geology of the area. Dún Laoghaire Harbour is located on the boundary of the Leinster Granite Batholith which comprises a number of domes of granite intruded into the surrounding carboniferous limestone rock. Percolation of hot hydrothermal fluids along joints resulted in the formation of quartz veins and in the alteration of the granite. Preferred weathering can occur along these zones of altered rock resulting in localised areas of weak rock.

A site investigation undertaken as part of the Dún Laoghaire Marina development in 1997 revealed bedrock at the site comprises a mottled grey and white medium to coarse grain granite. The rock mass is slightly locally weathered. A limestone/ granite conglomerate exists in the vicinity of West Pier and Traders Wharf (Coal Harbour). The conglomerate appears to represent the boundary between the carboniferous limestone and the granite. The superficial deposits comprise estuarine clayey silts and sand overlying a very stiff to hard sandy gravelly clay of glacial origin (boulder clay). Underlying bedrock is likely to be encountered at about -12 mOD nearshore dipping to -20 mOD offshore and rising to -4 mOD to -6 mOD in the South West. The estuarine alluvium on the surface of the boulder clay is typically of the order of 4 m to 8 m thick.

There are no sites of geological interest within Dún Laoghaire town or the Harbour area. There are three historical granite mines located to the South East, at approximately 400 m, 1.5 km and 2 km distance from the harbour.

Figure 4.2 – Existing Soils

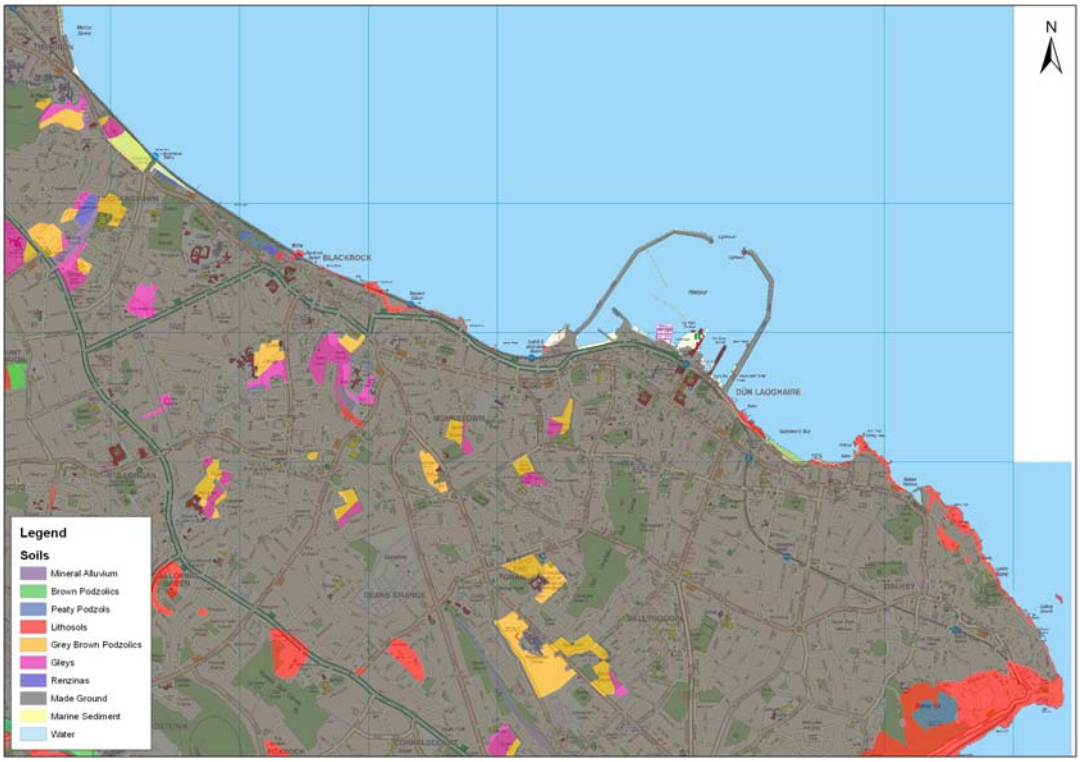


Figure 4.3 – Existing Geology

Key Issues

Soil has the potential to be polluted and contaminated as a result of pollution from development which is not serviced by appropriate waste water infrastructure. Policies in the Masterplan will ensure that the impacts on soil will be minimal within this urbanised area and ensure the amount of waste is minimised.

4.4 Water

Surface Water

Dún Laoghaire Harbour is located in and adjacent to coastal waters. Coastal waters are important for tourism, for supporting marine wildlife, and for use as bathing locations. The waters of Dublin Bay support a variety of birdlife which sustain a flow of nutrients into these waters.

The Assessment of Trophic Status of Estuaries and Bays in Ireland (ATSEBI) System is used by the EPA in order to classify the quality status of transitional waters. Categories of criteria for nutrient enrichment, accelerated growth, and undesirable disturbance are used by the ATSEBI in order to classify the estuarine and coastal waters. There are four classifications:

- Eutrophic waterbodies are those in which each of the criteria are breached, i.e. where elevated nutrient concentrations, accelerated growth of plants and undesirable water quality disturbance occur simultaneously;
- Potentially Eutrophic waterbodies are those in which two of the criteria are breached and a third falls within 15 per cent of the relevant threshold value/values;
- Intermediate waterbodies are those which do not fall into the Eutrophic or Potentially Eutrophic classes but which breaches one or two of the criteria occur; and
- Unpolluted waterbodies are those which do not breach any of the criteria.

Dublin Bay has been classified as being “Unpolluted”. It is noted that “good” status as defined by the Water Framework Directive can be attained by estuarine and coastal waters through the achievement of “Unpolluted” status.

A Water Framework Directive risk assessment has been undertaken for the coastal waters located off Dún Laoghaire- Rathdown. The waters of Dublin Bay which extend down to Dalkey Island are classified as being (1a) at significant risk of not achieving good status by 2015.

Reasons for this classification include:

- Morphological pressures such as built structures - port tonnage and an urban or industrial shoreline and coastal defences have lead to this classification; and
- Point sources such as combined sewer and treatment plant overflows and waste water treatment plants.

The main rivers in Dún Laoghaire Rathdown are the Loughlinstown River, the Glencullen River, the Little Dargle River and the River Dodder. The Loughlinstown River is the closest of these to Dún Laoghaire Harbour at over 4.5 km from the Masterplan area. Dún Laoghaire’s Rivers lie within the confines of the Eastern River Basin District.

The River Basin Districts were delineated through the progression of the Water Framework Directive which aims to promote the sustainable use of water resources across Europe and achieve good status water quality in all water bodies ranging from rivers, lakes, groundwater, transitional and coastal marine waters.

The most recent EPA water quality data identifies the Dodder River as being of Poor Status. The water quality status of the Loughlinstown River changes from Good Status at Carrickmines to Moderate to Poor Status as it flows through urban areas to the sea. In terms of achieving the WFD's objectives by 2015, all of these rivers are currently classified as being (1a) at significant risk of failing to achieve the WFD's objectives by 2015.

There are three designated bathing areas in Dun Laoghaire: Merrion Strand, Seapoint and Killiney. The most recent data published by the EPA on bathing water status in the County is for 2009. All three of these complied with Guide Values (good water quality) for 2009.

Groundwater

Groundwater is an important resource for Dún Laoghaire Rathdown as a source of potable water but also for its contribution to the hydrological balance of the county's river flows.

In general groundwater status in the Dublin region including Dún Laoghaire Rathdown has been found to be generally good with in excess of 90% of the groundwater area achieving good chemical status and quantitative status. The WFD risk assessment of groundwaters in Dún Laoghaire Rathdown classify groundwater underlying the northern half of the County being (1a) at significant risk of not achieving good status. Groundwater underlying the southern half of the County is (2b) not at significant risk. An area of land in the south eastern corner of the County near to Bray is classified as (1b) probably at significant risk. Reasons for this include diffuse pressures including clustered onsite systems and leaking urban sewerage systems and point source pressures such as contaminated land.

Flooding

The Office of Public Works (OPW) is the lead authority for river and coastal flooding and erosion management in the region and county. In terms of flood controls and flood relief schemes, the OPW are responsible for controlling river flooding in agricultural and urban areas. The OPW are also responsible for constructing and maintaining drainage works, emergency works to watercourses and sea defences.

Currently, the OPW and Local Authorities are initiating Catchment Flood Risk Assessment and Management Plans (CFRAMP) for all of the catchments across the country. Dún Laoghaire Rathdown County Council, the Office of Public Works, Dublin City Council and South Dublin County Council have identified the Dodder Catchment which is partly within Dún Laoghaire Rathdown as a priority due to existing floor risk. The Dodder CFRAM is one of a number of pilot projects currently being undertaken.

At the moment there are no complete flood risk maps available for the county. The OPW mapping does however provide information on previous flood events. The county has had previous incidents of flooding due to severe storm events and many urban centres are at risk of flooding from at least one or all three forms of coastal, pluvial or fluvial flooding.

The OPW National Flood Hazard Mapping Application indicates recurring flood events taking place at Clearwater Cove to the south of Dún Laoghaire Harbour from 2002 to 2004. Roads and basements in the area were flooding during periods of heavy rain. The likely cause identified on the OPW National Flood Hazard Mapping website was a combination of tidal conditions and surface water.

A flood event at Crofton Road, also to the South of the Harbour, occurred in October 2002. The flood report for the incident notes manholes lifting in the area following a period of heavy rainfall.

Key Issues

Human activities, if not properly managed, can cause deterioration in water quality. Pressures exerted by human activities include the following:

- sewage and other effluents discharged to waters from point sources, e.g. pipes from treatment plants;
- discharges arising from diffuse or dispersed activities on land;
- abstractions from waters; and
- structural alterations to water bodies, piers and marinas.

Flood risk and hazard is an important issue for all counties across the country including in Dún Laoghaire Rathdown. Climate change is also inducing a change in sea level and accompanied by increasingly severe storms has increased the risk of coastal flooding.

4.5 Air, Noise and Climate

Air Quality

The Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) establish the limit values in Ireland for NO_2, NO_X, PM_{10}, benzene and CO. These regulations are based on the EU Directives 1999/30/EC and 2000/69/EC.

In June 2008 the European Union published the Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on Ambient Air Quality and Cleaner Air for Europe. This new air quality Directive repeals Directives 96/62/EC, 1999/30/EC, 2000/69/EC, 2002/3/EC and Decision 97/101/EC. As a Member State, Ireland was obliged to transpose this Directive into law before 11 June 2010, to date this has not been transposed.

In order to comply with these directives, the EPA measures the levels of a number of atmospheric pollutants. For the purposes of monitoring in Ireland, four zones are defined in the Air Quality Standards Regulations 2002 (SI No. 271 of 2002). The main areas defined in each zone are:

- Zone A: Dublin Conurbation.
- Zone B: Cork Conurbation.
- Zone C: Other cities of population greater than 15,000.
- Zone D: all areas excluding Zones A, B and C.

Dún Laoghaire falls into Zone A. Current air quality in Zone A is “good”. The index is calculated based on the latest available measurements of particulate matter (PM10, PM2.5), sulphur dioxide, nitrogen dioxide (NO2) and ozone in Zone A. Dún Laoghaire-Rathdown County Council has adopted ‘The Air Quality Management Plan for the Dublin Region, 2009-2012’ under the provisions of the Air Pollution Act 1987.

Emissions from traffic are likely to be the main source of emissions in the Dún Laoghaire area. Other significant sources of emissions to air in the region result from residential home heating and solid fuel burning. Emissions from these sources would have an influence on background concentrations of NO2 and PM10/PM2.5 in the study area.

Noise

The Environmental Noise Directive (2002/49/EC) requires that action is taken by each member state, with a view to preventing and reducing environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health and to preserving environmental acoustic quality where it is good. The relevant local authorities have been designated by the Environmental Noise Regulations, SI Regulations No. 140 of 2006, as the bodies charged with development and making of 'Noise Action Plans'.

The Dublin Agglomeration Action Plan relating to the Assessment and Management of Environmental Noise (July 2008 to November 2013) summarises the statistics from noise modelling for the Dún Laoghaire-Rathdown County Council area as follows:

- Railway noise does not have a major impact on overall noise levels.
- Traffic noise is the dominant noise source.
- Almost 73% of citizens are exposed to 24-hour (Lden) sound levels from traffic below 65 decibels.
- The 'All Roads' category has a greater impact on more people than the 'Major Road' category.
- 4% of people in Dún Laoghaire-Rathdown County Council live in areas below 55 decibels 24 hour (Lden).
- 31% of citizens are being exposed to Night time levels from traffic above 55 decibels.
- Approximately 6,100 people are being exposed to average 24-hour sound levels equal to or greater than 75 decibels.

The baseline noise environment in the vicinity of Dún Laoghaire harbour is dominated by traffic noise and the intermittent DART movements.

Climate

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002. For the purpose of the EU burden sharing agreement under Article 4 of the Kyoto Protocol, in June 1998 Ireland agreed to limit the net growth of the six Greenhouse Gases (GHGs) under the Kyoto Protocol to 13% above the 1990 levels over the period 2008 to 2012.

In October 2010, the Environmental Protection Agency reported a significant decrease in Ireland's Greenhouse Gases during 2009. Ireland's Greenhouse Gas emissions fell by 5.4 million tonnes (7.9%) in 2009 to 62.32 million tonnes due to the effects of the economic downturn. The EPA report states that:

> *"while the actual situation in regard to compliance with the Kyoto Protocol will not be known until after the five year (2008-2012) period is over, it can be estimated that after the first two years we are currently a total of 6.2 million tonnes above target when the impact of the EU Emissions Trading Scheme and approved Forest Sinks are taken into account*".

Key Issues

The key issues are likely to include:

- Emissions from traffic and
- Noise emissions associated with port and entertainment related activities.

4.6 Landscape

Landscape Character

There are fourteen Landscape Character Areas identified by Dun Laoghaire Rathdown County Development Plan 2010-2016. However, none of those identified are near the Harbour area.

The coast and the Dublin Mountains are both significant to the identity of the area. The coastline where Dún Laoghaire is situated is diverse, varying from rocky headlands with a variety of inlets, long established harbours and high quality beaches. The Dublin Mountains form a distinct south-western edge to the Dublin city area rising in excess of 500m in some places - the peaks of Two Rock, Glendoo and Glencullen Mountains act as an accessible resource for both active and passive recreational pursuits. Along Dun Laoghaire's coastline South Dublin Bay SAC and pNHA (site code: 000210) are located. This site lies south of the River Liffey and extends from the south Wall to the West Pier at Dun Laoghaire. It is an intertidal site with extensive areas of sand and mudflats, a habitat listed on Annex 1 of the Habitats Directive. It is also a coastal system with extensive sand and mudflats.

Dún Laoghaire is characterized by the separation between the town and the harbour, which is the primary amenity of the area and which gives the town its unique sense of place. This separation is created by the DART, which is in open cut, and by Crofton and Queen's Road, where limited crossing points primarily serve traffic. Even the most casual observer is likely to note that there is a clear difference in 'feel' between the town and the harbour, defined primarily by current use and landscape characteristics. For the purposes of this text, the "town" will refer to the area south of the Dart line and the "harbour" will refer to the area north of the train line and between the harbour walls (the Gut is also assumed to be part of the harbour).

The town - The structure of the town is largely defined by George's Street running east-west and Marine Road running north south providing the key link between the town and the harbour. Crofton Road runs parallel to Georges Street defining the edge of the town and the beginning of the harbour. A number of north-south routes link Georges Street and Crofton Road. However, connections between the town and the harbour are considered to be poor. In addition to this, there are a number of green spaces, the largest of which is the People's Park located at the south-eastern end of George's street. The topography generally falls gently towards the harbour from the Dublin Mountains which form a backdrop to the town when viewed from the ends of the piers.

The harbour - connected along its southern edge by Harbour Road, development in the area consists mainly of marine infrastructure such as piers, transport buildings, sailing clubs and boat standage. Structures consist primarily of buildings sitting in open space surrounded by parking, outbuildings and associated landscaping. As one would expect in a working harbour, there is little urban structure in terms of streets or squares. However, several of the buildings are noteworthy due to their historic status or architectural quality.

The main areas of public open space are along the piers and harbourside, notably the East and West Pier, Traders Wharf and Old Pier, the Gut and the associated Accommodation Road. The open nature of these spaces contrasts markedly with the more enclosed nature of many of

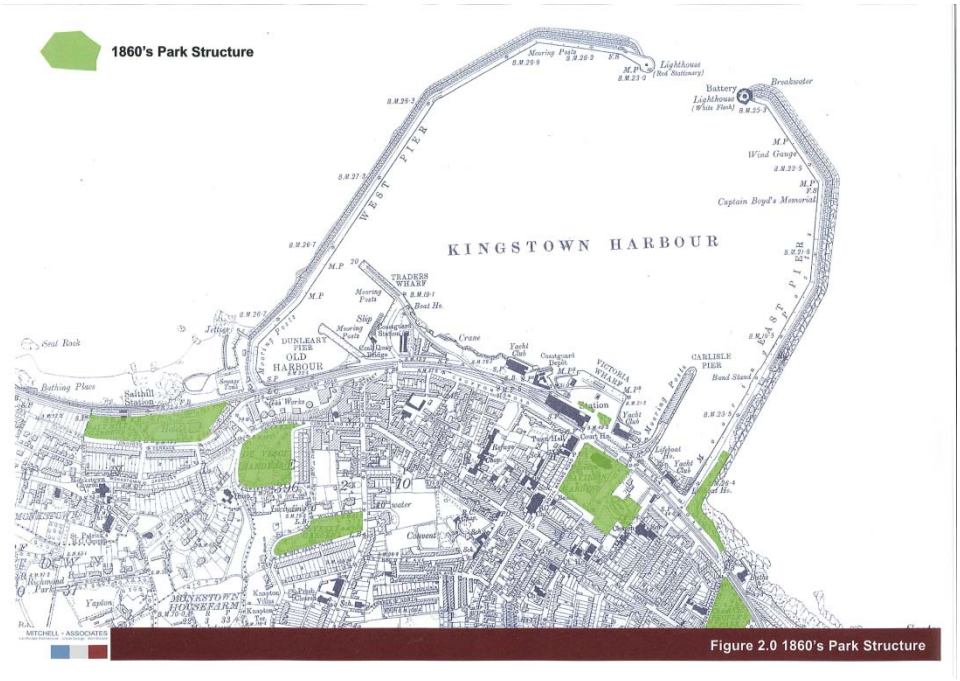
the streets within town. Some of these areas (particularly around Old harbour) are also used for car parking which tends to present a barrier to easy access to the waterside.

Further restrictions occur at a number of locations due to the marine operations of institutions such as the sailing clubs and The Commissioner of Irish Lights. Green space is largely restricted to the area west of the Royal Irish Yacht Club. There are large areas of underused/negative space, principally around St. Michael's Pier due to the reduction in passenger ferry activity.

Historic Landscape Character Areas

The Masterplan area is partially covered by a proposed Architectural Conservation Area under S81 of the Planning and Development Act 2000 (as amended). There is a legacy of planned Victorian parks and squares in Dun Laoghaire which forms an integral part of Dun Laoghaire's character which sets a strong precedent for the Harbour Masterplan.

Figure 4.4 – 1860 Park Structure



Character areas

Several distinct character areas can be defined within the Harbour itself. These consist of

- The Gut – The area to the immediate west of the East Pier. It is defined by its geographic location and sense of openess rather than its disparate uses which include industrial uses, a pumping station and sports/leisure.
- West Pier – The West Pier is regarded as being quiet and naturalistic due to its relative distance from the town centre.
- Old Harbour – located around Old Pier, Traders Wharf and the coastguard cottages, this is the oldest area of the harbour and its materials and intimate scale reflect this.

- Irish Lights and The Green – The area between the Ferry standage and the Old Harbour could be considered as an "in-between" space. While it contains the only green space in the harbour it is underused and not well overlooked.
- St. Michael's Pier – This area includes the standage as well as the terminal building and plaza. It has the most direct connection with Marine Road and the Dart station.
- Carlise Pier – This is the historic mail pier and surrounding areas. However it is currently closed to public access.
- East Pier – Better connections to the town centre mean that this pier is more heavily used than the West Pier. Its landscaping is also more urban in nature.
- Queens Road/Crofton Road – Victorian esplanade which contributes to the local sense of identity.

General Heights

Dun Laoghaire, on the coast, is designated as a major town centre. Building heights within the harbour area are typically 2-3 storeys. This height pattern is continued throughout the wider surrounding townscape. However, there is some post-war and recent developments of about 4-5 storeys, with a maximum of 7 storeys. This increase in height occurs mainly along the coast road (Crofton Road) which borders the harbour to the south. There is a significant cluster of such buildings in the area to the immediate south of the Dart station where one would expect to see higher density development. Only the spires of St. Michael's Church and Mariner's Church and the tower of the County Hall rise above this urban skyline.

The reinstatement of the Tower of the Royal Marine Hotel has added to the contrast between the horizontal plane of the Town and Harbour and the vertical elements. The manner in which the outline of the Town descends gradually down to the Harbour whose walls then extend in a horizontal plane out to sea and which is then punctuated by the Spires of the Town is a distinctive feature of Dublin Bay. This profile amplifies the urban character of Dun Laoghaire.

Views and Prospects

The Masterplan area is affected by a number of protected views in the Dun Laoghaire Rathdown Development Plan 2010-2016. There are a number of views to be preserved from inland locations looking out to the coast across the harbour and from the end of the piers. One of these views is on Marine Road outside the Pavilion Building looking across the side of the Ferry Terminal. The other notable one in Dun Laoghaire town is located outside De Vesci Terrace looking across the Old Harbour (i.e. the water inside the west pier).

There are a number of views along the coast road which are also protected. These are located at:

- Dun Leary Road looking out to the eastern edge of the West Pier.
- Dun Leary Road looking out to the inner pier (old harbour enclosure).
- Dun Leary Road looking out at the midpoint between the two above viewpoints.
- The Coal Quay Bridge looking across the harbour cottages.
- From Crofton Road at Albert Terrace and at Marine Court.
- Corner of Queens Road / Marine Road.
- Queen's Road looking down along the side of the National Yacht Club.

Views are typically composed of a number of elements ranging from:-

- The attractive seafront of terraces rising back to the skyline of the Town which is dominated by vertical Spires
- The broad expanse of the Harbour and its attractive marine architecture and the background of the Dublin Mountains and Killiney Hill

Within the Harbour itself, the appraisals of the Dun Laoghaire Urban Structure Plan contained in the Development Plan makes a detailed visual analysis which grades views and prospects into those which are considered high, medium or poor. These views could be further subdivided into panoramic views, long range views and glimpses.

For example, high value panoramic views include those from:-

- The East Pier looking east towards Scotsman's Bay
- East Pier looking towards Carlisle Pier
- the Ferry Terminal outwards to the new marina
- The east end breakwater towards Howth
- The East Breakwater looking west towards the Marina
- The green space and Crofton Road looking north to Howth
- Traders Wharf looking towards the East Pier battery
- Old Pier looking towards traders Wharf
- West Pier looking towards the Coastguard cottages
- Accommodation walks looking north towards Howth.
- The Gut looking east towards Dublin Port.
- Adelaide Street towards East Pier Battery

A high proportion of panoramic views, particularly from the water's edge, reflect both the topography and openness of Dublin Bay.

High value long range views include those from:-

- Haig Terrace towards East Bight
- Moran Park towards East Pier Battery
- East of Royal Yacht Club looking north-west
- East End Marina looking south towards Crofton Road
- Traders Wharf looking south towards Crofton Road
- Old Pier looking south towards Crofton Road

There are also important long range views from the ends of the East and West Piers back to the Town which have a very sensitive character and require protection or enhancement.

Medium value long range views include those from:-

- The old lifeboat slip at the bottom of East Pier looking towards the Carlisle Pier
- Georges Street along Marine Road
- East of Royal Yacht Club looking north-west
- Terminal plaza looking towards Howth (above wall)

Medium value glimpse views include those from:-

- Looking north along Clarence Street
- Looking north along Kelly's Avenue
- Looking north along Crofton Avenue

- Looking north along Charlemont Avenue
- Looking north from Harbour Lodge

These views are more intimate, characterised particularly by the series of glimpses along the lanes and opes to the south of Crofton Road, and are very characteristic of the enclosed nature of the town. Notwithstanding the above, there are also a number of lower quality views which require improvement.

Poor views include that of:-

- Carlisle Pier from its entrance
- The wall of the public space to the bottom of the Marine Road looking northwards
- The Ferry Terminal Plaza across the boatyard of the Royal St George Yacht Club.
- Across the Dart line and station from the bus stops on Crofton Road
- Looking north along Crofton Place

There are also other protected views/prospects in the Fingal County Development Plan 2005-2011 from Howth/Sutton across the Bay that may be of relevance. There are other important views from Sandymount, Poolbeg and Dollymount Strand which are not specifically listed in the Dublin City Development Plan 2011-2017. Figures 4.5 and 4.6 below illustrate the protected views and prospects, in addition to other views that may merit further consideration.

Figure 4.5 – Dun Laoghaire Harbour Views Analysis

Figure 4.6 – Strategic Views Analysis

Key Issues

The visual impact upon the landscape will be a key issue in the overall development of the Masterplan. Building heights and massing will have to have due regard to the townscape of Dun Laoghaire and skyline punctuated with spires. The Masterplan provides an opportunity to enhance local amenities and due regard will have to be paid to the historic landscape, represented by the Harbour itself and historical landscape areas around it.

There are strategic protected and unlisted views across Dublin Bay and important local views from the town and coastline. In addition, there are key views from within the harbour. Sea views on the approaches to Dun Laoghaire will also have to be considered.

4.7 Cultural Heritage – Archaeology

The baseline archaeological data has been acquired from an examination of archival resources, including the National Museum of Ireland topographical files; Department of the Environment, Heritage and Local Government (DoEHLG) Register of Monuments and Places files, Historic Shipwreck Inventory files, and Excavations database files; cartographic sources, including historic Admiralty Charts, Ordnance Survey First and Second Edition maps; Port/Harbour records; and relevant published sources.

There are clear indications of a rich and still largely unexamined earlier narrative associated with the early medieval origins of the harbour as a natural landing place that was protected and controlled by a leading Leinster king, Laoghaire. The supposed site of his dun or fort does not survive but its general location is known. Although the area has been significantly developed, opportunities should be taken when they arise to assess the potential for new insight, since the earliest origins of the harbour remain unclear.

The history of the development of Dún Laoghaire harbour is best understood for the Victorian era and later, when the East and West Piers provided a haven for commercial and leisure activity. Archaeological enquiry has not extended to the study of the nineteenth-century piers. What is known of these structures is based on the work of historians and architectural historians.

Dún Laoghaire is a location that has one of the largest number of reported shipwrecking events along the east coast. Despite the very small number of known wrecksite locations, there remains the potential for new discoveries to be made during construction activities associated with development of the harbour. Archaeological work associated with the harbour has been limited and has been conducted in relation to marine excavation and dredging work, both for the Dún Laoghaire Marina and the HSS navigation channel respectively.

Figure 4.7 – Archaeological Monuments and Shipwrecks

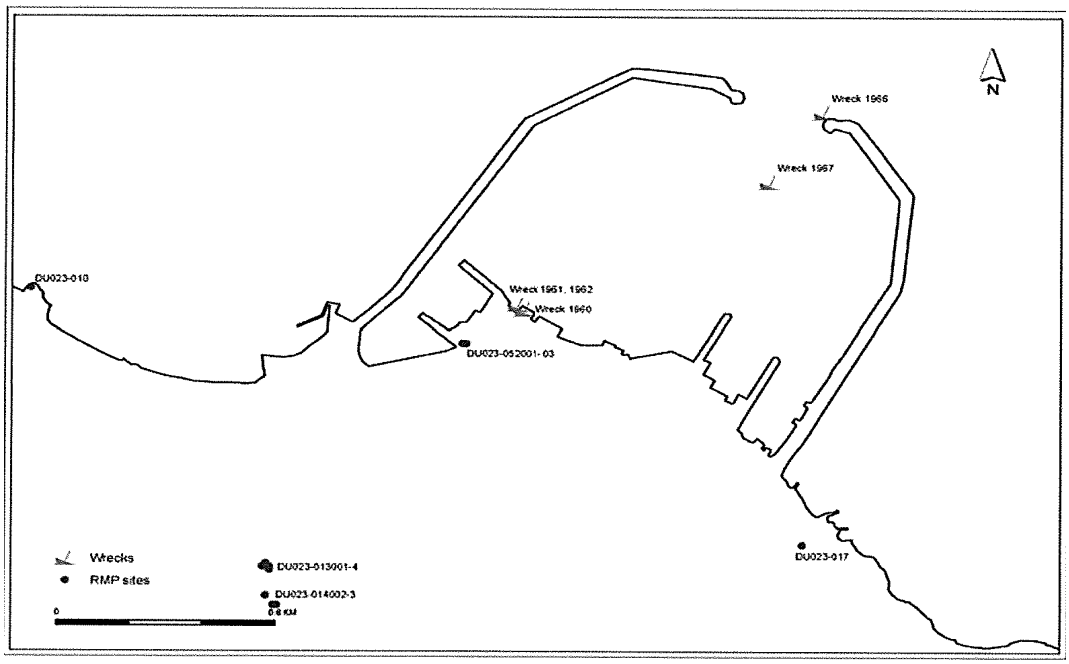


Figure 4.10 - Harbour Area 1673

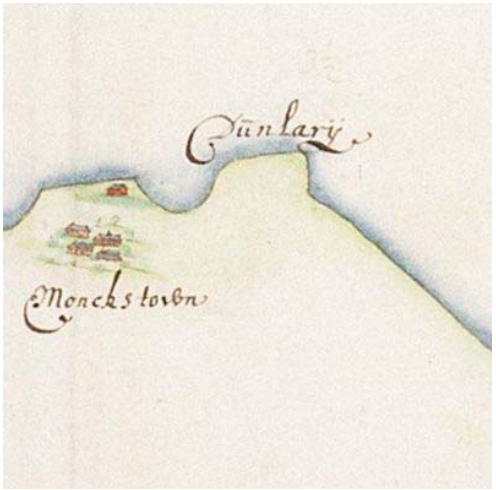
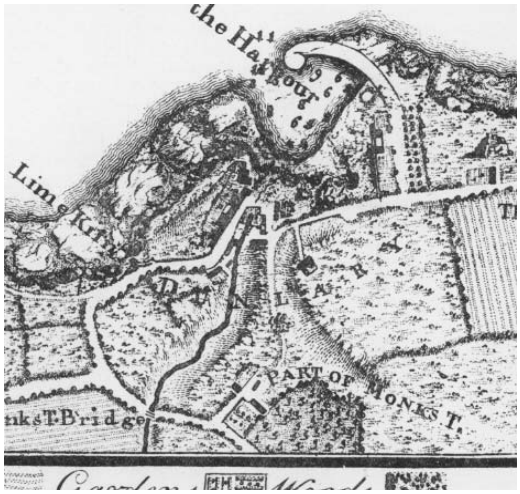


Figure 10 - John Rocque's Map 1765



Key Issues

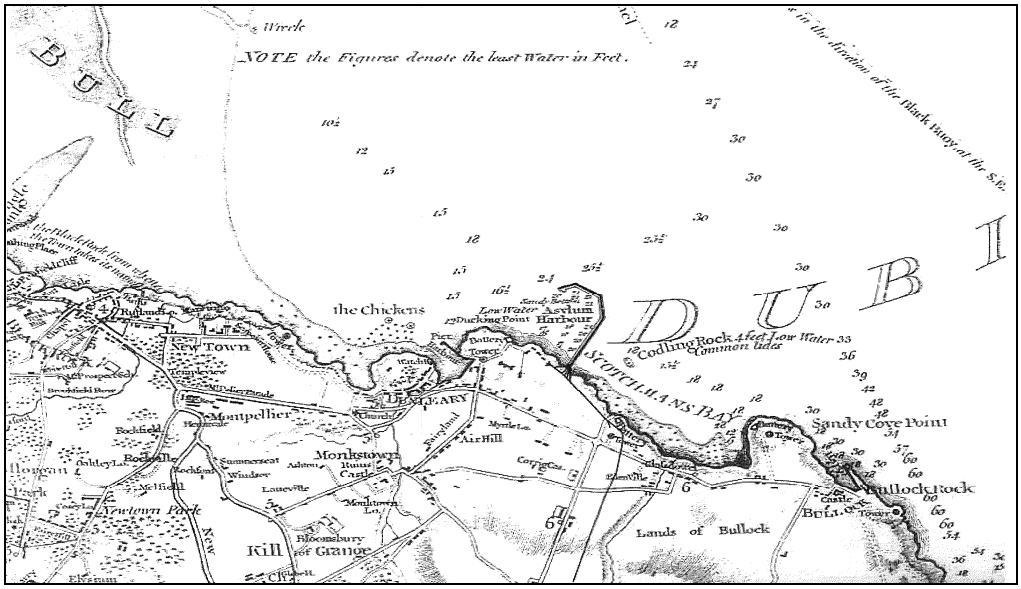
Due consideration will have to be given to the Recorded Monument (RMP DU023-052001) in the preparation of the Masterplan. In addition, there is significant potential for maritime archaeological remains. An archaeological protocol should be considered to ensure that archaeological work conducted as part of future development projects within the harbour meets overall project design requirements relating to the harbour's Cultural Heritage mission.

4.8 Cultural Heritage – Architectural Heritage

History

Dún Laoghaire Harbour was built between the years 1817 and 1842. The Harbour, and the railway that was built to service it, transformed the character of the small fishing village then known as Dunleary. In a very short period a suburban town of considerable scale sprung into existence. It became known as Kingstown after the visit to the Harbour by George IV in 1821.[13] The mail service that was transferred from Howth in 1826 gave added significance and importance to the town, while the railway built by James Pim, which serviced the mail, also made it possible for great numbers of civil servants, bank officials, merchants and tradesmen to commute daily into Dublin while retiring in the evening to the pleasant environs of the sea.

Figure 4.10 – Dun Laoghaire 1820s



Dún Laoghaire Harbour was built as an asylum harbour to give safe refuge to ships on their way to Dublin stranded at sea during bad weather or poor tide conditions. Granite was excavated on Dalkey Hill and delivered to the Harbour by a funicular railway - connected by a continuous chain the weight of the granite-filled trolleys going down was sufficient to pull the empty trolleys up and no horses or steam-engine were needed. Granite was also quarried at what is now known as the People's Park in Glasthule at the site of the now disappeared Martello tower, and in Churlfield, or Churl Rocks, now known as Moran's Park. The first stone of the Harbour was ceremonially laid by Lord Lieutenant Whitworth on 31st of May

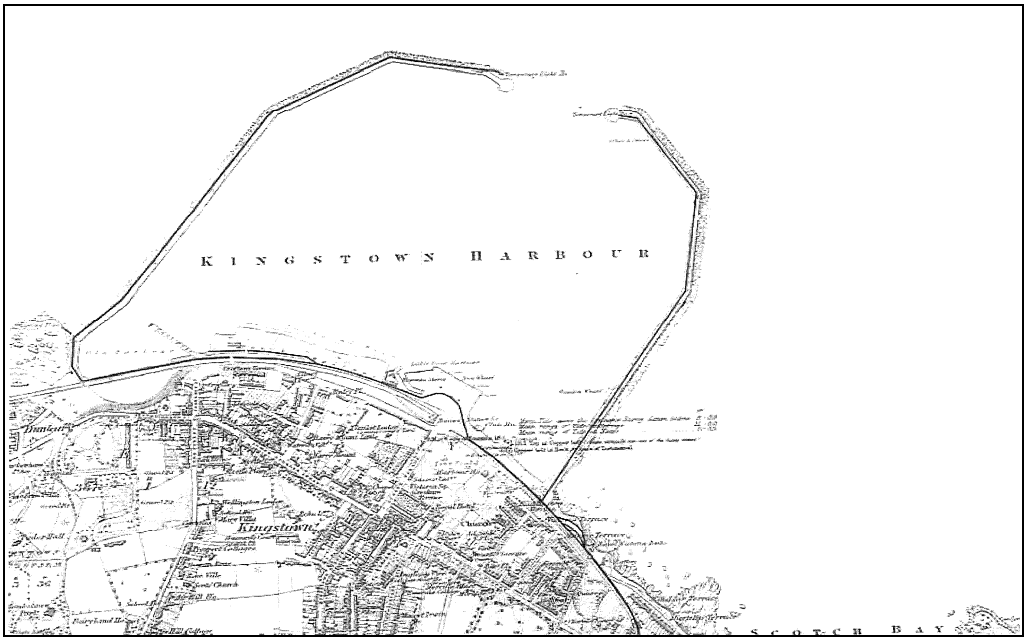
[13] Kingstown reverted to Dún Laoghaire in 1920, but for the purposes of this report Dún Laoghaire will be the name used for the town and the harbour throughout the report.

1817. Rennnie's original scheme provided for a two-piered harbour and Rennie's son, Sir John Rennie, took over the responsibility for the construction of the Harbour after the death in 1821 of his father. The piers, permanent lighthouse and battery were completed in 1842. The East Pier reached a length of 4231 ft and the West Pier was 5077 ft. They enclosed an area which comprises 251 acres of water.

In 1834 a railway was extended from the city of Dublin out to Dún Laoghaire. The Mail Packet was transferred to Dún Laoghaire in 1826. It was first accommodated by a wharf near the present band stand on the East Pier, then on the so-called Traders wharf, immediately to the east of the Old Pier, which was built in 1855, and finally by Carlisle Pier which accommodated the mailboats until recent times. Carlisle Pier, which was begun in 1853, was built to accommodate the largest types of steamboat then being built. When the railway was extended from Dún Laoghaire to Wexford a connecting spur to the new pier was added.

At the beginning of the century cars could be lifted onto the mailboat using derricks, but the maximum capacity of the ferry boats was about twenty-five cars. From the 1960s the need for a ferry service with drive-on and drive-off facilities became apparent. Although temporary facilities for a car ferry were located at the base of the East Pier in 1969 a new permanent ferry terminal located at St Michael's Wharf (formerly Victoria Wharf), to the west of Carlisle Pier, was built. Construction, which began in 1969, involved the loss of the granite neo-classical Sailor's Reading Room at that time the home of the Museum and Headquarters of the Maritime Institute of Ireland. A new pier, which absorbed St Michael's wharf and involved the filling in of the old Depot Harbour, was built, with a customs hall, departure point and car parking facilities. However the Mailboat continued to operate from Carlisle Pier until 1976. When the St Columba, a considerably wider vessel than those that had docked at Dún Laoghaire until then, was introduced in 1977, facilities for it were provided at Carlisle Pier and only smaller vessels used St Michael's Wharf.

Figure 4.11 – Dun Laoghaire 1843



Description of Structures

Dun Laoghaire Harbour is today defined and enclosed by the two principal breakwaters, commonly known as the East and West Piers. The East Pier is 4,231 feet in length (1,290 metres) and the West Pier is 5,077 feet (1,547 metres). Together they originally enclosed a water body of 251 acres (101.58 hectares), although this is somewhat smaller today due to subsequent foreshore reclamation as the Harbour uses expanded.

Within the Harbour area there are a number of smaller granite piers and wharfs, built as the Harbour was being completed and soon after completion, to serve a variety of landing craft. These include Victoria Wharf (1837) the Carlisle Pier (1850) and Trader's Wharf (1855). Near Trader's Wharf is the 1767 'Old Pier', around which Rennie's nineteenth century Harbour was built. Smaller granite slipways were also constructed within the Harbour, to facilitate launching of smaller boats and the most notable of these are at the beginning of the East Pier which was built in conjunction with the boathouse (now used by the RNLI) and at the east end of Trader's Wharf which again incorporates a granite boathouse or similar style and vintage to the RNLI. There is also a granite slipway within the Boatyard area, which lies between Trader's Wharf and the Old Pier.

Changes in ferry infrastructure in the second half of the twentieth century led to expansion and alteration of Victoria Wharf to form St. Michael's Pier, where the current ferry berths. Part of Victoria Wharf remains visible today – the eastern end which incorporates the 'Man of War' steps (used by the British Navy for the ship's cutters), restored in 2009. A new concrete slipway was constructed as part of harbour infill works in the mid twentieth century between the accommodation road (which runs alongside the railway line and gives vehicular access to the West Pier) and the Old Pier.

The Harbour also contains a number of buildings which are of architectural heritage significance. These comprise the two lighthouses (1847 to the designs of George Halpin) at the outer ends of the East and West Piers; the Battery military complex (1859-60) at the end of the East Pier; the Lighthouse Keeper's Cottage at the end of the West Pier (1863); the three earlier yacht clubs – the Royal St. George Yacht Club, which is the second oldest yacht club in the world (1840 designed by Jonathan Skipton Mulvaney and extended 1844 by George Papworth), the Royal Irish Yacht Club (1850, designed by Jonathan Skipton Mulvaney) and the National Yacht Club (1870, designed by William Stirling); the Coastguard Station and Cottages (1840's); the Rocket House (constructed sometime between 1867 and 1902) and, located a little away from the Harbour itself, although a fundamental original use, is the Harbour Master's Lodge (1820, built by George Smith), today the headquarters of Dun Laoghaire Harbour Company and Board.

In addition to the historic buildings of significance, the Harbour contains a number of modern buildings of varying architectural quality. These include a run of buildings at the beginning (south end) of the West Pier – the Marine Activity Centre, the Sea Scouts building and the Dun Laoghaire Motor Yacht Club building at the West Pier (c.1975); 1996 Ferry Terminal (Burke-Kennedy Doyle architects); the RNLI headquarters; the Marina building (2001 Murray O'Laoire Architects) and the Commissioners of Irish Lights Headquarters and workshop building (2006, Scott Tallon Walker Architects).

Throughout the Harbour are a number of monuments, pavilions and ancillary structures of architectural interest, including the Anemometer (1852, designed by Professor Robinson of Trinity College and the first of its kind in the world); the Boyd Memorial (1861); the Sun Shelter and Bandstand (1894 by the Glaswegian Walter McFarlane foundry); the George IV obelisk (1821) and the Victoria Drinking Fountain (1901). Again, the tradition of commemoration by

way of monument and plaque has continued into the twentieth and this century with a number of inscriptions, memorials and artworks of generally good quality.

Development Plan Provisions

Protected structures are detailed in Table 4.1 below.

Table 4.1 – Protected Structures

RPS No.	Description
726	National Yacht Club
599	Royal Saint George Yacht Club
127	West Pier
307	East Pier
401	Old Pier/Coal Quay
284	Traders Wharf
102	Lighthouse, East Pier, Dun Laoghaire
103	Lighthouse Complex, East Pier, Dun Laoghaire
711	Bollards and Chains, East Pier, Dun Laoghaire, Co. Dublin
530	Bollards and Chains, East Pier, Dun Laoghaire, Co. Dublin
491	Bandstand, East Pier, Dun Laoghaire, Co. Dublin
499	Glass Shelter, East Pier, Dun Laoghaire, Co. Dublin
754	RNLI Lifeboat House, East Pier, Dun Laoghaire, Co. Dublin
95	Lighthouse, West Pier, Dun Laoghaire
90	Lightkeeper's House, West Pier, Dun Laoghaire
629	Harbour Lodge, Harbour Square, Crofton Road, Dun Laoghaire, Co. Dublin
388	Coastguard Station (former), Harbour Road, Dun Laoghaire, Co. Dublin
458	Royal Irish Yacht Club, Harbour Road, Dun Laoghaire, Co. Dublin
417	1 Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin
414	2 Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin
409	3 Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin
406	4 Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin
403	5 Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin
400	6 Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin
395	7 Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin
393	8 Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin
360	Boat House Shed, Coal Quay, Harbour Road, Dun Laoghaire, Co. Dublin
369	Boat House, Coal Quay, Harbour Road, Dun Laoghaire, Co. Dublin

Dún Laoghaire Harbour is identified as a candidate Architectural Conservation Area (ACA) and the specific policy objective relating to candidate ACA's is Policy AR10. Other related candidate ACA'S are 'The Metals'; Dun Laoghaire Seafront and, Pavilion Site/Moran Park, Dun Laoghaire.

Character Areas, Views and Prospects

While the entity of Dun Laoghaire Harbour is in its entirety an area of distinct identity and character within the broader urban context of Dun Laoghaire and the county/regional context of Dun Laoghaire Rathdown and Dublin Bay, the Harbour itself can be understood as a series of Character Areas, each with their own distinctive character which derives from their physical composition, their history and the associative meanings of the area to those who use it. These are included in the list of character areas detailed in Section 4.6. of this report. In addition, there are views of a cultural and heritage value, which will need to be taken into account. These are:

- Views out from East Pier Battery complex and lighthouse
- View from seaward side at outer end of East Pier to Dublin Bay
- Views along East Pier looking out (seawards) through breaks in protective wall of upper level
- Views from Bandstand and sun shelter
- Views from principal rooms of the three historic yacht clubs looking out to the Harbour
- Views from Queen's Road/Crofton Road esplanade – note in particular viewing area at George IV Obelisk
- View from outer end of Carlisle Pier
- View from Marine Road towards Victoria Wharf and Harbour
- Views from grass area between RIYC and CIL headquarters offices
- Views from Coastguard Station tower
- Views along West Pier looking out (seawards) through breaks in protective wall of upper level
- Views from upper viewing deck level of protective wall at round-end of West Pier and views from lighthouse at West Pier outer end.

Key Issues

The important emerging issues relating to architectural heritage are as follows:

- The Masterplan should seek to preserve and enhance the key special architectural qualities and heritage of the Harbour, in addition to promoting a local sense of identity. In particular, it should have regard to architectural heritage character areas, and views and vistas with a heritage value.
- There will be a need to respect the setting of protected structures and preserve their fabric, in particular where condition is identified as being 'at risk' and where buildings are at risk through underuse, neglect, or over intensification of certain uses.
- New uses for the historic buildings and places of significance within the Harbour should be identified and reviewed for their appropriateness to the specific building and place and the specific impacts a particular use may have.

- Recording and archiving of relevant material will be important during the Masterplan process.
- Specialist architectural advice will be required throughout.

4.9 Material Assets (including waste water, drinking water, waste management, traffic, transport)

Wastewater

Dún Laoghaire Harbour is currently serviced by the local authority municipal waste water sewer system. Dún Laoghaire Rathdown County Council is responsible for the operation and maintenance of both the foul and surface water sewer networks within the county. The foul sewer network discharges to sewage treatment works at the following locations for treatment:

- Shanganagh
- Ringsend (operated by Dublin City Council)

The drainage of Dún Laoghaire Rathdown County Council and Dublin City is interconnected. Dún Laoghaire Harbour is serviced by the Dún Laoghaire Drainage Scheme which discharges to the West Pier pumping station. This is then pumped across Dublin Bay to Ringsend Treatment Plant. The West Pier pumping station is located on the edge of Dún Laoghaire Rathdown Harbour.

Surface water from the main Harbour area is discharged to the sea through tidal flaps.

Drinking Water

Dún Laoghaire Rathdown County Council is responsible for provision, maintenance and management of public water supply and supplies treated water to all households and business including the Harbour area.

Approximately 98% of water distributed in Dún Laoghaire Rathdown County Council is supplied from Dublin City Council treatment works at Roundwood (Vartry), Ballymore Eustace (Liffey) and Ballyboden (Dodder).

Testing is carried out at Dublin City Council's Central Laboratory which is accredited by the National Accreditation Board to undertake and certify these tests. Water supplied in the county routinely achieves a compliance in excess of 99% and is among the highest quality in the country. Results of water quality testing are submitted annually to the Environmental Protection Agency who summarise them in their annual publication Provision & Quality of Drinking Water.

In December 2010 as a result of freezing weather conditions drinking water supplies throughout the County were restricted in particular at nighttime. Likely causes are numerous water bursts and increased water demand.

Waste Management

Dún Laoghaire Rathdown County Council currently has no landfill site or any active waste treatment facilities in its functional area. The vast bulk of the waste that arises in the County is collected locally and transferred to facilities outside the County at Kill and KTK Landfill at Kilcullen, Co Kildare.

Occasionally a time-limited or volume-limited waste permit is granted to a landowner for the acceptance of waste material suitable for land reclamation purposes. Such waste is classed as inert e.g. soil and/rock and may be sourced within or outside Dún Laoghaire-Rathdown.

Traffic

The baseline report highlights the following:

- The site is well-located to provide a connection to the Town Centre uses
- Traffic flows generated by the ferry activities in the Harbour have reduced significantly in the last few years, due to reduced sailings/reduced demand
- HGV traffic which was previously an issue at the ferry terminal has now ceased to operate from Dun Laoghaire ferry terminal
- Traffic flows in Dun Laoghaire have reduced slightly due to the downturn in the economy and the reduction in construction projects
- Public transport servicing the Harbour is excellent with a high number of buses and rail services stopping adjacent to the entrance and the ferry terminal.
- Traffic signal settings at the Coal Quay Bridge junction should be revisited in light of the proposed reduced operations by Stena, which will place lower loadings when a ferry arrives and less frequently than the past situation.
- There is generally adequate car parking provision within the Harbour area to accommodate demands across most of the days, with some areas experiencing additional demand on sailing race nights and at weekends, although this tends to be well managed.

Key Issues

Waste Water

The Ringsend Wastewater Treatment Plant is currently operating at capacity. Inadequately treated effluents and spills or leakage from foul water sewer systems networks can lead to the pollution of the receiving waters. These pollutants can lead to a deterioration in water quality with subsequent downstream uses being impacted negatively e.g. water dependant ecosystems, potable water supplies, industrial or agricultural abstraction, fishing and aquaculture.

Traffic

The development of the Harbour area must have due regard to the carrying capacity of the local transportation infrastructure and the need to promote sustainable transport modes. In this regard the DART and bus services will play a significant role. Access and parking requirements for the ferry services will have to adapt to changing requirements and there will be a need to provide a high standard of coach access in the event that a cruise liner terminal is proposed. Parking will have to be managed in the interests of sustainable development and as part of an overall traffic management plan.

4.10 Identified Data Gaps

A number of deficiencies in the information were indentified through the baselines studies.

Additional information will be required at the project implementation stage on the following to ensure sufficient knowledge is available to avoid adverse impacts on the integrity of the Natura 2000 sites and on the associated ecosystems.

- Water and sediment quality in the Masterplan area;
- Benthic communities within the vicinity of the Masterplan area;
- Fish species and stocks in the Harbour and environs;
- Location of winter roosts on the piers and structures in the Harbour.

A comprehensive archaeological catalogue of materials relating to the harbour and its development may be required.

An update of the 2007 architectural inventory will be required to provide up to date baseline information on buildings, structures and elements within the Harbour area and to review condition.

In relation to the landscape impacts, further consideration may be required of the long range views and prospects.

5 STRATEGIC ENVIRONMENTAL OBJECTIVES, TARGETS AND INDICATORS

5.1 Introduction

An accepted method to determine the environmental effects of a plan is to devise environmental or SEA objectives for inclusion in the environmental report. An SEA objective is a statement of what is intended, usually specifying the desired direction of change. *SEA* objectives are a recognised way of considering the environmental effects of a plan or programme and comparing the effects of alternatives. They serve a different purpose from the objectives of the plan or programme, though they may in some cases overlap with them. SEA objectives are used to help show whether the objectives of the plan or programme are beneficial to the environment, to compare the environmental effects of alternatives, or to suggest improvements.

The SEA Guidelines for Planning Authorities indicate the following (section 4.21):

> *"It is important to understand that the SEA Directive only requires the identification of such objectives which are relevant to the plan, so a process of selection is required. Objectives should be adapted to local circumstances as necessary (e.g. coastal erosion may be relevant to only parts of a county's coastline)."*

As such, this Section presents the environmental objectives that have been identified for the environmental assessment process, against which the different Masterplan alternatives will be assessed.

The SEA objectives have been devised having regard to the baseline information, environmental issues that are apparent and to policies and objectives in place in other plans or national or European policy documents. Importantly, the selection of SEA objectives is required to be relevant to the context of the proposed Masterplan.

The SEA objectives used in this report take the form of a general statement referring to a general direction of change, which can be measured by an indicator and given specific targets. A target usually underpins an objective often having a time deadline that should be met. Indicators are measurements of variables over time, which are often used to measure or demonstrate the achievement of objectives. The objectives outlined in this section will be used for the initial assessment of the alternatives and then refined in Chapter 6, where the preferred alternative is chosen.

5.2 Relevant Strategic Environmental Objectives

Environmental objectives and corresponding indicators have been identified and devised for each of the major components of the environment as presented in Section 4 having regard to the nature of the Masterplan. These are presented in Table 5.1 below.

Table 5.1 - SEA Objectives, Targets and Indicators

SEA OBJECTIVES	TARGETS	INDICATORS
Population and Human Health		
P01: Improve peoples quality of life through the provision of residential, services, employment, recreational uses and provision of enhanced public realm	o Provide a wide range of residential and employment opportunities o Provide high quality developments in accordance with the Urban Design Principles set out in the Masterplan o Provide high quality recreational environment	o Good quality design, setting and finishes, showing a range of scale and employment types o Number of new open spaces and recreational facilities made available to the population and public following development of the Plan lands. o Increase the percentage of publicly accessible waterfront to 70%
P02: Maintain and enhance Dun Laoghaire Harbour as tourism and marine leisure destination and facility as a local and regional economic driver	o Provide for a range of tourist attractions and marine facilities	o Tourist numbers and number of leisure craft
P03: Minimise adverse safety impacts upon people arising from harbour related activities	o Provide for safely designed marine facilities o Ensure that any proposals don't compromise safety	o Number of health and safety incidents
Biodiversity, Flora and Fauna		
B01: Maintain and enhance the diversity of habitats and protected species, and ensure no adverse impact upon designated Natura 2000 sites.	o Incorporate biodiversity in landscape and building design o No loss of important habitats or species during the life span of the Masterplan	o Habitat and bio-diversity surveys o Identified occurrence of flora and fauna species o Increase/decrease in habitat diversity
Water		
W01: Ensure that any new development is adequately serviced by foul drainage infrastructure	o Phase developments in line with provision of foul treatment infrastructure	o Ensure available infrastructure capacity.
W02: Prevent pollution and contamination of groundwater, maintain and improve coastal water quality and avoid contamination of bathing water	o No contamination or pollution of water courses as a result of development o Provide surface water attenuation areas and incorporate these as a design feature	o Analysis of water indicates compliance with standards o Comparison of water quality testing on water courses shows an improvement or at least no change in water quality.
W03: Minimise any potential flood risk	o Address through design and land use allocation	o Provision of flood risk evaluations with proposed

SEA OBJECTIVES	TARGETS	INDICATORS
		developments. o % of planning applications that utilise SUDS.
Air Quality and Climate Factors		
A01: Promote sustainable energy	o All development comply with standards on Sustainable Development in EU Directive 2002/91/EC	o Percentage number of new buildings since development of the Masterplan that comply with standards on Sustainable Design (2002/91/EC standards)
Cultural Heritage/ Architectural and Archaeological		
C01: To protect all recorded archaeological sites from inappropriate development	o All unknown sites are protected from inappropriate development o Adequate investigation of identified potential archaeological sites is undertaken prior to development.	o All development within the Masterplan lands is in line with DoEHLG recommendations
C02: Protect and preserve the architectural character of the Harbour, existing protected structures within the area.	o All new development is in line with the urban design and conservation principles outlined in the Masterplan	o The design and setting of new developments incorporate design features outlined in the Masterplan
Noise		
N01: Minimise noise impacts from uses within the Harbour, including cruise liner ships and facilities	o All new development proposals to include suitable noise insulation Measures	o % of developments which include noise insulation
Landscape		
L01: Ensure that new development integrates and respects the natural form and character of the landscape and the townscape of Dun Laoghaire	o Design of all new developments is sympathetic and appropriate to its surroundings	o Appropriate scale and densities permitted, ensuring appropriate transition between new and existing development. o Limit visual impact from new development
Transport		
T01: Maximise the use of sustainable transport modes	o Higher densities. o Manage parking	o Survey to measure mode split

5.3 Compatibility of Environmental Objectives

The compatibility of each environmental objective is checked to allow for early identification of conflicts. Table 5.2 illustrates the result of this assessment. Flood protection measures (W03) may conflict with heritage protection C02)

Table 5.2 – Compatibility of Environmental Objectives

+ Significant Positive Impact, X Significant Negative Impact, O No Relationship/ Insignificant (*positive or negative*) Impact, ? Uncertain Impact

SEA OBJECTIVES	P01	P02	P03	B01	W01	W02	W03	A01	C01	C02	N01	L01	T01
P01: Improve peoples quality of life through the provision of residential, services, employment and recreational uses and provision of enhanced public realm		+	o	o	+	o	+	+	o	+	+	+	+
P02: Maintain and enhance Dun Laoghaire Harbour as tourism and marine leisure destination and facility as a local and regional economic driver	+		+	o	+	o	+	+	o	+	+	+	+
P03: Minimise adverse safety impacts upon people arising from harbour related activities	+	+		o	o	o	+	o	o	o	o	o	o
B01: Maintain and enhance the diversity of habitats and protected species, and ensure no adverse impact upon designated Natura 2000 sites.	o	o	o		+	+	o	+	o	o	+	+	+
W01: Ensure that any new development is adequately serviced by foul drainage infrastructure	+	+	o	+		+	o	o	o	o	o	+	+
W02: Prevent pollution and contamination of groundwater, maintain and improve coastal water quality and avoid contamination of bathing water	+	+	o	+	+		o	+	o	o	o	o	o
W03: Minimise any potential flood risk	+	+	+	o	o	o		o	?	X	o	o	+
A01: Promote sustainable energy	+	+	o	+	o	+	o		O	o	o	+	+
C01: To protect all recorded archaeological sites from inappropriate development	o	o	o	o	o	o	?	o		+	o	+	o
C02: Protect and preserve the architectural character of the Harbour, existing protected structures within the area.	+	+	o	o	o	o	X	o	+		+	o	o
N01: Minimise noise impacts from uses within the Harbour, including cruise liner ships and facilities	+	+	o	+	o	o	o	o	o	+		o	o
L01: Ensure that new development integrates and respects the natural form and character of the landscape and the townscape of Dun Laoghaire	+	+	o	+	+	o	o	+	+	+	o		+
T01: Maximise the use of sustainable transport modes	+	+	o	+	+	o	+	+	o	o	o	+	

6 CONSIDERATION OF ALTERNATIVES

6.1 Introduction

In this Section, the strategic alternative development proposals undergo an environmental assessment by being tested for compatibility with the SEA objectives presented.

In the following sub sections, a "Do Nothing" scenario is considered and three alternative options, one where the emphasis is on habour/port development, another urban development and a third that provides for a mix of habour and urban development uses.

The environmental assessment consists of each alternative development scenario being assessed against the SEA objectives to identify any potential effect or impact on different aspects or components of the environment. The assessment is presented in matrix form with an associated explanatory text. The potential impacts for each alternative is determined as being significant or insignificant and, where identified as being significant, as having either a positive or an adverse effect. The assessment of the impacts is both qualitative and quantitative and is based on experience to date and consultation with relevant agencies.

The key for the potential effects used in the matrices is as follows:-

+ Significant Positive Impact
X Significant Negative Impact
O No Relationship/ Insignificant (*positive or negative*) Impact
? Uncertain Impact

Following the environmental assessment of the three alternative development scenarios, the preferred alternative will be selected and described in greater detail. Then a further assessment of the chosen alternative, including the identification of any significant impacts of implementing this alternative on the different components of the environment will be outlined.

6.2 "Do Nothing" Alternative

The Dun Laoghaire Harbour Company is a designated Body under the Harbours Act 1996 whose objectives are:-

- To take all proper measures in the management, control operation and development of its Harbour and the approach channels thereto.
- To provide such facilities, services, accommodation and lands in its harbourship for ships, goods and passengers as it considers necessary
- To promote investment in the Harbour
- To engage in any business activity, either alone or in conjunction with other persons, that it considers to be advantageous to the development of its Harbour and
- To utilise and manage the resources available to it in a manner consistent with the objectives aforesaid.

Local Objective 13 of the Dun Laoghaire Rathdown County Development Plan 2010-2016 is to prepare a Masterplan in close conjunction with the planning authority. Given the statutory remit of the Harbour Company and the provisions of the County Development Plan a 'Do Nothing' scenario is not a reasonable alternative and would not be in keeping with the principle of the proper planning and sustainable development of the area.

6.3 Option 1 - Predominant Port and Harbour Related Uses

Option 1 considers the alternative where port related RoRo car and lorry ferry, cruise facilities and marine leisure are the predominant functions of the harbour. The planning argument in favour of Option 1 is that it would support the National Spatial Strategy objective of enhancing the Dublin Holyhead link and the gateway into the Greater Dublin Region and the Country.

Table 6.1 shows the results of a comparison of this Option against the SEA objectives.

Table 6.1 – Evaluation of Option 1

SEA OBJECTIVES	IMPACTS
Population and Human Health	
P01: Improve peoples quality of life through the provision of residential, services, employment, recreational uses and provision of enhanced public realm	X
P02: Maintain and enhance Dun Laoghaire Harbour as tourism and marine leisure destination and facility as a local and regional economic driver	+
P03: Minimise adverse safety impacts upon people arising from harbour related activities	o
Biodiversity, Flora and Fauna	
B01: Maintain and enhance the diversity of habitats and protected species, and ensure no adverse impact upon designated Natura 2000 sites.	X
Water	
W01: Ensure that any new development is adequately serviced by foul drainage infrastructure	o
W02: Prevent pollution and contamination of groundwater, maintain and improve coastal water quality and avoid contamination of bathing water	X
W03: Minimise any potential flood risk	+
Air Quality and Climate Factors	
A01: Promote sustainable energy	o
Cultural Heritage/ Architectural and Archaeological	
C01: To protect all recorded archaeological sites from inappropriate development	o
C02: Protect and preserve the architectural character of the Harbour, existing protected structures within the area.	X
Noise	
N01: Minimise noise impacts from uses within the Harbour, including cruise liner ships and facilities	X
Landscape	
L01: Ensure that new development integrates and respects the natural form and character of	X

SEA OBJECTIVES	IMPACTS
the landscape and the townscape of Dun Laoghaire	
Transport	
T01: Maximise the use of sustainable transport modes	o

In terms of environmental impact, this alternative would not provide residential, services and other opportunities, other than for employment. It would fully accord with the objective of sustaining economic development within the region. Depending on the scale and nature of development there is the potential for adverse impacts upon designated Natura 2000 sites. It would be difficult to integrate new substantial port facilities into the historic fabric of the harbour, without adversely impacting upon protected structures.

6.4 Option 2 - Predominant Urban Development

Option 2 considers the alternative where the emphasis is on urban development on the waterfront areas, including the Carlisle Pier, St. Michael's Pier and the Gut. A significant quantum of residential is incorporated into this option, with only marine leisure included within the harbour area. Ferry services (either HGV or car) and cruise liner services are not accommodated. This option would be justified in planning terms predominantly on the basis of increasing residential densities close to public transport in the form of the DART Station.

Table 6.2 shows the results of a comparison of this Option against the SEA objectives.

Table 6.2 – Evaluation of Option 2

SEA OBJECTIVES	IMPACTS
Population and Human Health	
P01: Improve peoples quality of life through the provision of residential, services, employment, recreational uses and provision of enhanced public realm	X
P02: Maintain and enhance Dun Laoghaire Harbour as tourism and marine leisure destination and facility as a local and regional economic driver	+
P03: Minimise adverse safety impacts upon people arising from harbour related activities	o
Biodiversity, Flora and Fauna	
B01: Maintain and enhance the diversity of habitats and protected species, and ensure no adverse impact upon designated Natura 2000 sites.	X
Water	
W01: Ensure that any new development is adequately serviced by foul drainage infrastructure	o
W02: Prevent pollution and contamination of groundwater, maintain and improve coastal water quality and avoid contamination of bathing water	+
W03: Minimise any potential flood risk	o
Air Quality and Climate Factors	

SEA OBJECTIVES	IMPACTS
A01: Promote sustainable energy	+
Cultural Heritage/ Architectural and Archaeological	
C01: To protect all recorded archaeological sites from inappropriate development	o
C02: Protect and preserve the architectural character of the Harbour, existing protected structures within the area.	X
Noise	
N01: Minimise noise impacts from uses within the Harbour, including cruise liner ships and facilities	+
Landscape	
L01: Ensure that new development integrates and respects the natural form and character of the landscape and the townscape of Dun Laoghaire	X
Transport	
T01: Maximise the use of sustainable transport modes	+

In terms of environmental impact, this alternative would provide residential, but would not provide any significant employment and would not fulfil the objective of sustaining economic development within the region. Significant residential development on the Gut could have an adverse impact upon the adjoining designated Natura 2000 sites. It would be difficult to integrate new substantial urban development into the historic fabric of the harbour, without adversely impacting upon protected structures. It would have a positive impact in relation to promoting and maximising sustainable modes of transport with residents able to utilise the DART.

6.5 Option 3 - Mix of Harbour and Urban Development

This Option considers the alternative, which represents a mix between Options 1 (port/harbour) and Option 2 (urban development). It proposes the limited provision of harbour/port facilities in the form of ferry services (car only) and a cruise liner facility, with an emphasis on the development of small craft marine leisure facilities. Complementing this would be a limited scale on mixed use residential, services, hotels, cultural, recreational development. Residential development on the Gut would be limited to a significant extent. A cultural attraction would be incorporated on the Carlisle Pier without residential. The principal residential component would be on St. Michael's Pier, along with a mix of other uses, including retail, restaurants, leisure, cultural attractions, in addition to ferry/cruise liner terminal facilities. This is the preferred option.

Table 6.3 shows the results of a comparison of this Option against the SEA objectives.

Table 6.3 – Evaluation of Option 3

SEA OBJECTIVES	IMPACTS
Population and Human Health	
P01: Improve peoples quality of life through the provision of residential, services, employment, recreational uses and provision of enhanced public realm	+
P02: Maintain and enhance Dun Laoghaire Harbour as tourism and marine leisure destination and facility as a local and regional economic driver	+
P03: Minimise adverse safety impacts upon people arising from harbour related activities	o
Biodiversity, Flora and Fauna	
B01: Maintain and enhance the diversity of habitats and protected species, and ensure no adverse impact upon designated Natura 2000 sites.	o
Water	
W01: Ensure that any new development is adequately serviced by foul drainage infrastructure	o
W02: Prevent pollution and contamination of groundwater, maintain and improve coastal water quality and avoid contamination of bathing water	+
W03: Minimise any potential flood risk	o
Air Quality and Climate Factors	
A01: Promote sustainable energy	+
Cultural Heritage/ Architectural and Archaeological	
C01: To protect all recorded archaeological sites from inappropriate development	o
C02: Protect and preserve the architectural character of the Harbour, existing protected structures within the area.	+
Noise	
N01: Minimise noise impacts from uses within the Harbour, including cruise liner ships and facilities	X
Landscape	
L01: Ensure that new development integrates and respects the natural form and character of the landscape and the townscape of Dun Laoghaire	+
Transport	
T01: Maximise the use of sustainable transport modes	+

As this option would provide a good mix of uses, it would enhance overall quality of life by providing places to work, live and recreate. The retention of port and harbour related activities would contribute to the regional economy. Limiting the quantum and scale of urban development

would ensure that it respects protected structures and the townscape and landscape. Limiting residential development on the Gut would avoid any adverse impact upon the adjoining designated Natura 2000 sites. It would have a positive impact in relation to promoting and maximising sustainable modes of transport with residents able to utilise the DART.

6.6 Selection of Preferred Alternative

A summary of the scoring/rating of each of the development alternatives against the SEA objectives is provided in Table 6.4 below. The scores were compared against each other. From this it is clear that Option 3 is the preferred alternative.

Table 6.4 - Scoring / Rating of Development Alternatives

Alternative Development Scenario	Significant Positive Impact +	Significant Negative Impact X	No Relationship / Insignificant O	Total net positive impacts
Option 1	2	6	5	-4
Option 2	5	4	4	1
Option 3	7	1	5	6

Option 1 shows the poorest result, reflecting the sensitive natural and cultural heritage environment within which development would occur. Option 2 shows a better result, reflecting that most of the development is on land, and the impacts are predominantly related to the built environment. Option 3, which is the preferred option, maximises the positive benefits and minimises the negative ones, reflecting that it is a combination of both Options 1 and 2.

7 ASSESSMENT OF PREFERRED ALTERNATIVE

7.1 Introduction

This Section will assess the potential impacts of the preferred alternative on the environment. As mentioned previously in Section 2, the responses received from the prescribed environmental bodies on the Scoping documentation and an examination of the existing environment allowed for the identification and focusing of the likely significant effects on the environment of the implementation of the Masterplan.

For consistency with Section 4, the different components of the environment are assessed to determine whether implementing the Masterplan would have likely significant effects on the environment.

7.2 Biodiversity (including Flora and Fauna)

The key environmental impacts of the proposed Masterplan relate to:

- Deterioration in water quality during construction and operation of developments associated with the Masterplan. Contamination may arise in all waters through poor working practices, leakages or accidental spillage of materials if efficient pollution control measures are not fully implemented and maintained during the construction and operation phase of any developments associated with the Masterplan. This also includes pollution arising from increased recreational use of the area, in particular increases in boating activity. Such point source pollution can arise from hydrocarbon releases and grey water for example (cleaning products and antifouling paints etc.)
- Impacts on marine and intertidal habitats and species through disturbance during construction and operation of any developments associated with the Masterplan, including dredging, vibration and noise;
- Impacts on local bird populations. Specific reference was made in the NPWS consultation response of 25th January 2011 to impacts on black guillemots which are known to have previously roosted in the structure beneath Carlisle Pier;
- Disturbance to habitats and species through increased recreational usage. Any assessment of potential impacts should take into account species and habitats protected under both European (European Communities (Natural Habitats) Regulations 1997) and national (Wildlife Act 1976 and Wildlife (Amendment) Act 2000) legislation and cover such habitats both inside and outside of designated areas.

7.3 Population and Human Health

Development within the area would be on a phased basis over the period of the Plan. The mix of uses would have a significant beneficial effect as a place to live, work and recreate. The resident population is expected to be c600 persons.

The quality of built environment in terms of urban design and public realm will contribute to an overall positive impact. Additional marine boat activity could contribute to a risk of increased accidents.

7.4 Soils and Geology

Soils in any area are the result of the interaction of various factors, such as parent material, climate, vegetation and human action. Soil has the potential to be contaminated as a result of pollution from development which is not serviced by appropriate waste water infrastructure.

If contaminated soils are eroded and transported to the sea, there is potential for impact to marine water quality and aquatic flora and fauna.

Where dredging is to be carried out and there is the potential for contaminated silts to be present, a programme of sampling and laboratory testing will be carried out in advance of works commencing. The purpose of this exercise is to ensure that the material is properly assessed, classified and managed in accordance with the appropriate legislation. The most appropriate method of dredging will be employed so as to minimise the potential for environmental impact from the activity. If the material is deemed suitable for disposal at sea the appropriate surveys will be undertaken at the disposal location.

7.5 Water (Including Flooding)

Human activities, if not properly managed, can cause deterioration in water quality. Pressures exerted by human activities include the following:

- sewage and other effluents discharged to waters.
- abstractions from waters
- structural alterations to water bodies, piers and marinas
- dredging.

The quality of seawater adjoining Dún Laoghaire Rathdown and in particular the areas of coastline where bathing takes place will be maintained with special emphasis on beachs designated under the Quality of Bathing Water Regulations. In addition, the objectives of the Water Framework Directive (2000/60/EC) must be adhered to which includes the protection of all waters (includes coastal waters).

Flood Risk

Flood risk and hazard is an important issue for all counties across the country including in Dún Laoghaire Rathdown. Climate change is also inducing a change in sea level and accompanied by increasingly severe storms has increased the risk of coastal flooding. Mitigation measures for future development will include strategic flood risk assessment for the Masterplan. Consideration will be given to 1:200 year extreme water levels (for commercial development) and 1:1000 year extreme water levels (for dwellings).

A Strategic Flood Risk Assessment has been undertaken as part of the Plan and included in Appendix II of this Environmental Report. Four potential sources of flooding have been identified for the Dun Laoghaire Harbour site:

- Coastal flooding from the Irish Sea
- Pluvial flooding (direct rainfall) from localised storm water runoff from adjacent ground
- Groundwater flooding
- Sewer flooding

The main source of flooding to the site is from the sea. From the information available it has been established that the sea level will also influence the impacts of flooding from other sources i.e.

groundwater. The site is not directly at risk of flooding from the sea; however future rises in sea level may cause an increase in both the water level of the adjacent drainage and sewer system and the level of the groundwater underneath the site. Overtopping may increase the risk of flooding in certain areas of the site. The majority of the site is located in the Flood zone C. Parts of the site on the outer extent of the site of the seaside are in flood zones A and B. There are no inappropriate structures or developments located in these areas (zone A+B). There are no planned structures or developments in these areas as part of the Dun Laoghaire Masterplan. When considering climate change in 100 years, or 50 years, the majority of the site will remain above the 1:1000 year flood level.

It is not foreseen that the development will have a major affect on the existing flooding conditions. The Harbour site is located on the coastline and is at a lower level than the surrounding town. The site itself is sloping towards the sea and all of the proposed developments are located out of the 1 in 1000 flood levels. Only minor mitigation measures are required.

7.6 Air, Climate and Noise

Air Quality

The main potential for negative impact on air quality as a result of the implementation of the Masterplan occurs during the construction phase. Dust emissions during the construction phase of the proposed development, in the absence of adequate controls, may allow the potential for dust nuisance to occur in the vicinity of the construction site. However, as part of the mitigation measures proposed a detailed dust minimisation plan will be formulated for the construction phase of the project, to ensure that all construction activities are minimised in so far as possible.

During the operation of the proposed development, the potential for air quality impacts is considered to be slight. No significant emissions of pollutants are likely during the operational phase of the development due to the nature of the development as outlined in the Masterplan and as no significant car parking will be provided, the impact from vehicle emissions is not considered to be significant.

There is the potential for the generation of carbon dioxide during the construction phase of the proposed Masterplan arising from construction traffic movements and construction works. Greenhouse gas emissions will be minimised during the operational phase of the development and it is not anticipated that the development will give rise to significant levels of greenhouse gas emissions.

Heat and energy demands are expected to be the primary sources of greenhouse gas emissions associated with the operation phase of the proposed Masterplan.

Climate

The climatic impacts are not considered significant during either the construction or operational phases following mitigation.

Noise

Noise and vibration effects are inevitable during the construction phase of the proposed Masterplan development. These potential impacts are no different from other construction activities of a similar scale which occur regularly with the redevelopment of areas. As has been identified in the environmental baseline, the noise environment in the vicinity of Dún Laoghaire harbour is dominated by traffic noise and the intermittent DART movements.

During the operational phase there is the potential for noise impacts from building services. Other potential sources of noise in operation are the noise emissions associated with traffic and noise associated with port and entertainment activities.

Car parking will be limited thereby minimising noise impacts from traffic movements. However, this and other potential impacts will be minimised through the implementation of mitigation measures.

7.7 Landscape

In general the key focus of development is St. Michael's Pier and Carlisle Pier. Views of the Harbour are mostly internalised with views of the Harbour lands from the town of Dun Laoghaire being relatively screened due to topography and The Metals. As such the impact of the Masterplan from within Dun Laoghaire town is likely to be quite limited. It should be noted however that important views exist of the harbour water area, the harbour walls and the wider Dublin Bay beyond. The impact of the Masterplan upon these views will require assessment as part of individual planning applications.

The harbour however is highly prominent and visible from a number of locations as noted in the SEA around Dublin Bay and also from the seascape looking landwards. From a strategic assessment and based upon the level of information available in the Masterplan it is not considered that the proposals contained in it will result in an adverse impact upon the landscape. However, as previously noted the following views are of particular relevance and will require particular attention at the planning application stage:

Dublin City

No specific key views are identified in the DCC Development Plan. Identification of important views and assessment of such at planning application stage is required with particular reference to the Coastline from Ringsend southwards.

Fingal County

A number of key views are identified from Howth Head looking southwards across Dublin Bay. The impact of the Masterplan proposals, with particular relevance to St Michael's Pier and its impact upon Dun Laoghaire's townscape beyond needs to be assessed.

Dun Laoghaire Rathdown

- Key identified Development Plan views approaching Dun Laoghaire from the west require careful assessment at planning application stage. At present there is a clear view across 'The Gut' of both Piers and the Harbour Mouth. This is an important and sensitive vista. Careful assessment of views and the impact of proposed development on 'The Gut' at planning application stage is required to ensure that the Masterplan objectives do not have an adverse effect upon these views.
- The impact of the St Michael's Pier Masterplan proposals requires careful assessment at planning application stage. Views looking back toward the town from a number of locations along both piers require assessment, i.e. views from the sea towards the town. The townscape of Dun Laoghaire and its roofscape and structures referred to in the SEA is of importance.
- The impact of Masterplan upon views of the harbour from Dalkey/Killiney hill – a key development plan view also requires assessment at planning application stage. The

impact of the St Michael's Pier proposals requires particular attention.

7.8 Cultural Heritage

Archaeological Heritage

A public slipway extending into the sea area is proposed at the northeast side of the Gut, outside the West Pier, while another new slipway is proposed extending into the old harbour from the Dun Laoghaire Motor Yacht Club site.

The proposal includes a facility for berthing cruise ships, and it is suggested that such a berth might include the seaward side of the East Breakwater. It may be that such a facility would require deepening the existing seabed levels through dredging-related activity, and such work would represent a direct impact on the seabed.

Seabed disturbances of this area have the potential of exposing items of archaeological interest that have not been recorded.

Architectural Heritage

In a broad sense, of greatest significance in terms of architectural heritage in the Masterplan proposals, is the intention to improve the connections between the harbour and the town. The restoration of a visual connection to the water's edge from Marine Road would have a considerable impact, as would the restoration of the setting of the harbour, particularly along the esplanade on Queen's Road. Increased access to the water's edge, as proposed under the Masterplan would significantly change the experience of most visitors to the harbour when compared with the current situation, providing greater opportunity to engage with the physical fabric of the harbour.

The proposal to introduce large cruise ships will affect the character of the harbour and how it is experienced in terms of scale. Such a large vessel will dominate the harbour and visually disconnect some areas from one another while it is berthed. The nature and scale of the berthing structure may also have visual and physical impacts on the harbour, as a new intervention within the generally open water body. Another impact would be the creation of new wave motion within the harbour which could have a damaging effect on the physical fabric of the piers and other harbour structures. This issue is the subject of a separate detailed study.

Under the Masterplan, the greatest quantum of new development is to take place on St. Michael's Pier, which is currently the location of a large amount of underused space. The proposals seek to intensify use of this space, while opening up a greater area at ground level to the public, and also to replace the existing terminal building. Thus the impact of the new structures can be reduced and proposed improvements to the public realm can assist in reversing some of the negative effects of previous developments.

The harbour is currently used by a significant number of groups and individuals which puts pressure on the physical structure in terms of event space, storage space and access to the water. The proposed Masterplan and associated Harbour Management Plan provide an opportunity to reorganise the limited space in consultation with all users (this is particularly of significance in relation to the Boatyard/Old Harbour area). It is an important part of the cultural heritage of the harbour that a multiplicity of groups has used and can continue to use the harbour.

In order to realise the proposals of the Masterplan, it will be necessary to make physical interventions in the fabric of the harbour. This could range from the construction of new breakwaters to making breaches in the pier walls. All interventions must be handled sensitively,

using appropriate designs, materials and construction methods and planned, supervised and implemented by properly skilled, qualified and experienced conservation professionals and contractors, in order to avoid significant adverse impact in terms of the architectural heritage.

7.9 Material Assets (waste water, drinking water, waste management, traffic, transport)

Wastewater

Inadequately treated effluents and spills or leakage from foul water sewer systems networks can lead to the pollution of the receiving waters. These pollutants can lead to a deterioration in water quality with subsequent downstream uses being impacted negatively e.g. water dependant ecosystems, potable water supplies, industrial or agricultural abstraction, fishing and aquaculture.

As previously mentioned, wastewater within this area of Dún Laoghaire Rathdown is currently treated at the municipal Ringsend Wastewater Treatment Plant (WWTP) which is currently operating at its design capacity of 1.6 M PE. Consequently, any future development within the Dún Laoghaire Harbour area must be cognisant of that fact and incorporate sustainable waste water treatment practices into its Masterplan to ensure that no significant adverse impact will arise in terms of wastewater.

Drinking Water

Drinking water is an important resource - the use of which must be carefully managed. The development of the Masterplan area will require the provision of potable water given the use mix (e.g. residential and hotel uses), which therefore will have an impact on this resource.

Waste Management

There is potential for waste management impacts both during the construction and operational phases of the Masterplan development. During the construction phase waste can arise from the following:

- Excavation and groundworks
- Demolition of structures
- Construction of new structures and renovation of existing structures.

During the operational phase waste can arise from the various uses within the Masterplan development:

- Commercial and household waste
- Waste arising from maintenance activities and upkeep of buildings.

Traffic and Transport

A review of the Census data shows that a large number of people travelling to and from Dun Laoghaire use public transport, and it is expected as previously agreed on other development projects in Dun Laoghaire that the modal split for cars will reduce down to the order of 50%.

A traffic impact assessment indicates that the road junctions within the area will operate within capacity.

It is noted that this assessment is a preliminary estimation of the number of trips generated by the development and the distribution of trips onto the existing network. The provision of additional information on existing building to be replaced as well as the locations of car parks may affect the results of the analysis.

7.10 Compatibility of Masterplan and Environmental Objectives

As discussed in Chapter 6 above, Option 3, 'Mixed of Harbour and Urban Development Uses' was selected on the basis of compatibility with the Environmental Objectives. In this section the objectives put forward as part of the Masterplan were tested for compatibility with the Environmental Objectives. The assessment of the objectives involved testing specific objectives of the selected option against the Environmental Objectives (Table 7.1) below. As before, the matrix recorded positive, negative, uncertain and neutral impacts. This process was carried out so that it could inform the mitigation measures that are required.

The assessment indicates that when the Masterplan objectives are assessed against the Environmental Objectives the impact of the Plan in the vast majority of instances is either neutral or positive. There a number of instances where the impact of the ferry services, cruise liners and leisure craft have either an unknown or potentially adverse impact upon safety. This is due principally to the fact that inadequate details are available at the Plan stage, and will need to be resolved at the detailed project stage.

7.11 Cumulative Effects

The cumulative effects on the environment are not considered to be negative, provided appropriate mitigation measures are taken in respect of the individual headings.

Table 7.1 - Compatibility of Masterplan and Environmental Objectives

No.	Masterplan Objective	P01	P02	P03	B01	W01	W02	W03	A01	C01	C02	N01	L01	T01
1	Ensure the safe operation and development of the Harbour and its approach waters and provide such facilities, services, accommodation for ships, goods, passengers and marine leisure activities.	+	+	+	o	+	o	o	+	o	o	+	o	o
2	Facilitate the ongoing operation of the ferry services over the period of the Masterplan.	+	+	?	o	o	o	o	o	o	o	o	o	+
3	Accommodate cruise liner facilities, having regard to the needs of other Harbour users, potential environmental impacts and the feasibility of providing such facilities.	+	+	?	o	+	o	o	o	o	?	?	o	+
4	Utilise the Masterplan as a framework for investment and growth.	+	+	o	o	o	o	+	+	o	o	+	+	+
5	Promote a mix of employment opportunities, including those in retailing, enterprise, offices and the community sector	+	+	o	o	+	o	+	o	o	o	o	o	+
6	Promote development within the Masterplan area to integrate effectively with Dun Laoghaire Town Centre.	+	+	o	o	+	o	+	o	o	o	+	o	+
7	Facilitate the appropriate expansion of specialist retailing to complement Dun Laoghaire's role as a major Town Centre within the region.	+	o	o	o	o	o	+	o	o	+	o	+	+
8	Promote a sustainable mix of uses including residential and major visitor attractions, which will contribute to an 18-hour day and contribute to the vitality and vibrancy of the Town	+	+	o	o	+	o	+	+	+	+	o	+	o
9	Ensure an appropriate arrangement of uses to promote pedestrian footfall between the Harbour area and the Town Centre.	+	+	o	o	o	o	+	o	o	+	o	+	+

No.	Masterplan Objective	P01	P02	P03	B01	W01	W02	W03	A01	C01	C02	N01	L01	T01
10	Promote a high density of development close to the DART station in order to maximise the use of public transport.	+	+	o	+	+	o	o	+	o	o	o	o	+
11	To promote sustainable modes of transport, including public transport, cycling and walking	+	+	o	o	+	o	o	+	o	+	o	+	+
12	Develop a parking strategy to serve the Harbour area and complement existing strategies within the Town Centre.	+	+	o	+	+	+	+	o	o	+	o	+	+
13	Ensure a high standard of pedestrian permeability throughout the area and provide for appropriate pedestrian connectivity to the Town Centre.	+	+	o	o	o	o	o	o	o	+	o	+	+
14	Facilitate the Sutton to Sandycove (S2S) cycleway through the Harbour area.	+	+	o	o	o	o	+	+	o	+	o	+	+
15	Seek to protect the heritage status of Dun Laoghaire Harbour and secure the implementation of the Architectural Heritage Management Plan.	+	+	o	+	o	o	x	o	o	+	o	+	o
16	Secure the preservation of all Protected Structures within the Harbour area.	+	+	o	o	o	o	x	o	+	+	o	+	o
17	Have regard to the designation of part of the Harbour Area as a proposed Architectural Conservation Area.	+	+	o	+	o	o	o	o	+	+	o	+	o
18	Seek to preserve archaeological heritage through investigation, preservation in- situ and recording, as appropriate.	o	o	o	o	o	o	?	o	+	+	o	o	o

No.	Masterplan Objective	P01	P02	P03	B01	W01	W02	W03	A01	C01	C02	N01	L01	T01
19	Promote Dun Laoghaire Harbour as a major marine leisure facility and a destination for tourism and recreation, while minimising the impact upon designated habitats.	+	+	?	o	o	o	o	o	o	+	+	+	+
20	Develop land mark attractions, including a Diaspora Museum, restaurants, destination retailing and waterfront buildings and uses.	+	+	o	o	o	o	o	o	+	+	o	+	+
21	Facilitate sailing, boating and other forms of marine leisure activities.	+	+	x	o	+	o	+	+	o	+	?	o	o
22	Promote the use of the Harbour by sports and sailing clubs, community organisations and other stakeholders.	+	+	x	o	o	o	o	+	o	+	o	+	o
23	Maximise public access to the waterfront and enhance the public realm wherever possible.	+	+	x	o	o	o	o	o	o	+	o	+	o
24	Ensure a development framework does not impact upon the adjoining areas designated under the Habitats Directive in Dublin Bay and that development is subject to Appropriate Assessment in accordance with Article 6 of the Directive.	o	o	o	+	+	+	+	o	o	o	o	+	o
25	Integrate the new development with the built and natural landscapes of the surrounding area.	+	+	o	+	+	+	+	o	o	+	o	+	o
26	Promote sustainable design in the natural and built environment.	+	o	o	+	+	+	+	+	+	+	o	+	o
27	Phase develop in line with the availability of supporting infrastructure, including foul sewage treatment.	+	+	o	+	+	+	o	o	o	o	o	o	+

No.	Masterplan Objective	P01	P02	P03	B01	W01	W02	W03	A01	C01	C02	N01	L01	T01
28	Promote the appropriate development on "The Gut" having regard to the adjoining environmental designations.	+	+	o	o	+	+	o	o	o	+	o	+	o
29	Ensure that all new proposed development is adequately assessed in line with the Flood Risk Management – Guidelines for Planning Authorities.	+	+	o	o	o	o	+	o	o	o	o	o	o
30	Keep under review the potential for renewable energy initiatives	+	o	o	o	o	o	o	+	o	o	?	o	o

8 MITIGATION MEASURES

8.1 Introduction

Mitigation measures are measures envisaged to prevent, reduce and as fully as possible, offset any significant adverse impacts on the environment of implementing the proposed Masterplan. Mitigation involves ameliorating significant negative effects. Where there are significant negative effects, consideration is given in the first instance to preventing such effects or, where this is not possible for stated reasons, to lessening or offsetting those effects. Mitigation measures can be roughly divided into those that: *avoid* effects; *reduce* the magnitude or extent, probability and/or severity of effect; *repair* effects after they have occurred, and; *compensate* for effects, balancing out negative impacts with other positive ones.

8.2 Mitigation Measures Proposed

8.2.1 Biodiversity (including Flora and Fauna)

B1 No projects, giving rise to significant direct, indirect or secondary impacts on Natura 2000 sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects, shall be permitted on the basis of the Dun Laoghaire Harbour Masterplan (either individually or in combination with other plans or projects).[14]

B2 All subsequent projects, and or plans, arising from the Dun Laoghaire Harbour Masterplan will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive.

B3 Dun Laoghaire Harbour Company shall set up procedures to ensure compliance with the requirements of Article 6 of the Habitats Directive for all subsequent projects and or plans, arising from the Dun Laoghaire Harbour Masterplan.

B4 No Ecological networks[15], or parts thereof which provide significant connectivity between areas of local biodiversity, will be lost without remediation as a result of implementation of the Dun Laoghaire Harbour Masterplan

8.2.2 Soils and Geology

SG1 Promote the recycling of construction and demolition waste and the reuse of aggregate and other materials in order to reduce the quantities of virgin material being extracted.

[14] Except as provided for in Section 6(4) of the Habitats Directive, viz. There must be:
(a) no alternative solution available,
(b) imperative reasons of overriding public interest for the plan to proceed; and
(c) adequate compensatory measures in place

[15] Ecological networks may include for example, continuous rocky shoreline or other linear coastal habitats

SG2 Ensure that the polluter pays principle is adhered to in full cooperation with the EPA

SG3 Policies in the Masterplan will ensure that the impacts on soil will be minimal within this urbanised area and ensure the amount of waste is minimised.

8.2.3 Water

W1 Comply with the objectives, policies and standards of the Greater Dublin Strategic Drainage Study.

W2 Incorporate a sustainable drainage plan into the Masterplan.

W3 Explore proposals for sustainably reducing water consumption for the Masterplan area (e.g., grey water recycling and rainwater harvesting).

W4 Promote SuDS principles for all drainage including the use of attenuation ponds to improve water quality and the integration of storm water attenuation facilities for new developments and existing catchment areas.

W5 Ensure that the individual projects are subject to a Flood Risk Assessment (FRA) at the planning application stage and undertake an overtopping study of wave impacts.

W6 Confirm the capacity of the existing local council surface and sewer water collection systems should be obtained prior to detailed design.

W7 Undertake a detailed geotechnical survey in order to understand the hydraulic activity of the soil under the site.

8.2.4 Air, Noise and Climate

ANC1 Ensure that the objectives and policies of the Air Quality Standards Regulations SI 180 of 2011, implementing 2008/50/EC are complied with.

ANC2 Promote the reduction of emissions of Greenhouse Gases through sustainable design of future developments on site to ensure Ireland's compliance with our national Kyoto Protocol Targets.

ANC3 Selection of plant and the location of stacks and car parking vents to minimise air quality impact at sensitive areas (including amenity areas)

ANC4 Dust Minimisation Plan to be developed for the construction phase of the Masterplan area to minimise potential dust nuisance and air quality impact.

ANC5 In order to minimise electrical energy associated with lighting and give building users sufficient access to daylight with a view to enhancing their experience, the design of the building footprints, heights and layouts will be developed to encourage maximum daylight to enter buildings, minimise overshadowing of each other, of existing neighbouring buildings, and of landscaped areas, as well as to ameliorate existing wind conditions on site. In addition, the use of sustainable energy will be promoted and the built environment will be used as a key learning tool to promote sustainable objectives.

ANC6 Construction works in the Masterplan area will comply with the recommendations and limits of BS5228: Noise and vibration control on construction and open sites (Part 1: Noise & Part 2: Vibration).

ANC7 Consideration of sensitive receptors (i.e. residential, creches etc.) and the external environment i.e. proximity to road, rail of port noise sources. Particular attention should be given to guidance document entitled "Planning Policy Guidance 24: Planning and Noise". Consideration of existing noise policy for the area for example noise mapping and noise action plans produced by the Local Authority.

ANC8 Consideration of the internal design of the buildings e.g. open plan spaces or partitioned spaces and the noise implications of both. Consideration of the acoustic properties of the materials to be used both internally and externally depending on the building use and the surrounding noise environment.

8.2.5 Landscape

L1 Planning applications with a potential for a high visual impact upon the natural and built landscape, views and vistas, shall be accompanied by a visual impact assessment demonstrating that the landscape impacts have been avoided to a level consistent with the sensitivity of the landscape.

8.2.6 Cultural Heritage

CH1 Planning applications affecting protected structures, or their setting, shall be accompanied by an assessment undertaken by an accredited conservation architect, where appropriate detailing the impacts of the relevant development upon the special interest and character of the surrounding architectural heritage.

CH2 The accompanying Architectural Heritage Plan shall be implemented in tandem with the Masterplan.

CH3 Any planning applications for proposals involving substrata work shall be subject to an archaeological assessment, which will include investigate, excavation, recording as appropriate to safeguard the archaeological heritage of the Harbour.

8.2.7 Material Assets (waste water, drinking water, waste management, traffic, transport).

MA1 Protect the hydrological environment from adverse effects of the wastewater discharges by ensuring that there is suitable wastewater treatment if required to meet the demands of development within the proposed Masterplan area before it is discharged to the environment.

MA2 Ensure that development within the Masterplan area complies with the implementation of the Regional Waste Management Plans together with any future National or Regional Waste Management Plans.

MA3 Development within the Masterplan area will incorporate a Waste Management Strategy which encourages waste prevention, minimisation, reuse, recycling and recovery as methods of managing waste. The strategy shall also ensure that where waste management is not being carried out properly, the Waste Management Acts, 1996 to 2001 will be used as a means to ensuring specific national policies and regulations are adhered to.

MA4 Promote and facilitate community awareness and involvement in community–based recycling initiatives or environmental management initiatives that will lead to local sustainable waste management practices.

MA5 It will be ensured that the development is designed so that adequate internal and external storage space is provided (for all users, commercial, residential etc.) to facilitate and help maximise the source separation of waste into three primary waste streams (dry-recyclables, biodegradable/organic and residual waste). Provision also needs to be made for the separate storage of WEEE, bulky waste and hazardous waste streams.

MA6 A site-wide resource and waste management strategy should be developed which aims to achieve more than 95% participation from all occupants/tenants. This will comprise working with residents, commercial tenants and community-based recycling initiatives (where relevant) to reduce the generation of waste and to provide education to raise the awareness of recycling and resource management.

MA7 All planning application proposals generating more than 500 private vehicle trips per day, and/or 100 trips in the peak period shall be the subject to a full traffic impact assessment.

MA8 Parking will have to be managed in the interests of sustainable development and as part of an overall traffic management plan.

9 MONITORING PROPOSALS

9.1 Introduction

The SEA Directive requires that the significant environmental effects of the implementation of plans and programmes are monitored. This environmental report puts forward proposals for the monitoring of the Masterplan.

Monitoring is based around the indicators, which were chosen earlier in the process. These indicators allow quantitative measures of trends of progress over time relating to the Environmental Objectives used in the evaluation. Focus is given to the indicators which are relevant to the likely significant environmental effects of implementing the Masterplan and existing monitoring arrangements are used in order to monitor the selected indicators where possible. Each indicator to be monitored is accompanied by the relevant target(s) which were identified with regard to the relevant legislation.

Monitoring enables, at an early stage, the identification of unforeseen adverse effects and the undertaking of appropriate remedial action. In addition to this, monitoring can also play an important role in assessing whether the Masterplan is achieving its environmental objectives and targets and whether the proposed mitigation measures are being implemented.

9.2 Monitoring Proposals

The monitoring programme for the implementation of the Masterplan is outlined in Table 9.1 below.

Table 9.1 - Monitoring Programme

SEA OBJECTIVES	INDICATORS	WHEN	BY WHOM	SOURCE/METHOD
Population and Human Health				
P01: Improve peoples quality of life through the provision of residential, services, employment, recreational uses and provision of enhanced public realm	o Good quality design, setting and finishes, showing a range of scale and employment types o Number of new open spaces and recreational facilities made available to the population and public following development of the Plan lands. o Increase the percentage of publicly accessible waterfront to 70%	To be addressed during the lifetime of the Plan	By Dun Laoghaire Harbour Company and the Planning Authority	Planning applications and surveys
P02: Maintain and enhance Dun Laoghaire Harbour as tourism and marine leisure destination and facility as a local and regional economic driver	o Tourist numbers and numbers of leisure craft	2 year review	By Dun Laoghaire Harbour Company l	Surveys

SEA OBJECTIVES	INDICATORS	WHEN	BY WHOM	SOURCE/METHOD
P03: Minimise adverse safety impacts upon people arising from harbour related activities	o Number of health and safety incidents	5 year review	By Dun Laoghaire Harbour Company	Accident reports
Biodiversity, Flora and Fauna				
B01: Maintain and enhance the diversity of habitats and protected species, and ensure no adverse impact upon designated Natura 2000 sites.	o Habitat and bio-diversity surveys o Identified occurrence of flora and fauna species o Increase/decrease in habitat diversity	5 yearly review	By Dun Laoghaire Harbour Company, NPWS, Dun Laoghaire Rathdown County Council	Surveys for comparison with baseline
Water				
W01: Ensure that any new development is adequately serviced by foul drainage infrastructure	o Ensure available infrastructure capacity.	Regular review	By Dun Laoghaire Harbour Company and Dun Loaghaire Rathdown County Council	PE calculations
W02: Prevent pollution and contamination of groundwater, maintain and improve coastal water quality and avoid contamination of bathing water	o Analysis of water indicates compliance with standards	5 yearly review	By Dun Laoghaire Harbour Company, Dun Loaghaire Rathdown County Council and EPA	Water Quality Surveys
W03: Minimise any potential flood risk	o Provision of flood risk evaluations with proposed developments. o % of planning applications that utilise SUDS.	Regular review	By Dun Laoghaire Harbour Company, Dun Loaghaire Rathdown County Council and the OPW	Flood Risk maps and FRA

SEA OBJECTIVES	INDICATORS	WHEN	BY WHOM	SOURCE/METHOD
Air Quality and Climate Factors				
A01: Promote sustainable energy	o Percentage number of new buildings since development of the Masterplan that comply with Standards on Sustainable Design (2002/91/EC standards)	2 yearly review	By Dun Laoghaire Harbour Company	Building design drawings
Cultural Heritage/ Architectural and Archaeological				
C01: To protect all recorded archaeological sites from inappropriate development	o All development within the Masterplan lands is in line with DoEHLG recommendations	Regular review	By Dun Laoghaire Harbour Company, Dun Laoghaire Rathdown County Council and the Department of Environment, Communities and Local Government	Archaeological assessments accompanying planning applications.
C02: Protect and preserve the architectural character of the Harbour, existing protected structures within the area.	o The design and setting of new developments incorporate design features outlined in the Masterplan	5 yearly review	By Dun Laoghaire Harbour Company and Dun Laoghaire Rathdown County Council	Planning applications and development proposals
Noise				
N01: Minimise noise impacts from uses within the Harbour, including cruise liner ships and facilities	o Developments include noise insulation	Regular review	Dun Laoghaire Harbour Company	Surveys

SEA OBJECTIVES	INDICATORS	WHEN	BY WHOM	SOURCE/METHOD
Landscape				
L01: Ensure that new development integrates and respects the natural form and character of the landscape and the townscape of Dun Laoghaire	o Appropriate scale and densities permitted, ensuring appropriate transition between new and existing development. o Limit visual impact from new development	Regular review	Dun Laoghaire Harbour Company & Dun Laoghaire Rathdown County Council	Character assessments and planning applications
Transport				
T01: Maximise the use of sustainable transport modes	o Mode split targets	5 yearly review	By Dun Laoghaire Harbour Company, the NTA and Dun Laoghaire Rathown County Council	Travel and traffic surveys

10. SUBMISSIONS AND CONSEQUENCES OF AMENDMENTS

10.1 Introduction

This is the final stage of the Environmental Report of the Masterplan Strategic Environmental Assessment (SEA).

It details:

1. Responses to the submissions on the Environmental Report which have been made during the public display of the Draft Masterplan and the Draft Environmental Report. Where required, updates to the Environmental Report as a result of these submissions are provided.
2. The environmental consequences of relevant amendments made to the Masterplan after the first period of public display. These environmental consequences supplements the evaluation made in the Draft Environmental Report.

10.2 Consideration of Submissions

Submissions
Four submissions were received.

Issues

- The proposed Cruise Liner facility could potentially impact upon the piers and the Environmental Report indicates that this will be the subject of a separate study. The full environmental impacts of the Masterplan have not been assessed.
- The environmental impact upon Scotsmans Bay in relation to fish breeding and habitat for sand eel population should be taken into account.
- The reuse of the elements of the former Train Shed on the Carlisle Pier should be required in the final Masterplan.
- The Mitigating Measures in the Environmental Report and the AA should be included in the Final Plan.
- Dún Laoghaire Rathdown County Council is not a prescribed body for the purposes of Article 13 of the 2004 Regulations.

Response
The Environmental Report does not address the detailed impacts of the individual projects, as this will be a matter for any required Environmental Impact Statement accompanying any planning application.

The submission in relation to the Scotsman's Bay is noted, and it is considered that the Environmental Report addresses this.

The Dún Laoghaire Rathdown County Council submission is noted.

Decision to Change or Not to Change

Future buildings or structures on the Carlisle Pier must ensure appropriate re-use of elements of the dismantled former train shed.

10.4 Environmental Consequences of Amendments

There are no significant environmental impacts resulting from any of the amendments made.

APPENDIX I - Relevant Plans and Programmes

Identified Plan, Programme or Legislation	Summary of Relevant Objectives	Relevance to Masterplan
EU Directives and Policy		
EC Birds Directive	The maintenance of the favourable conservation status of all wild bird species across their distributional range (Article 2) with the encouragement of various activities to that end (Article 3). The identification and classification of Special Protection Areas (SPA) for rare or vulnerable species, as well as for all regularly occurring migratory species, paying particular attention to the protection of wetlands of international importance (Article 4).	SPA sites in proximity to Masterplan area. Harbour development proposals may have implications for these areas.
EC Habitats Directive	Establishes a network of nature conservation sites (Special Areas of Conservation) and a system of species protection. The main aim is to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements.	SAC sites in proximity to Masterplan area. Harbour development proposals may have implications for these areas.
EC Water Framework Directive	Requires Member States to manage all of their waters: rivers, canals, lakes, reservoirs, groundwaters, protected areas (including wetlands and other water dependent ecosystems), estuaries and coastal waters. Member States must: ▪ prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters; ▪ aim to achieve at least good status for all waters by 2015. Where this is not possible, good status should be achieved by 2021 or 2027; ▪ promote sustainable use of water as a natural resource; ▪ conserve habitats and species that depend directly on water; ▪ progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment; ▪ progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; ▪ contribute to mitigating the effects of floods and droughts.	Water resources and conditions can potentially be affected by habour development. It is an objective of the Masterplan to promote Dun Laoghaire as a major marine leisure facility while minimizing the impact on designated habitats.
The European Commission Recommendation on Integrated Coastal Zone Management (ICZM)	It paves the way for better strategic planning of coastal areas which maintains the integrity of this important resource while considering local traditional activities and customs that do not present a threat to sensitive natural areas and to the maintenance status of the wild species of the coastal fauna and flora.	It is an objective of the Masterplan to ensure a development framework does not impact upon adjoining areas designated under the Habitats Directive.
The Ports Policy Communication	This aims to increase the carrying capacity of ports in order to allow a further increase of maritime and fluvial transport. The relationship between cities and their ports remains one of interdependency and should be ruled by long term strategic vision and planning.	Harbour development proposals may increase the carrying capacity of the Harbour.

Identified Plan, Programme or Legislation	Summary of Relevant Objectives	Relevance to Masterplan
Maritime Spatial Planning in the EU	It highlights that integrated spatial planning, including maritime spatial planning, offers opportunities for anticipating difficulties and adverse environmental impacts and for avoiding potential conflicts and delays in project development. Such plans should be submitted to strategic environmental assessments, and also to appropriate assessments under the Habitat Directive – to evaluate the potential impacts of plans and projects on Natura 2000 sites.	The report indicates that the appropriate assessments will be undertaken. This includes the a Habitat Directive Assessment to evaluate the impact on the integrity of the Natura 2000 sites in the area.
Integrating Biodiversity and Nature Protection into Port Development & The Implementation of the Birds and Habitats Directive in Estuaries and Coastal Zones	It outlines how to effectively integrate biodiversity with the development of Ports. The key stakeholders are port authorities, dredging companies, private investors, member states' administrations, environmental groups. There needs to be a better understanding of the context, improved planning of projects, integration of SEA and EIA into plans and projects, in addition to the better management of dredging.	Harbour development proposals may have an effect on the biodiversity of the area. It is an objective of the Masterplan to integrate the new development with the built and natural landscapes of the surrounding area.
National Policy		
The National Spatial Strategy 2002-2020	It identifies the sea link between Dublin and Holyhead as a main corridor to and from Ireland. Dun Laoghaire Harbour is identified as a transit Port in the Dublin and East Region along with Drogheda, Dublin, Wicklow and Arklow. The Strategy observes that priority already apparent is the need for upgrading of alternative corridor links through Great Britain and to the European mainland in order to avoid congestion and bottleknecks on the main corridor link from Ireland to the UK and Europe.	Development of harbour/port facilities could impact on the status of Dun Laoghaire Harbour in the national context.
The National Development Plan 2007-2013	It proposed a major programme of investment in infrastructure with a particular focus on addressing deficits in the various National Spatial Strategy Gateway areas. A particular objective of the Plan is the preparation of a comprehensive study of the role of Dublin Port,	The Masterplan proposes the development of harbour/port facilities which could help to address the deficit in the gateway areas.
Smarter Travel - A Sustainable Transport Future	A national policy document which sets out a broad vision for the future and establishes objectives and targets for transport.	Harbour development proposals could help to improve national transport links.
The Ports Policy Statement, Department of Transport	seeks to provide a framework for the provision by Port Companies of port services which are efficient, effective and adequate for the needs of our growing economy.	The Masterplan aims to create a framework for investment and growth.
The Ports Policy Review Consultation Document, Department of Transport	The review recognises the potential for urban development in Ports. Environmental impact and in particular potential impact upon designated Natura 2000 sites is a particularly sensitive issue. Means by which connectivity for passengers and freight can be improved should be explored further.	The SEA assesses the impact upon Natura 2000 sites. The harbour/port facilities development will seek to improve

Identified Plan, Programme or Legislation	Summary of Relevant Objectives	Relevance to Masterplan
		connectivity for passengers and freight.
Ministerial Guidelines	The following Guidelines have been taken into account in the preparation of the Masterplan: ▪ Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas, and accompanying document Urban Design Manual – A Best Practice Guide (2009) ▪ Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities (2007) ▪ Retail Planning - Guidelines for Planning Authorities (2005) ▪ The Planning System and Flood Risk Management - Guidelines for Planning Authorities (2009) ▪ Architectural Heritage Protection – Guidelines for Planning Authorities (2004)	These will impact upon different constructed aspects of the Masterplan
Draft Offshore Renewable Energy Development Plan	The Draft Plan sets out a framework for the development of renewable energy in offshore locations.	Renewable energy proposals may impact upon the Dun Laoghaire Harbour area, or future renewable energy proposals could be integrated into the development of the Harbour.
Regional Policy		
The Regional Planning Guidelines for the Greater Dublin Area 2010-2022	The Guidelines seek to consolidate development and increase overall densities of development which will lead to a more compact urban form, relative to the size of the population and facilitate the provision and use of a considerably enhanced public transport system. Dun Laoghaire Harbour is recognized as having a role to play in port capacity at a smaller scale and in relation to specialist needs.	The Masterplan can contribute to the realisation of policies and objectives set out in the Guidelines.
A Platform for Change	It outlines an integrated transportation strategy for the Greater Dublin Area for the period 2000 – 2016.	This is likely to be of limited relevance for the Masterplan as it is due to be revised by the NTA Transport strategy (see below)
Greater Dublin Area Draft Transportation Strategy, 2011-2030.	Dun Laoghaire is a designated town centre. Higher densities should be promoted at designated town centre railway stations and there will be an emphasis on commercial development around such transport nodes.	There is already high density development found in proximity to the DART station. The proposed harbour development will further enhance residential and the commercial development around the station and the local economy.
Retail Strategy for the Greater Dublin Area, 2008-2016	It identifies Dun Laoghaire and Dundrum as major Town Centres within the Region and therefore should be the location for a full range of shopping extending to higher order comparison shopping	The mixed use element of the proposed development comprises retail, leisure, entertainment and cultural.

Identified Plan, Programme or Legislation	Summary of Relevant Objectives	Relevance to Masterplan
	together with the integration of leisure, entertainment and cultural facilities.	
Greater Dublin Strategic Drainage Study (GDSDS) (2005).	It sets out drainage and flood prevention measures for the Greater Dublin Area	While there are no rivers within the area of the Masterplan, the proposals contained in the Plan will impact upon Ringsend Wastewater Treatment Plant.
Greater Dublin Water Supply Strategic Study 1996-2016	It sets out the strategy for the provision of water in the Greater Dublin Area.	The Masterplan area will need to be served by potable water and there will be a need to ensure that it is adequately served.
Waste Management Plan for the Dublin Region 2005-2010	It sets out the waste management plan for the Greater Dublin Area, which includes for recycling, the development of an incinerator at Ringsend and landfill throughout the region.	The Masterplan will adopt best practice in relation to the disposal of waste.
Air Quality Plan for the Dublin Region (1999)	The Plan sets out targets for Air Quality within the Greater Dublin Area.	The Masterplan has the potential to impact upon air quality.
Local Policy and Projects		
The Dun Laoghaire Rathdown County Development Plan 2010-2016	The Harbour area is zoned with Objective 'W' is "*To provide for waterfront development and harbour related uses".* A range of port related uses, marine leisure, commercial, retail services and residential are permitted in principle or open for consideration. The objectives for the proposed Masterplan the Dun Laoghaire Harbour area, will have due regard to the following Development Plan objectives for the Urban Framework Plan (in summary): 13 To facilitate the continued development of the Harbour in accordance with a Harbour Masterplan to be prepared by Dún Laoghaire Harbour Board in close conjunction with the Planning Authority. Any approved Masterplan must adhere to the overall zonings, policies and objectives of the Development Plan. 14 To encourage the redevelopment of 'The Gut' adjacent to the West Pier to include improved access to the area. 15 Coal Quay Bridge. To improve/upgrade access to Dún Laoghaire Harbour and lands adjacent to the West Pier. 16 To retain the Carlisle Pier structure and to encourage redevelopment on it that will incorporate uses that will bring significant cultural, social, recreational and economic benefits and must	Subject Masterplan is in accordance with this zoning objective. The subject Masterplan is in accordance with the overall policies and objectives of the CPD. Development of the "Gut" will have to be appropriate. Improved access could be provided through the harbour estate. The Masterplan accords with this objective The Masterplan accords with this objective.

Identified Plan, Programme or Legislation	Summary of Relevant Objectives	Relevance to Masterplan
	provide for a high degree of public accessibility and permeability, with walkways, viewing areas and public spaces throughout. The redevelopment should commemorate the unique heritage and history of the Pier as a gateway for the Irish Diaspora. 21 To develop an enhancement scheme for the area between the East Pier and Sandycove. This scheme will include proposals for the upgrading and development of the Dún Laoghaire Baths site and facilitate improved pedestrian linkage to the East Pier in accordance with the recommendations of the Dún Laoghaire Baths Sub-Committee.. 84 To protect and conserve South Dublin Bay and proposed candidate Special Area of Conservation. 93 To promote the development of the Sutton to Sandycove (S2S) Promenade and Cycleway. 94 To provide a Youth and Community Centre for Dún Laoghaire. 95 To promote Water Leisure Facilities for public use at the coastal fringe of the Gut and rear of the West Pier,	Due regard has been given to the proposals developed by the Council for the Baths. This objective will require any scheme to also provide adequate sea defences and take into consideration that the area between the East Pier and Sandycove is a pNHA Protecting Natura 2000 sites is central to the development of the Masterplan. It should be noted the alignment shown on Maps 2, 3 and 4 is not absolute but indicative only. The necessary EIS will commence during the term of the Plan. This will be subject to the appropriate environmental assessments including any assessment required under the Habitats Directive in co-operation with the relevant agencies
Development Plan SEA	Relevant Mitigating measures include: Biodiversity and Flora and Fauna I No projects giving rise to significant direct, indirect or secondary impacts on Natura 2000 sites shall be permitted on the basis of this Plan. Biodiversity and Flora and Fauna II All subsequent plan-making and adoption of plans arising from this plan will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive. Biodiversity and Flora and Fauna III The Council shall set up procedures to ensure compliance by plan-makers with the requirement of Article 6 of the Habitats Directive for land use plans. Water Protection I The Council shall address the significant water management issues identified in the Water Matters Consultation publications for the Eastern River Basin District.	The Environmental Report reflects these mitigating measures.

Identified Plan, Programme or Legislation	Summary of Relevant Objectives	Relevance to Masterplan
	Water Protection II When adopted, the relevant policies and objectives of the Eastern River Basin Management Plan and associated Programme of Measures shall be integrated into the Plan through amendment or otherwise. Water Protection IV The Council shall ensure that the ongoing development of the County is undertaken in such a way so as not to compromise the quality of surface water and groundwater. Bathing Water I The Council shall comply with the provisions of the Bathing Water Regulations to ensure that where any bathing water fails the mandatory bathing standards that the public are made aware of this fact by means of information notices posted at the bathing area. Bathing Water II The Council shall ensure compliance with Directive on bathing water (Directive 2006/7/EC) as implemented by the Bathing Water Quality Regulations 2008 (S.I. No. 79) of 2008 Waste Water I Development under the Plan shall be preceded by sufficient capacity in the public waste water treatment plants and appropriate extensions in the existing public waste water treatment catchments. Waste Water II The Council shall implement the relevant recommendations set out in Urban Waste Water Discharges in Ireland for Population Equivalents Greater than 500 Persons . Drinking Water I The County Council shall ensure conformance with the relevant recommendations set out in The Provision and Quality of Drinking Water in Ireland - A Report for the Years 2006-2007 (EPA Office of Environment Enforcement, 2008). Drinking Water II Existing and new populations under the CDP shall be served with clean and wholesome drinking water. Flooding I The Council has engaged consultants to carry out a Coastal Defence Strategy Report which is to be completed in late 2009. The study will detail a coastal protection strategy identifying specific coastal protection measures on a priority basis and undertake a risk assessment of the vulnerability of the	

Identified Plan, Programme or Legislation	Summary of Relevant Objectives	Relevance to Masterplan
	study area and hinterland to both erosion and coastal flooding. The CDP shall require new developments to comply with these measures and to have due regard to the Coastal Defence Strategy Report where relevant. Developments near the coast will be required to have specific regard to the Report's risk assessment on erosion and coastal flooding. Flooding III It is Council policy to implement the recommendations of the most recent version of the Department of the Environment, Heritage and Local Government and the Office of Public Works Guidelines on "The Planning System and Flood Risk Management" including using the Guidelines to assess applications for planning permission. Flooding V It is Council policy to ensure that all development proposals incorporate Sustainable Urban Drainage Systems (SUDS). Cultural Heritage I Landuses shall not give rise to significant losses of the integrity, quality or context of archaeological material - except as may be conditioned or directed by the appropriate heritage agencies. Cultural Heritage II It shall be ensured that pre-development archaeological testing, surveying, monitoring and recording are carried out where appropriate. Cultural Heritage III Alterations and interventions to Protected Structures shall be executed to the highest conservation standards, and shall not detract from their significance or value. Cultural Heritage IV Planning applications for developments in sensitive areas shall be accompanied by an assessment undertaken by an accredited conservation architect Cultural Heritage V It is Council policy to consider further amendments to the record of Protected Structures following the publication of the National Inventory of Architectural Heritage of the County. Landscape Planning Applications that have the potential to significantly adversely impact upon landscapes attributed with a High Amenity zoning objective or upon protected views or prospects shall be required to be	

Identified Plan, Programme or Legislation	Summary of Relevant Objectives	Relevance to Masterplan
	accompanied by an assessment of the potential landscape and visual impacts. Air and Noise I It is Council policy to implement the provisions of National legislation and EU Directives on air and noise pollution in conjunction with other agencies as appropriate. Air and Noise II The Council shall minimise increases in, and where possible, reduce, the quantity of the County's population exposed to excessive noise levels arising from land uses Transportation I It is Council policy to introduce traffic calming and traffic management schemes on particular roads. Waste Management I The Council shall ensure the implementation of an integrated approach to waste management for any proposed development(s) within the lands in question	
Non Statutory Plans and Programmes	The following are of relevance: ▪ County Development Board – An Integrated Strategy for Social, Economic and Cultural Development 2002-2012 ▪ Traveller Accommodation Programme (2009) ▪ Dun Laoghaire-Rathdown Arts Strategy 2007-2010 ▪ Dun Laoghaire-Rathdown Heritage Plan (2004) ▪ The Vision – Tourism Masterplan for Dun Laoghaire-Rathdown (2008) ▪ Dun Laoghaire-Rathdown Biodiversity Plan (2008) ▪ The Local Coastal Plan Booterstown to Sandycove (2002) ▪ Dublin Bay Task Force Terms of Reference,DoEHLG (2008) ▪ Dublin Port Study, Department of Transport (2008) ▪ The Potential for Growing Marine Leisure, Inter Reg 2005-2007 ▪ Sutton to Sandycove Cycleway, Dublin Regional Authority (2006) ▪ Dun Laoghaire Baths Proposal, Dun Laoghaire Rathdown County Council (2010) ▪ Dun Laoghaire DART Station Interchange, Dublin Transportation Office (2006)	The Masterplan has had due regard to each of these plans, strategies and projects

APPENDIX II - Strategic Flood Risk Assessment

Dun Laoghaire Harbour Company

Dun Laoghaire Harbour Masterplan

Stage 2 Initial Flood Risk Assessment for the DLHC Masterplan

D7263.100

Rev B | July 2011

Ove Arup & Partners Ireland

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Job number D7263.100

ARUP

Document Verification

ARUP

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Contents

Appendix C

Sections

Appendix D

Overtopping

Appendix E

Historical Flood Reports

Appendix F

Flood Zone Map

1 Introduction

The Dun Laoghaire Harbour Company (DLHC) is a state commercial company charged with the responsibility for the maintenance and development of Dun Laoghaire Harbour. The vision of the company for the harbour is to make it "to be recognised internationally as an exciting waterfront, marine and tourist destination". With this objective, the company is preparing a major regeneration masterplan to utilise the 200 year old heritage environment to achieve this vision and also to establish closer integration with Dun Laoghaire town centre.

Images of Dun Laoghaire harbour in its current state and in the reconfiguration proposed by the masterplan are presented in Appendix A.

As part of the studies required for the preparation of the masterplan, DLHC commissioned Arup to complete a Stage 2 Flood Risk Assessment (FRA) of the harbour in line with the current flooding guidelines.

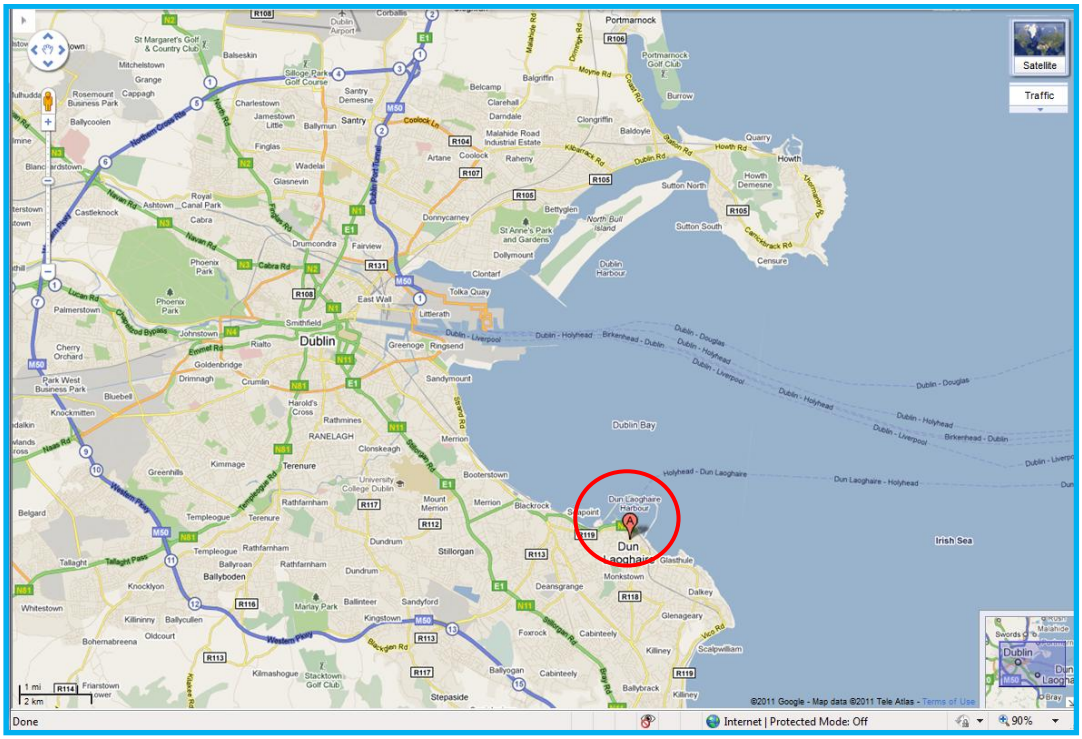
The Stage 2 initial Flood Risk Assessment for the DLHC masterplan that is the subject of this report will be generally in line with the guidelines laid down by the Office of Public Work (OPW) in 'The planning system and Flood Risk management – Guidelines for planning authorities, OPW 2009. Further detailed studies will be required for a planning application in line with the OPW guidelines and our following conclusions.

This report will include:

- An examination of sources of flooding that may affect the site;
- Information on the location, standard and condition of existing flood defences;
- Information on extent and depth of previous flood events or on flood predictions;
- A flood zone map for the site in question;
- Consideration of the flood zone in which the site falls and demonstration that the development is appropriate given the flood zone and the vulnerability criteria of the type of development;
- An investigation of future rise in flood levels as a result of climate change;
- An assessment of how safe access and egress can be provided for routine and emergency access under both frequent and extreme flood conditions;
- An assessment of potential impact of development on flooding elsewhere. The likely impact of any displaced flood water on third parties caused by alterations to ground levels, reducing floodplain attenuation, impeding flood flow routes or raising flood embankments and the means of providing compensation for this loss of floodplain, where necessary.
- A scoping of possible mitigation measures and what compensation works may be required and what land may be needed;
- Anticipated water levels and associated probabilities.
- Future work/studies as detailed planning work might be progressed

2 Existing Information

2.1 Site



Dun Laoghaire harbour is located in Dublin Bay, on the south Dublin shoreline between Blackrock and Dalkey. Dun Laoghaire Harbour was built between the years 1817 and 1842. The Harbour, and the railway that was built to service it, transformed the character of the small fishing village then known as Dunleary. The harbour lands extend for approximately 1.6km along the coastline. The form of the harbour is generated by its two breakwater arms, each over 1km long (the East and West Pier).

The harbour itself can be broken up into six characteristic areas. These areas are as follows;

A - East Pier;
This area is eastern breakwater. The East Pier has a promenade running along the length of the pier. There are few existing active structures on the pier (bandstand, shelter & Lighthouse). The pier is mostly used for non marine activities, pedestrians etc.

B – West Pier
The West pier is the western breakwater and is located it at the extremities of the harbour lands. This part of the harbour is quiet; there are fewer strollers than elsewhere. This is due to it being more distant from town centre and from most yacht clubs, and it is cut off from the town by the railway tracks.

C - Queen's Road/Crofton Road esplanade;
This linear space displays a typical seafront character— comprised of paths, railings, seating, monuments, street furniture, bollards and chains, planting. An

integrated part of the landscape, the railway creates a change in level and forms the junction between the sloping townscape and the harbour.

D - Carlisle Pier;
In recent times this part of the harbour has become increasingly underused. Larger vessels have been known to moor here. The pier is a raised reinforced concrete slab supported on piled foundations. It is approximately 275m long.

E - Old Harbour;
The Old Harbour includes some of the historical part of Old Dunleary and was the location of the original pier constructed in 1767. This area encompasses an old boatyard and houses modest boating activities.

F - Victoria Wharf/Marine Road/Mallin Station/St Michaels Pier/ HSS Ferry Berth
This area houses the main access/entrance to the harbour. It acts as the interface to both the town and the nearby railway station. This area also houses St Michaels Pier, HSS ferry Berth as well as a number of yacht clubs. This can be viewed as the busiest of the harbour.

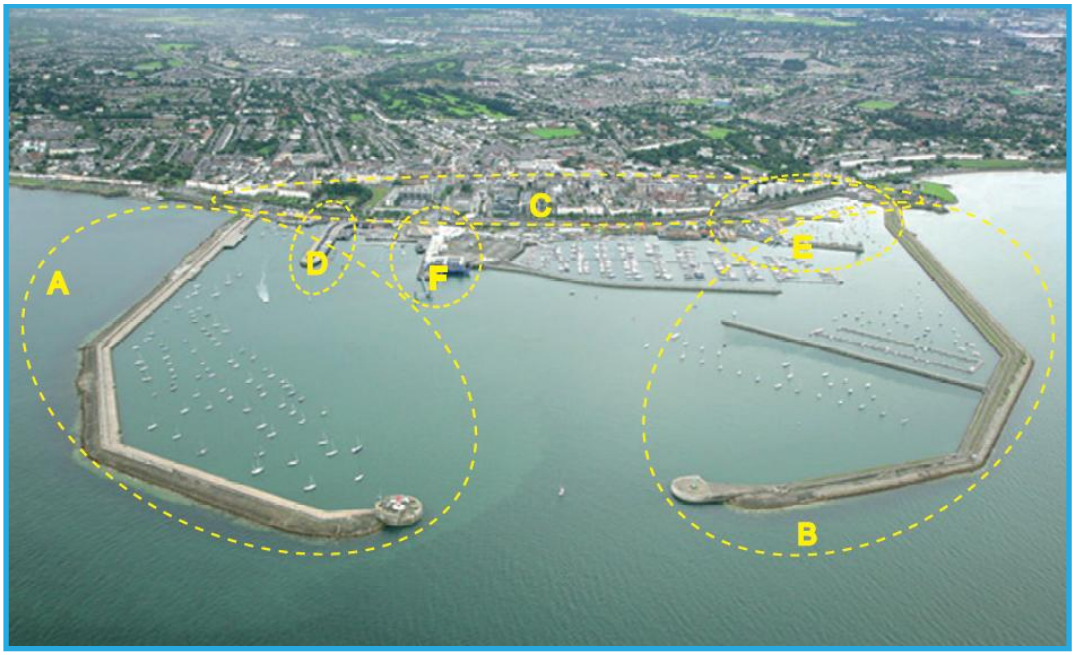


Figure 1 Dun Laoghaire Harbour Significant Areas (Peter Barrow photography)

The ground levels of the harbour vary significantly from area to area. A topographical survey of the harbour can be found in Appendix B

2.2 Surrounding Area

Dun Laoghaire Harbour is over looked by the town of Dun Laoghaire from the south-west. The town of Dun Laoghaire is situated on a gentle hill that slopes towards the harbour grounds (See sections 1&2 in Appendix C). Separating the harbour and the town is the N31 (Dunleary Rd, Crofton Rd, Queens Rd) and the Dublin Area Rapid Transit (DART) railway line. The N31 terminates inside the harbour lands and is the main access to the Dun Laoghaire harbour. The harbour itself has four access routes for vehicles each spurred off the coastal road. Please see below Figure 2

Figure 2 ‘Google Maps’ image of Dun Laoghaire harbour and surrounding area.

© Google Map data ©2011 Tele Atlas

3 Analysis of Flood Hazards and Flooding Mechanisms

The following potential sources of flooding have been identified for the Dun Laoghaire Harbour site:

- Coastal flooding from the Irish Sea
- Pluvial flooding (direct rainfall) from localised storm water runoff from adjacent ground
- Groundwater flooding
- Sewer flooding
- Overtopping

Fluvial flooding is not seen as a potential source of flooding as there are no major water ways (canal or rivers) in the area surrounding Dun Laoghaire harbour.

Overtopping may be a potential source for flooding in the harbour. It is known that waves can propagate inside the harbour and wave overtopping over the promenade along the east pier from inside the harbour are not an uncommon scene. Overtopping risk is a function of the developed and reserved edge of the detailed development and should be reviewed and considered at planning stage. This report will not cover overtopping but will highlight areas where it may be an issue and suggest possible mitigation measures.

3.1 Coastal Flooding

As the site is located close to the shore the main source of flooding is likely to be from the sea.

In order to determine how significant coastal flooding can be for the site, results from the Irish Coastal Protection Strategic Study (ICPSS) were used. The ICPSS has been developed by the OPW in phases since 2004. In June 2011 the report for Phase 3 was published including the north east coast of Ireland and essentially comprising an assessment of the hazard and potential risk from coastal flooding at a strategic level. The study provides extreme sea water levels in a number of points along the coast. The most significant points for Dun Laoghaire northwest and southeast of the harbour are points 24 and 25 respectively. The exact location of these points is shown in the Figure 3 below.

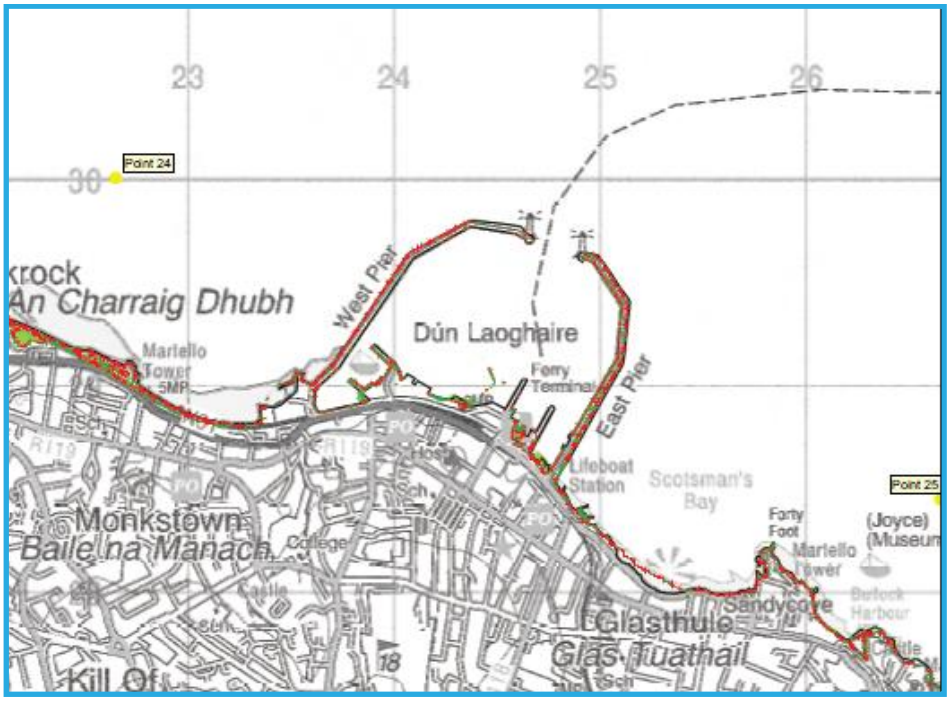


Figure 3 Extract from ICPSS showing points 24 & 25

Relevant for coastal flooding are the 1 in 200 and 1 in 1000 year extreme water levels. These extreme water levels in the two points 24 and 25, together with an interpolated value for the harbour are summarized in Table 1.

Table 1 Extreme water levels OD

Levels above OD Malin	**1 in 200 year extreme water level**	**1 in 1000 year extreme water level**
Point 24	2.98m	3.19m
Interpolation for Dun Laoghaire Harbour	2.99m	3.21m
Point 25	2.99m	3.22m

These levels will be used in section 5 to map the flood zones across the harbour.

The ICPSS extreme water levels do not include an allowance for climate change. The impacts of climate change are accounted for in section 6.

3.2 Pluvial Flooding

Pluvial flooding is caused by surface water runoff due to direct rainfall. As mentioned previously, Dun Laoghaire town is situated on a hill overlooking the harbour. There is a plateau as it reaches the roadway separating the harbour and the town. A localised depression is formed by the railway track structure that separates the roadway and the harbour. The surface water runoff from the town is

collected by the town's surface water drainage system. If there is any excess water this will run down towards the roadway (N31) drainage system and then possibly further to be picked up by the railway track drainage system. There is a risk that if there is a large enough flood in the town and the road and rail drainage systems are blocked or do not have capacity to take the extra water that excess surface water may flow towards the harbour. This risk should be taken into consideration when redesigning the drainage system for the harbour.

Surface water runoff in the harbour is and will continue to be collected in the normal manner using land drains and gullies etc. It is planned that surface water collected will be discharged directly to the sea. Tidal storage may be required in a conventional approach. The normal local authority requirement for attenuated discharge should be complied with.

3.3 Ground water flooding

3.3.1 Existing Ground Conditions

A detailed geotechnical survey of the existing ground conditions should be carried out to progress the design of the development. The survey should identify the existing soil characteristics but also investigate the hydraulic characteristics of the soil such as permeability and saturation levels, and groundwater behaviour.

3.3.2 Possible Groundwater Behaviour

When the hydraulic characteristics of the soil are obtained and the water table level recorded a more detailed assessment should be made to look at the relationship between tide and groundwater levels. As the site is located near the sea, it is likely the groundwater beneath the site is in hydraulic conductivity with the water in the sea. As a result of this relationship the water table is likely to rise and fall in relation to the tidal cycle. A slight time lag is to be expected between the rising/falling of the tide level and the rising/falling of the water table in the area. In addition, the level of variation in the groundwater level due to the tide should be less than the tidal variation.

Groundwater contours generally follow the contour of the land. It is expected the groundwater in Dun Laoghaire broadly follows the slope of the higher ground inland and flows to the sea underneath the site.

3.3.3 Groundwater Impact On Flooding

Ground water levels could impact on flooding on the site. If the flow of groundwater to the sea is insufficient due to poor permeability of the soil under the site or an increase in water levels due to a flood on the higher grounds, the ground water levels may rise above ground level inland of the coast, creating a flood. Permeability of the soil is unlikely to be an issue however, as no record was found of this occurring in the past. Historic flooding events will be discussed further in section 4 of this report.

3.4 Sewer flooding

Historic flooding of sewer systems will be discussed later in section 4, however sewer floods from a source in the town can be treated in the same way as discussed in section 3.2.

The collection system in the harbour will continue to be treated in a conventional manner. The Foul water system will be discharged into the DLRCC system using rising mains and submersible pumps in some areas of the site.
There may be issues with capacity in council system in the receiving combined sewerage system and measures should be allowed for to minimise the rate of discharge to these sewers (foul water attenuation storage and discharge over a protracted period or at night etc). It was noted that the invert levels of some of the foul water systems in the harbour (for example St. Michael's Pier) will be lower than predicted tidal levels. A survey and assessment should be carried out in order to eliminate any issues related to this. Similar to the pluvial flooding issue, the local authorities will need to be consulted prior to detailed planning when specific outputs are known to confirm capacity of the existing collections systems.

3.5 Overtopping

Wave overtopping of existing coastal defences or coastal structures may cause or add to flooding in the low lying areas located behind these defences. As part of the ICPSS study, areas where there was considered to be a significant potential for wave over-topping were defined from an initial assessment using the OPW's northeast coast LIDAR data, the coast of Ireland oblique imagery survey and local knowledge of the area. Dun Laoghaire was identified in the report as being potentially vulnerable to wave overtopping during storms. There has been history overtopping in Dun Laoghaire harbour. Please see Figure 4 below.

Figure 4 Overtopping in Dun Laoghaire Harbour

Areas in the Harbour that are potentially at risk to overtopping are highlighted in the attached drawing in Appendix D. As outlined in section 3 above, overtopping should be considered in detail at planning stage when profiles and water edge details are more developed.

4 Historical Flooding in Area

The OPW floodmaps website was used to collect information on any previous food events that took place the vicinity of Dun Laoghaire Harbour. (www.floodmaps.ie) Figure 5 is a diagram outlining where records of floods have taken place.

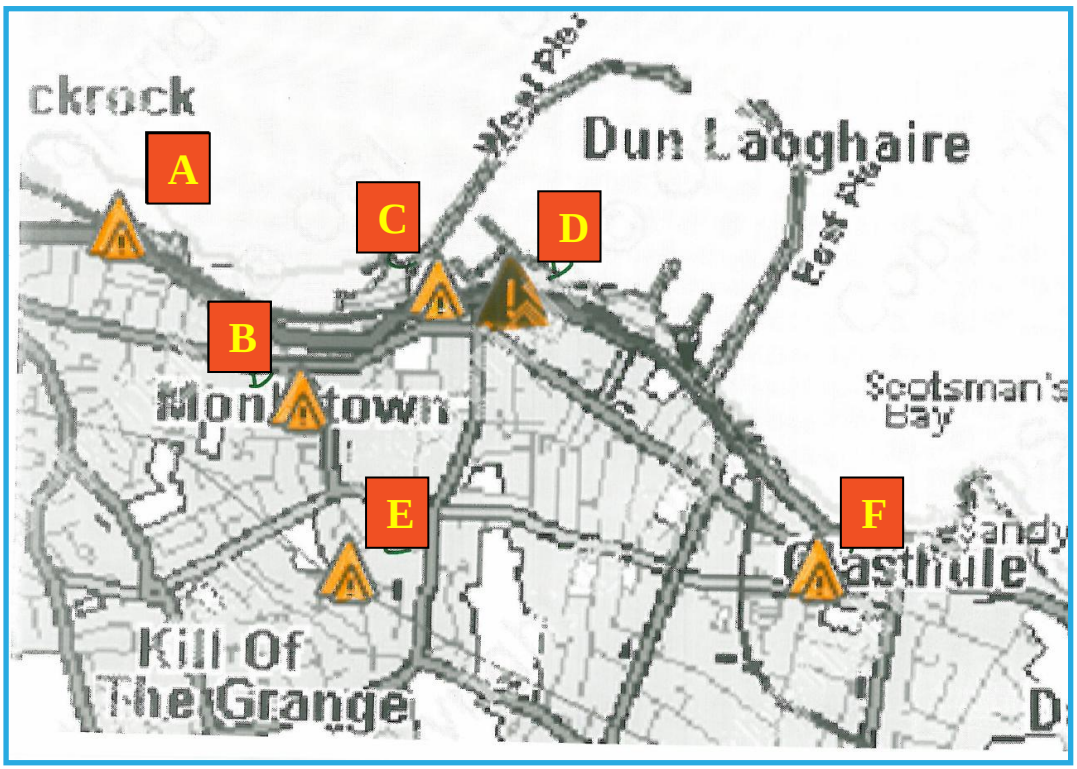


Figure 5 Recorded flood locations (Floodmaps.ie)

A - Brighton Vale

This area is vulnerable in stormy tidal conditions. These houses are parallel to the sea. Last flooding occurred in 2003. Houses no. 1-16 requested sand banks in the past, as they have basements prone to flooding from high tides (2004). This is a reoccurring flood.

B – Carrickbrennan Rd and former Monkstown hospital site

Carrickbrennan Rd - Frequent flooding on road due to blocked road gullies. This is a reoccurring flood.

Former Monkstown hospital site /new apartments - Flooding due to blocked gullies. Problem would be solved by raising the threshold at the entrance gate or by creating a mound in front of it.

C - Clearwater cove.

This area is prone to particularly bad flooding. Flooding is caused by geometry of hydraulic system (2004). Remedial works have been undertaken. Frequent flooding was also due in part to the failure of the sealed manhole covers on the greater DL drainage system in addition to the blocked gullies on the run from

Crawfords garage down to the low spot. The latter can still cause problems during heavy rain

D - Old Dun Leary road.

Prone to flooding as a result of fallen leaves blocking road gullies. (2004) Water was 78cm high in the middle of the road. Sewer surcharge beside apartments.

E - Dunedin, Monkstown.

Particularly bad flooding due to overflow of sewer. Significant flooding in 2003. Foul flooding due to inadequacies of sewer in Dunedin and old sewer in Monkstown Avenue.

F – Glasthule.

Several flooding incidents from 1999 to 2003 due to teething problems with the greater Dun Laoghaire drainage system.

Reports, maps and other documentation of the flooding discussed above can be found in Appendix E

Reoccurring flooding events that may have a direct impact on harbour operations appear to be due to maintenance issues most notably blockages of road gullies. It should be confirmed with the local council, prior to detailed design of the development, that the risk of flooding related to gulley conditions, levels and capacity issues of surface water and sewer systems have been rectified and should no longer be an issue.

5 Flood Zones

5.1 Zone Definitions

The new "Planning System and Flood Risk Management Guidelines" published in November 2009 by the Department of the Environment, Heritage and Local Government use three different flood zones to define areas of flood risk. Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning.

There are three types or levels of flood zones defined for the purposes of these Guidelines:

Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1 in 200 for coastal flooding). Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation, would be considered appropriate in this zone.

Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 1 in 1000 year and 1 in 200 for coastal flooding). Less vulnerable development, such as retail, commercial and industrial uses, sites used for short-let for caravans and camping and secondary strategic transport and utilities infrastructure, and water-compatible development might be considered appropriate in this zone.

Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 1 in 1000 for both river and coastal flooding). Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast).

The new guidelines are aimed at discouraging vulnerable developments in areas of high risk of flooding so that in zone A and B dwellings should not be constructed.

5.2 Dun Laoghaire Site Flood Zoning

Flood zones are defined on the basis of the 1 in 200 years and 1 in 1000 years extreme water levels. These levels are the result of a modelling which includes uncertainties both in the input data and in the modelling technique. It is usual practice to add to the estimated extreme levels a freeboard to account for these uncertainties. The freeboard is therefore a function of the degree of sophistication and of the accuracy of the model adopted. The ICPSS indicates that the extreme levels given have a degree of confidence of approximately 0.33m. In view of this and in line with what assumed for other studies undertaken by Arup a freeboard of 0.5 m would appear to be adequate. Using the values from Table 1 above and taking a freeboard of 0.5m, the flood zones levels for the Dun Laoghaire site are outlined in Table 2 below.

Table 2 Dun Laoghaire Flood Zones

Flood Zone	Flood probability	Level (m ODM)
A	greater than 0.5% (1in200)	below +3.49m
B	0.5% (1in200) to 0.1% (1in1000)	+3.49m to +3.71m
C	Smaller than 0.1% (1in1000)	above than +3.71m

In Appendix F there is a drawing indicating the flood zones for the entire site. Figure 6below shows the current land use of the harbour.

The majority of the site is located in the flood zone C.

A section of the western edge of the East Pier is located in the flood zone A and so too are areas of the piers at Traders Warf and Old Dun Laoghaire harbour. In addition a number of areas at the yacht clubs and RNLI launch points are understandably at levels in zone A. These areas are used for activities that fall under the suitability criteria for Zone A. There is no plan to change the use of these areas under the masterplan.

There are a few small areas of the site that fall into the flood zone B. These are located on the East Pier, at Traders Warf and Old Dun Laoghaire Harbour. These areas in question fall under the suitability criteria for zone B (as discussed in section 5.1 above). The masterplan does not currently have any plans to change the use of these areas.

According to drawings in the 'Dun Laoghaire Harbour consultation Masterplan' all of the proposed structures and developments are located in zone C and therefore the type of structure/development is not restricted by flooding considerations.

Figure 6 Current Land use of Dun Laoghaire harbour

6 Climate Change and Design Flood Level

The new "Planning System and Flood Risk Management Guidelines" advise a precautionary approach with regard to climate change. The precautionary approach includes:

- Ensuring that the levels of structures designed to protect against flooding, such as flood defences, land-raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect; and
- Ensuring that structures to protect against flooding and the development protected are capable of adaptation to the effects of climate change when there is more certainty about the effects and still time for such adaptation to be effective.

The draft guidance by the OPW "Assessment of Potential Future Scenarios for Flood Risk Management"(separate to the guidelines), advises on future scenarios and allowances for climate change. It identifies two scenarios: the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS) with an allowance for mean sea level for both of +0.5m and +1m respectively.

- The former (the MRFS) is intended to represent a 'likely' future scenario, based on the wide range of predictions available and with the allowances for increased flow, sea level rise, etc. within the bounds of widely accepted projections.
- The latter (the HEFS) is intended to represent a more extreme potential future scenario, but one that is nonetheless not significantly outside the range of accepted predictions available, and with the allowances for increased flow, sea level rise, etc. at the upper the bounds of widely accepted projections.

While the adoption of the HEFS is usually considered adequate for large size developments and strategic infrastructures, when smaller developments are considered it quickly becomes too onerous.

The water levels from the ICPSS, shown in section above, do not include an allowance for climate change. In order to account for climate change a value for sea level rise must be added to the ICPSS values. The following Table 3 outlines the updated ICPSS water levels (previously shown in Table 1) with the inclusion of climate change and freeboard.

Table 3 Extreme water levels OD including sea level rise as a result of climate change

Extreme water levels for Dun Laoghaire Harbour *[All levels above OD Malin]*	**1 in 200 years extreme level**	**1 in 1000 years extreme level**
from ICPSS	3.09	3.21
with climate change (MRFS=+0.5 m in 100 years) and freeboard	4.09	4.21
with climate change (HEFS=+1.0 m in 100 years) and freeboard	4.59	4.71

There is a great deal of uncertainty in relation to the potential effects of climate change and therefore adopting the High-End Future Scenario for a hundred years design period for the existing ground areas would appear to be over-conservative. For these areas a scenario between the Mid-Range and the High-End scenarios may be appropriate provided that the scheme is flexible enough in being implemented or protected with other measures should the High-End prediction for climate change be confirmed. With this approach a level of 4.5 m OD Malin (i.e. in excess of [4.09+4.59] / 2 = 4.34 m) is suggested for general ground levels in the masterplan. More vulnerable developments (such as residential) should be situated at the High-End level of not less than 4.71 m.

7 Conclusion and Recommendation

7.1 Flood Sources

Four potential sources of flooding have been identified for the Dun Laoghaire Harbour site:

- Coastal flooding from the Irish Sea
- Pluvial flooding (direct rainfall) from localised storm water runoff from adjacent ground
- Groundwater flooding
- Sewer flooding

The main source of flooding to the site is from the sea. From the information available it has been established that the sea level will also influence the impacts of flooding from other sources i.e. groundwater. The site is not directly at risk of flooding from the sea; however future rises in sea level may cause an increase in both the water level of the adjacent drainage and sewer system and the level of the groundwater underneath the site. Overtopping may increase the risk of flooding in certain areas of the site and a separate study on Overtopping is expected to be carried out during the preparation of the flood risk assessment for the planning application.

7.2 Risk of Flooding of Site and Access Road

As discussed briefly in the report and as can be seen in the topographical survey and the sections in Appendix B the surrounding area slopes towards the harbour and the harbour site slopes towards the sea. As a result this means that surface and flood waters flow towards the sea.

The Majority of the site is located in the Flood zone C. Parts of the site on the outer extent of the site of the seaside are in flood zones A and B. There are no inappropriate structures or developments located in these areas (zone A+B). Locations of the site that are in Zones A & B fall under the accepted criteria for the zones as specified in section 3.5 of the 'The planning system and Flood Risk management – Guidelines for planning authorities, OPW 2009'. There are no planned structures or developments in these areas as part of the Dun Laoghaire Masterplan.

When considering climate change in 100 years (MRFS), or 50 years (HEFS), the majority of the site will remain above the 1:1000 year flood level.

All of the access roads are in the flood zone C and are above the 1:1000 year flood level considering climate change. (at1m or 0.5m)

It is important to note that overtopping may create a risk of flooding. A separate study should be carried out in order to address any overtopping flooding risks when detailed design is progressing.

7.3 Affect of the Future Development on the Existing Flood Conditions

It is not foreseen that the development will have a major affect on the existing flooding conditions. The Harbour site is located on the coastline and is at a lower level than the surrounding town. The site itself is sloping towards the sea and all of the proposed developments are located out of the 1 in 1000 flood levels.

As part of the development, the surface water drainage systems will need to be designed to take into account new hardstands and collection areas in a manner that will not to make the existing system run over capacity. The same is to be said for the revised sewer system.

The new development should not impede the flow of the groundwater into the sea to a degree that flooding occurs as described in sections 3.3.2 and 3.3.3. If a large obstacle is placed in the way of the groundwater flow this may result in a localised increase of groundwater levels which will need detailed study at planning stage.

7.4 Flood Mitigation Measures/ Recommendations

There are no major flood mitigation measures needed at this time. Mitigation measures may need to be taken should the masterplan decide to locate a development in a position that is located inside an inappropriate flood zone. If vulnerable developments are planned to be located in high or moderate risk of flooding (zones A&B) a justification test must be carried out and all criteria satisfied. A justification test scrutinises the existing conditions, the development type and the proposed flood protection system and lists a number of statements that must be confirmed. There are no vulnerable developments currently planned in zones A or B as part of the Masterplan.

Regardless whether the masterplan is to relocate some of the developments out of Zone C, a detailed flood risk assessment of the development will need to be carried out at planning stage. The detailed flood risk assessment will provide a quantitative appraisal of potential flood risk to the development, of the development's potential impact on flood risk elsewhere and expand on any proposed mitigation measures. It will give detailed analysis to each element of the site.

As discussed in chapter 6 a general ground level of 4.5m OD Malin and a level of 4.71m OD Malin for vulnerable developments is recommended for the Masterplan. As one of the most flood sensitive uses, we recommend levels for residential areas of above 4.71m OD Malin and ideally to be on the first floor level or above.

Overtopping may be an issue at certain locations in the harbour. An analysis should be carried out to eliminate the risk overtopping has to flooding the site. If, after an analysis is carried out, overtopping is found to create a risk of flooding, then a number of mitigation measures can be applied. These include;

- Raising the level of the interface between the sea and land,

- Installing a revetment to reduce the velocity of the overtopping wave
- Create a cantilever finish at the interface of the sea and land which reduces the over topping effect.
- Move structures away from sea edge and install a surface water collection system capable of collecting the volume of predicted overtopping

Confirmation of the capacity of the existing local council surface and sewer water collection systems should be obtained prior to detailed design.

A detailed Geotechnical survey should be carried out in order to understand the hydraulic activity of the soil under the site.

References

[1] The Planning System and Flood Management – Guidelines for Planning authorities" November 2009. Office of Public Works & Department of Environmental Heritage and Local Government.

[2] "Irish Coastal Protection Strategy Study Phase 3 – North East coast" June 2010. Office of Public Works.

[3] Dun Laoghaire Harbour Company

[4] www.floodmaps.ie

[5] Dun Laoghaire Harbour Masterplan 2011

Appendix A

Plans of Dun Laoghaire Harbour

Current plan of Dun Laoghaire Harbour

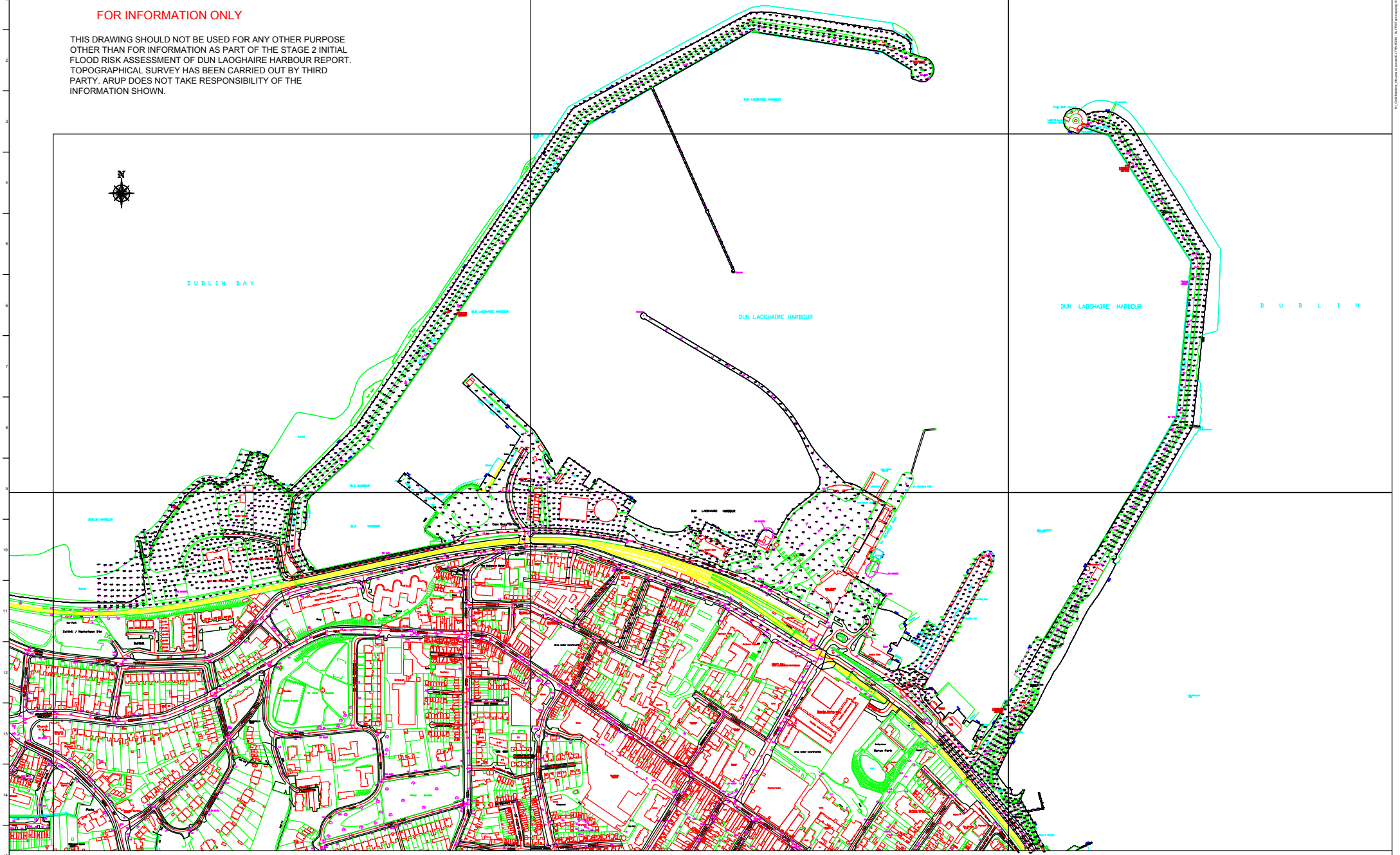
Plan of Dun Laoghaire Master plan

Appendix B

Topographical Survey

FOR INFORMATION ONLY

THIS DRAWING SHOULD NOT BE USED FOR ANY OTHER PURPOSE OTHER THAN FOR INFORMATION AS PART OF THE STAGE 2 INITIAL FLOOD RISK ASSESSMENT OF DUN LAOGHAIRE HARBOUR REPORT. TOPOGRAPHICAL SURVEY HAS BEEN CARRIED OUT BY THIRD PARTY. ARUP DOES NOT TAKE RESPONSIBILITY OF THE INFORMATION SHOWN.



Issue	Date	By	Chkd	Apprd

Client
Dun Laoghaire Harbour Company

Job Title
Stage 2 Initial flood Risk Assessment
Dun Laoighaire Harbour
Masterplan 2011

Scale at A0: As Shown
Discipline: Maritime

ARUP
50 ringsend Rd
Dublin 4
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www.arup.ie

Drawing Title
Topographical survey
Dun Laoghaire Harbour

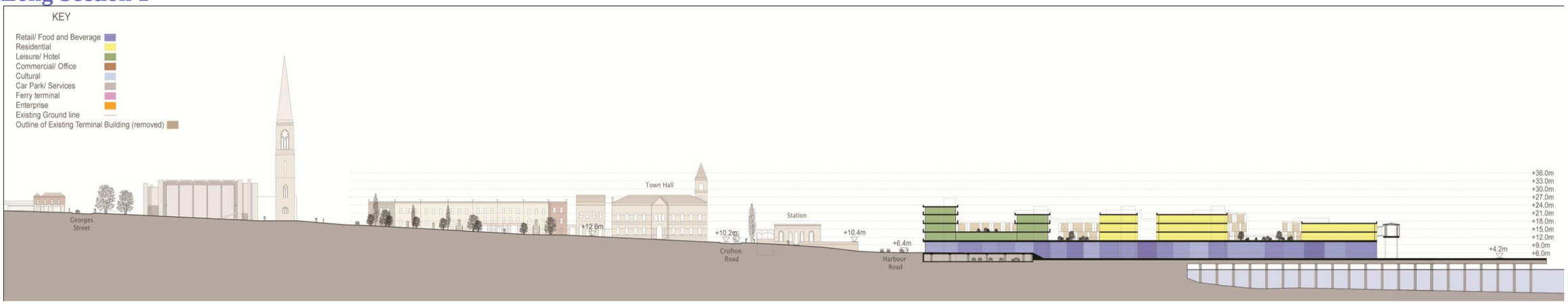
Drawing Status
For Information Only

Job No	Drawing No	Issue
327263.100	SK0001	01

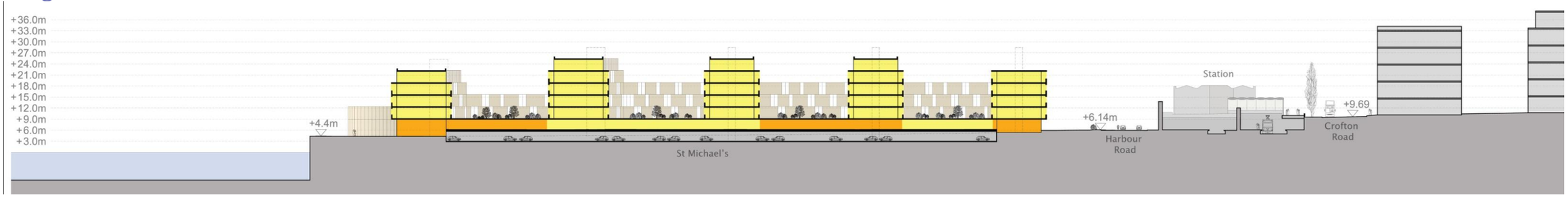
Appendix C

Sections

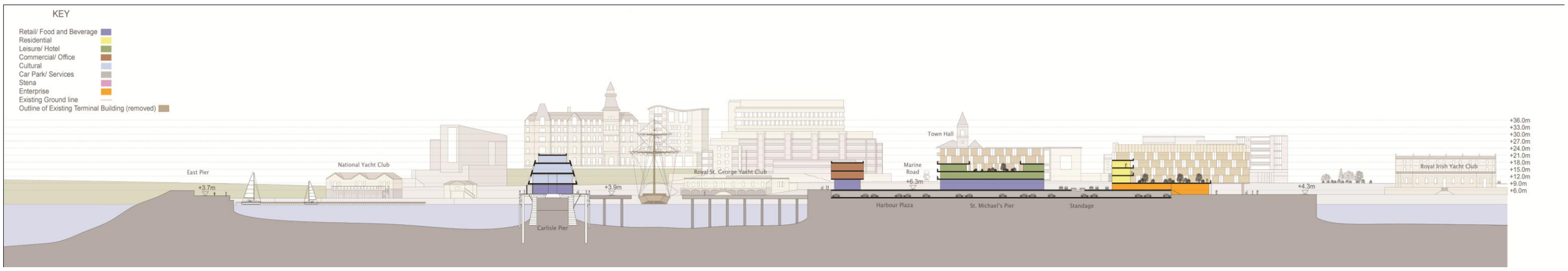
Long Section 1



Long Section 2

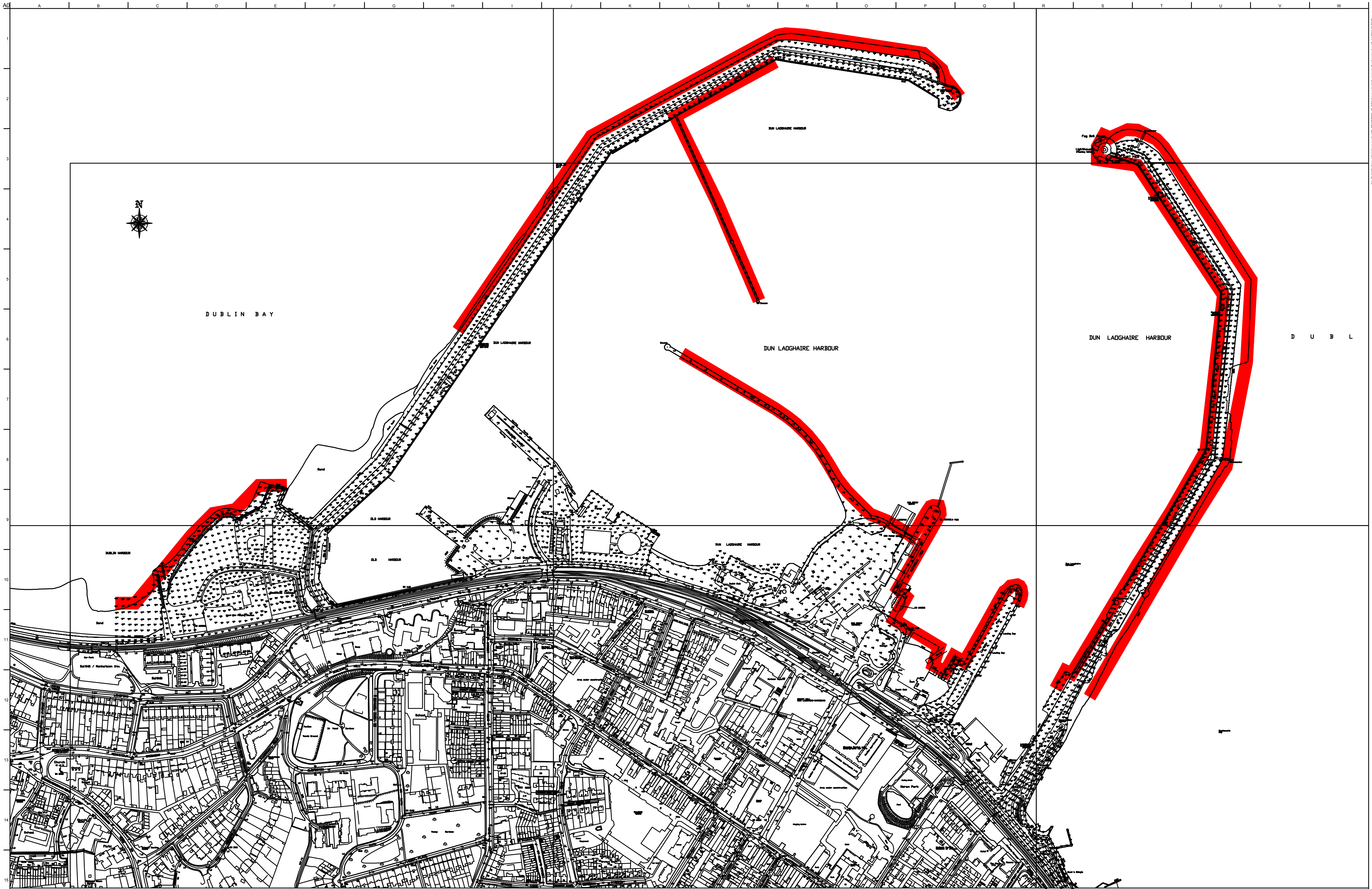


Cross harbour section



Appendix D

Overtopping



AREAS POTENTIALLY PRONE TO OVERTOPPING FLOODING

Issue	Date	By	Chkd	Appd

Client
Dun Laoghaire Harbour Company

Job Title
Stage 2 Initial flood Risk Assessment
Dun Laoighaire Harbour
Masterplan 2011

Scale at A0: As Shown
Discipline: Maritime

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Drawing Title
Potential Overtopping Areas
Dun Laoghaire Harbour

Drawing Status
For Information Only

Job No	Drawing No	Issue
327263.100	SK0002	01

Do not scale

Appendix E

Historical Flood Reports

FAO :

FLOODING THAT OCCURRED IN AREA
STARTED FROM 21/10/2002

- OLD DUN LAOGHAIRE AT CLEARWATER COVE, 2004
  MANHOLES SURCHARGING

- O'ROURKE PARK AT ROUNDABOUT -----MANHOLES LIFTING.

- TRIMSTON AVENUE TO JUNCTION AT ROCK ROAD

- IN ON SITE AT MEADOW LANDS NEAR DUNEDIN, -----MANHOLES 2006
  OVERFLOWING

- FLOODING AT PURTY KITCHEN-----SURCHARGING THROUGH 2004
  MANHOLES

- FLOODING AT B.I.M. ON CROFTON ROAD AGAIN THROUGH
  MANHOLES.

ALL OF THE RIVERS AND STREAMS WERE FLOWING AT FULL CAPACITY WHICH ONLY LEFT INCHES TO SPARE BEFORE FLOODING IN ALL AREAS, WHICH MEANT THE SCREENS HAD TO BE ATTENDED TO URGENTLY AT ALL TIMES OVER THE PERIOD OF HEAVY RAIN,TO AVOID MAJOR FLOODING OCCURRING.

MINUTES OF MEETING

Reference:	**P4D403A – F310 – 013 – 004 – 1779**	**Page 1 of 4**
Project No.:	**P4D403A**	
Project Title:	**OPW Flood Hazard Mapping – Phase 1**	
Purpose of Meeting:	**Data Collection Meeting No 3 – Dun Laoghaire Rathdown County Council**	
Participating:	**Senior Executive Tec** **Senior Executive Engineer** **Search Manager**	**Drainage DLRCC** **Drainage DLRCC** **ESBI**
Venue:	**Dun Laoghaire Rathdown County Offices, Dun Laoghaire, Co. Dublin**	
Date of Meeting:	**07/04/2005**	
Copies to:	**File**	
Status:	**Final**	
Approved for ESBI:	**Search Manager**	
Approved for Dun Laoghaire Rathdown County Council	**Area Engineer**	
Status:	**Final**	
Date:	**08/04/2005**	

ESB INTERNATIONAL LTD.
Stephen Court, 18/21 St. Stephen's Green, Dublin 2, Ireland.
Telephone: +353-1-7038000 Fax: +353-1-6764400
Website: www.esbi.ie

The following items were received.

File marked ‘Avondale Hall, inc. flooding at Ladymead, Dublin Crystal, No. 16 Avondale Lawn’ was taken away for inspection.

Flooding Photos of May-June 1993 (Killiney Hill Road, Carysfort Ave., Commons Road) - 40No. Size 15cm x 10cm

Flooding Photos – May 26, 1993 (Carrickbrennan Road, Carysfort)
12No. Size 76mm x 79mm

A copy of a map of the council area, received during the DLRCC workshop, was used as basis for discussion. More information was noted on some of the previously identified flooding locations and some new locations were identified.

DLRCC clarified that many of the flooding problems in the DLRCC area arose from blocked trash screens. (Previous reference to tidal screens should have been trash screens)

Those locations, identified previously by DLRCC Drainage Section as prone to flooding, were reviewed. The following summarises comments made by DLRCC in respect of these locations:-

1. Brighton Vale (Flood ID No. 2003)
   Flooding at this location in November 2003. Vulnerable in stormy tidal conditions.

2. *Clearwater Cove (near Purty Kitchen pub) (Flood ID No. 2004)
   Problem caused by geometry of hydraulic system.
   Remedial works undertaken in 2004.

3. Carysfort Ave (Flood ID No. 2005)
   Significant problem due to limited capacity of surface water network. There was severe flooding ‘once off’ due to partially blocked culvert at Carysfort Park Estate entrance. Also regular flooding of Avondale Lawn due to insufficient hydraulic capacity. (ref. Roughan O’Donovan preparing flood alleviation scheme). This is considered one of DLRCC’s major flooding issues.

4. Dunedin, Monkstown (Flood ID No. 2006)
   This is combined sewer problem. Significant flooding in Nov 2003.

5. Glasthule (Flood ID No. 2007)
   This was a consequence of ‘teething’ problems with the new Greater Dun Laoghaire Drainage Scheme. Several flooding incidents between 1999 and 2003 in Glasthule village with properties flooded. Remedial works in 2003/2004 and problem solved (PHMcCarthy &Co. project)

6. Achill Road/Seafield Road (Flood ID Nos 2008 & 2009)
   Deansgrange River flowing full causing surcharge of gullies.

7. Seafield Court, Killiney (Flood ID No. 2010)
   Possible tidal impact. Tidal impact affects shale on beach which may be impairing the stream discharge at outfall. Old screen removed and new screen installed and this may alleviate problem.

8. Commons Road (Flood ID Nos 1705, 2011)
   Flooding in 1993 of Commons Road and River Lane when Shanganagh River bursts its banks.
   Flood alleviation scheme in 2005 in connection with South Eastern Motorway project.

10. Brewery Road (Flood ID No. 2016)
    Remedial works carried out in 2000 – 2002.

11. Larchfield Estate, Goatstown (Flood ID No. 2017)
    House drainage cannot discharge due to problems in Goatstown sewer. (remedial works scheduled 2005)

12. Crinken/Woodbrook Stream (Flood ID No. 2019)
    Occasional flooding on road, near golf club entrance, and in school grounds. Probably due to culvert blockage.

13. Thomas Road, off Fosters Ave.
    Not considered significant. Localised blockage.

14. Stillorgan Hill (Flood ID No. 2024)
    Very deep culvert at this location. Localised blockage.

15. Old Railway Line Dundrum. (Flood ID No. 2025)

16. Rosemount/Dundrum Road (Flood ID No. 2026)
    Flooding due to insufficient drainage. Surface water pipes were undersized but capacity problem solved with Luas and Dundrum Bypass works.

17. Pine Valley Park
    Constant flooding behind houses Nos 44 – 56. This was due to work undertaken by resident. Problem has been resolved. Do not include.

18. Carrickbrennan Road (Flood ID No. 2028)
    Historically subject to frequent flooding due to blocked road gullies. (ref. photos). Remedial works carried out.

19. Ferndale Road (Flood ID No. 2029)
    Stream spills across road in heavy rain.

20. Old Connaught Ave. (Flood ID No. 2030)
    Occasional flooding due to hydraulic inadequacy. Some properties may have been flooded.

21. A. Waltham Terrace/Sydney Ave. (Flood ID No. 2031)
    Stream through private property. Flooding in 1993 and 1995 caused by inadequate capacity due to blockages.

    B. Hyde Park Gardens (Flood ID No. 2032)
    Some flooding due to problems with overflow arrangement to Priory stream.

22. St. Fintans Villas
    Frequent flooding of back gardens due to inability of water to escape. No soakage

23. Torquay Road (Flood ID No. 2195)
    Frequent road flooding due to limited hydraulic capacity of roadside drains. Remedial works planned.

24. Brighton Cottages, Foxrock (Flood ID No. 2196)
    New surface water pipe provided. Problem solved.

Reference was made to MCO'Sullivan reports on
    Shanganagh River
    Slang River

Crinken/Woodbrook

These include predicted flood contours.

The 1974 problem at Friarsland cottage may have been due to localised blockage.

DUN LAOGHAIRE RATHDOWN COUNTY COUNCIL

Water and Drainage Division
Town Hall,
Dun Laoghaire,
County Dublin.

Phone: (01) 205 4700

Ó Chuan go Sliabh

Legend

0100

MINUTES OF MEETING

Reference:	**P4D403A – F310 –013 – 004 – 1777**	**Page 1 of 2**
Project No.:	**P4D403A**	
Project Title:	**OPW Flood Hazard Mapping – Phase 1**	
Purpose of Meeting:	**Data Collection – Dun Laoghaire Rathdown County Council**	
Participating:	**Area Engineer** **Inspector** **Search Manager**	**Drainage DLRCC** **Drainage DLRCC** **ESBI**
Venue:	**Georges Place Depot, Dun Laoghaire, Co. Dublin**	
Date of Meeting:	**22/03/2005**	
Copies to:	**File**	
Compiled by:	**Search Manager**	
Status:	**Final**	
Approved for ESBI:	**Search Manager**	
Approved for Dun Laoghaire Rathdown County Council	**Area Engineer**	
Date:	**22/03/2005**	

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Website: www.esbi.ie

The Area Engineer clarified that his district of responsibility, Dun Laoghaire, was approximately that area North of the N11. The remainder of the council area, Sandyford, is under the responsibility of a separate Area Engineer.

Copies of the following documents were received.
A - Flooding from 21/10/2002 (internal memo)
B – Reports of Flooding that occurred on 29/10/02 (internal memo)
C - Reports of Flooding which occurred on the 27/11/02 (internal memo)
D – Flood concerns in Seafield Court, Killiney (letter to DLRCC received from residents)
E – Flooding complaints relating to 28/10/2004. (copy internal email)

A copy of map of the council area, received during DLRCC workshop was used as basis for discussion. This map is a comprehensive map of flooding problems within Council boundaries

The following locations were identified as prone to flooding. (* indicates serious problem)

1. Brighton Vale (Flood ID No. 2003)
   House basements prone to tidal flooding. Dart Line, which is behind these houses, could be vulnerable. (Ref. Document E).

2. *Clearwater Cove (near Purty Kitchen pub) (Flood ID No. 2004)
   Flooding of road due to combination of tidal conditions and surface water runoff (ref. Document A, E). The Area Engineer has pictures which he will email to ESBI.

3. Carysfort Ave (Flood ID No. 2005)
   Severe flooding ‘once off’ due to partially blocked culvert. Regular flooding of house at end Avondale Lawn due to insufficient hydraulic capacity. (Ref. Roughan O’Donovan Report)

4. *Dunedin, Monkstown (Flood ID No. 2006)
   Inadequacies of sewer at Dunedin and old sewer in Monkstown Avenue give rise to flooding. (Ref. Document E).

5. *Glasthule (Flood ID No. 2007)
   Several Flooding incidents between 1999 and 2003 due to drainage problems (ref. Projects office/ PHMcCarthy &Co.)

6. Achill Road/Seafield Road (Flood ID No. 2008 & 2009)
   Deansgrange River flowing full causing backup of drains.

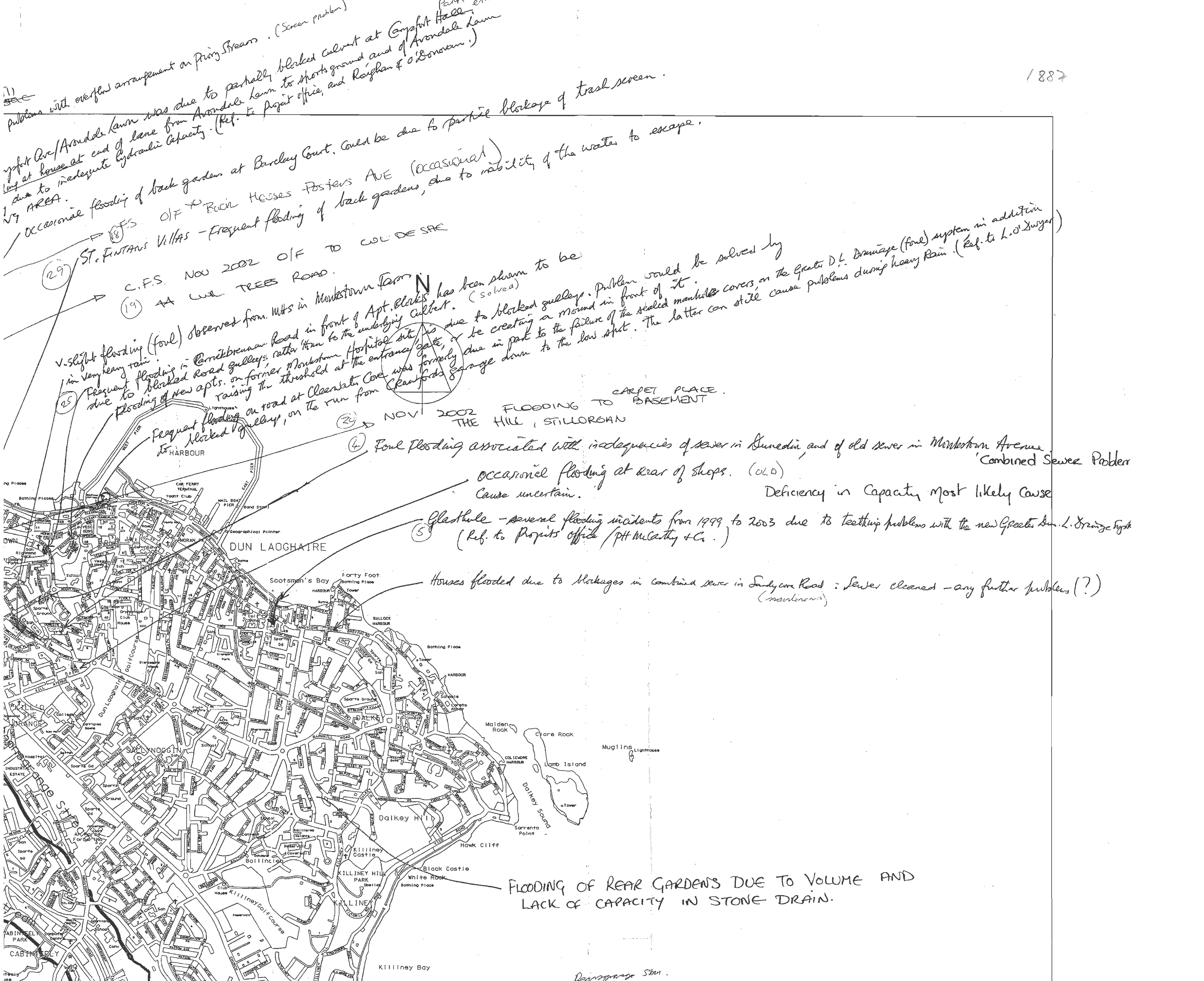
7. Seafield Court, Killiney (Flood ID No. 2010)
   Flooding of road and houses due to inadequate capacity of railway culvert Deansgrange River (ref Document D)

8. Commons Road (Flood ID Nos 1268, 355, 1270, 1704, 1705, 2011, 2015)
   Flooding of Commons Road and River Lane when Shanganagh River bursts its banks. (Ref. Document C)

The Area Engineer advised that most of their flooding problems relate to inadequate surface water and combined sewer. The Greater Dublin Strategic Drainage Study (GDSDS) will highlight those problematic areas.

A Map locating the tidal screens will be provided.

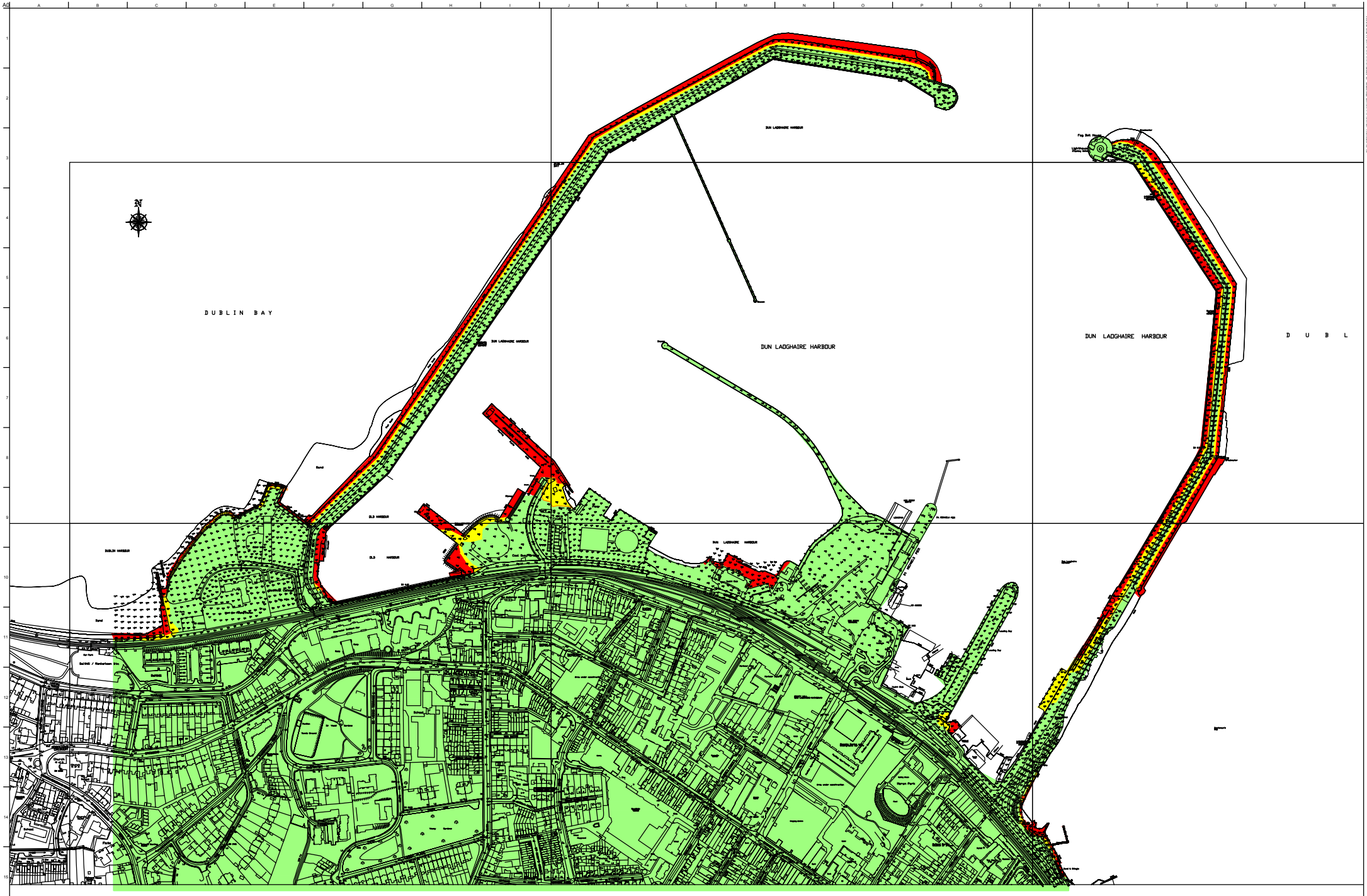
1887


problems with overflow arrangement on Priory Stream. (Screen problem)
...gfort Ave/Avondale Lawn was due to partially blocked culvert at Cangfort Hall Lawn ... at house at end of lane from Avondale Lawn to sports ground and of Avondale Lawn due to inadequate hydraulic capacity. (Ref. to Project office, and Roughan & O'Donovan.)
... AREA.
Occasional flooding of back gardens at Barclay Court. Could be due to partial blockage of trash screen.
F.S. O/F to Rock Houses Posters AVE (OCCASIONAL)
(18) St. Fintan's Villas – Frequent flooding of back gardens, due to inability of the water to escape.
(29) C.F.S. NOV 2002 O/F TO CUL DE SAC
44 ... TREES ROAD.
(19) ... observed from MHs in Monkstown Farm has been shown to be ... (solved)
N
V. slight flooding (foul) observed from MHs in ... in very heavy rain.
(25) Frequent flooding in Carrickbrennan Road in front of Apt. Blocks is due to blocked gulleys. Problem would be solved by due to blocked Road gulleys rather than to the underlying culvert.
Flooding of new apts. on former Monkstown Hospital site, or be creating a mound in front of it.
raising the threshold at the entrance gate,
... was formerly due in part to the failure of the sealed manhole covers on the Greater D.L. Drainage (foul) system in addition
... Crawfords garage down to the low spot. The latter can still cause problems during heavy rain. (Ref. to L. O'Dwyer)
Frequent flooding on road at ... due to blocked gulleys, on the run from ...
(24) NOV 2002 FLOODING TO CARPET PLACE BASEMENT THE HILL, STILLORGAN
(4) Foul flooding associated with inadequacies of sewer in Dunedin, and of old sewer in Monkstown Avenue
'Combined Sewer Problem
Occasional flooding at rear of shops. (OLD)
Cause uncertain.
Deficiency in Capacity Most likely Cause
(5) Glasthule – several flooding incidents from 1999 to 2003 due to teething problems with the new Greater Dun L. Drainage System
(Ref. to Project's office (PH McCarthy + Co.)
Houses flooded due to blockages in combined sewer in Sandycove Road: Sewer cleaned – any further problems (?)
(mainline)
FLOODING OF REAR GARDENS DUE TO VOLUME AND LACK OF CAPACITY IN STONE DRAIN.
Deansgrange Stm.
HARBOUR
DUN LAOGHAIRE
Scotsmen's Bay
Forty Foot
SALLYNOGGIN
Dalkey Hill
Dalkey Sound
Clare Rock
Lamb Island
Muglins
Maiden Rock
Sorrento Point
Hawk Cliff
Black Castle
White Rock
KILLINEY HILL PARK
Killiney Castle
Killiney Golf Course
Ballinclea
CABINTEELY
Killiney Bay

FLOODING AT CARRICKBRENNAN ROAD
NR. JUNCTION WITH FINGLAS ROAD.
26-5-93

Appendix F

Flood Zone Map



FLOOD ZONE A

FLOOD ZONE B

FLOOD ZONE C

Issue	Date	By	Chkd	Apprd

Client
Dun Laoghaire Harbour Company

Job Title
Stage 2 Initial flood Risk Assessment
Dun Laoighaire Harbour
Masterplan 2011

Scale at A0: As Shown

Discipline: Maritime

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www.arup.ie

Drawing Title
Flood Zone Map
Dun Laoghaire Harbour

Drawing Status
For Information Only

Job No.	Drawing No.	Issue
327263.100	SK0003	01