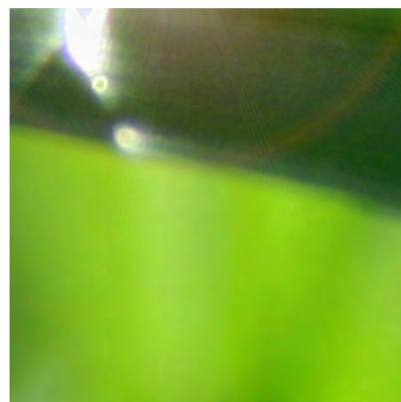
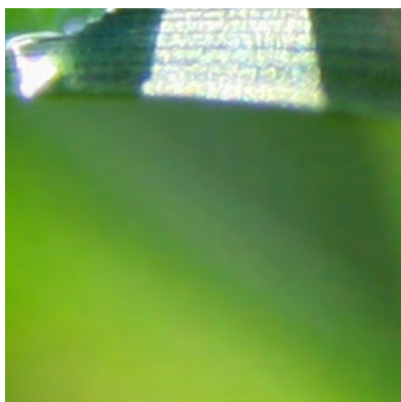
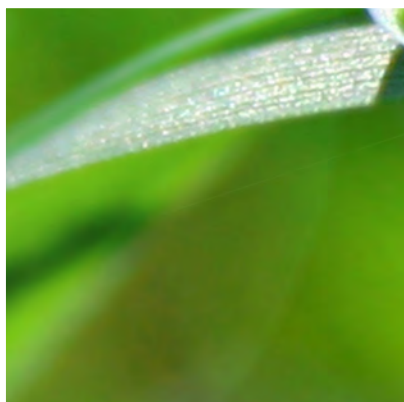
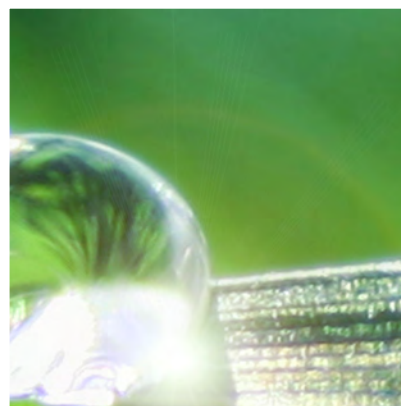
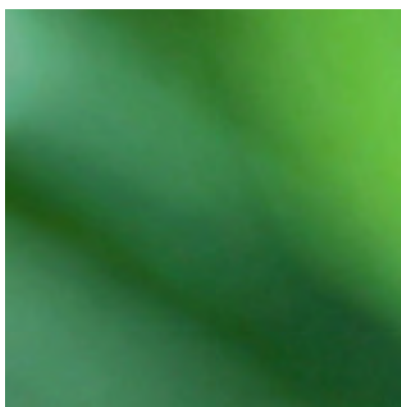
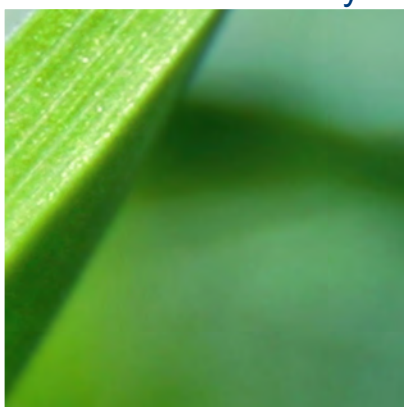


Shannon Foynes Port Company

Vision 2041 Natura Impact Report

IBE0720.00/February 2013





Shannon Foynes Port Company VISION 2041

Habitats Directive Assessment

Natura Impact Report

DOCUMENT CONTROL SHEET

Client	Shannon Foynes Port Company					
Project Title	Shannon Foynes Port Company VISION 2041					
Document Title	Habitats Directive Assessment Natura Impact Report					
Document No.	IBE0720 D01					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	128	1	1	2

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
V01	Working Draft	S. Downes	K. Fay	N/A	Limerick	N/A
V02	Final Draft issued for client review	S.Downes	K.Fay	Alan Barr	Limerick	14/12/2012
V03	Final draft issued for consultation	S.Downes	K.Fay	Alan Barr	Limerick	19/12/2012
F01	Final	S.Downes	K.Fay	Alan Barr	Limerick	13/02/2013

TABLE OF CONTENTS

1	INTRODUCTION.....	1
1.1	APPROPRIATE ASSESSMENT OF NATURA 2000 SITES.....	1
1.2	PROJECT SETTING AND BACKGROUND.....	1
1.2.1	<i>Legal Basis of Vision 2041</i>	<i>2</i>
1.2.2	<i>Requirement for Appropriate Assessment.....</i>	<i>2</i>
2	REQUIREMENTS OF A HABITATS DIRECTIVE ASSESSMENT	4
2.1	INTRODUCTION	4
2.2	GUIDANCE.....	5
2.3	OTHER LEGISLATION.....	7
2.4	RELATIONSHIP WITH STRATEGIC ENVIRONMENTAL ASSESSMENT.....	8
2.4.1	<i>Integration with SIFP SEA process</i>	<i>8</i>
3	STAGE 1 – SCREENING	10
3.1	INTRODUCTION	10
3.2	IS VISION 2041 CONNECTED WITH OR NECESSARY TO THE MANAGEMENT OF THE NATURA 2000 SITES?	10
3.3	IS VISION 2041 LIKELY TO HAVE SIGNIFICANT EFFECTS ON NATURA 2000 SITES IN VIEW OF THE SITES CONSERVATION OBJECTIVES?	10
4	STAGE 2 APPROPRIATE ASSESSMENT	12
4.1	INTRODUCTION	12
4.2	DESCRIPTION OF SHANNON FOYNES PORT COMPANY VISION 2041	12
4.3	STUDY AREA	16
4.4	APPROACH TO THIS ASSESSMENT.....	17
5	CONSERVATION OBJECTIVES OF THE NATURA 2000 SITES	19
5.1	QUALIFYING FEATURES OF THE NATURA 2000 SITES.....	19
5.2	CONSERVATION OBJECTIVES OF THE NATURA 2000 SITES	20
5.2.1	<i>Barrigone SAC Conservation Objectives.....</i>	<i>20</i>
5.2.2	<i>Lower River Shannon SAC and River Shannon and Fergus Estuaries SPA Conservation Objectives.....</i>	<i>21</i>
5.2.3	<i>River Shannon and River Fergus Estuaries SPA.....</i>	<i>22</i>
5.3	PRIORITY HABITATS AND SPECIES	22
6	ASPECTS OF THE SFPC VISION 2041 LIKELY TO HAVE IMPACTS ON THE NATURA 2000 SITES	24
6.1	INTRODUCTION	24
6.2	METHODOLOGY	24
6.2.1	<i>Detailed Assessment.....</i>	<i>24</i>
6.2.2	<i>Assessment of Likely Potential Effects.....</i>	<i>34</i>
6.2.2.1	<i>Static Acoustic Monitoring of deep water berths in the Shannon Estuary.....</i>	<i>34</i>

6.2.2.2	<i>Identification and Rating of Important Areas for Bottlenose Dolphins</i>	44
6.2.2.3	<i>Identification and Rating of Bird Areas</i>	48
6.3	IDENTIFICATION OF POTENTIAL EFFECTS	52
6.4	DESCRIPTION OF POTENTIAL EFFECTS EMANATING FROM THE IMPLEMENTATION OF THE VISION AT PROJECT LEVEL	72
6.4.1	<i>Direct Physical Loss or Damage to Habitats or Non-Mobile Species</i>	72
6.4.2	<i>Direct Physical Damage to Mobile Species</i>	73
6.4.3	<i>Indirect Effects on Habitats and Non Mobile Species</i>	74
6.4.4	<i>Indirect Effects on Mobile Species</i>	75
6.5	DETAILED APPROPRIATE ASSESSMENT OF SIGNIFICANT EXPANSION OPPORTUNITIES	79
7	MITIGATION	81
7.1	INTRODUCTION	81
7.2	OVER-ARCHING MITIGATION (RECOMMENDATIONS FROM THE AA TO FEED INTO THE PLAN)	82
7.3	GENERAL MITIGATION MEASURES PER SECTOR	84
7.3.1	<i>General Mitigation Measures</i>	84
7.3.1.1	<i>Sector – Shipping and Navigation – Associated with a variety of developments and other sectors within the Shannon Estuary</i>	84
7.3.1.2	<i>Sector – Marine Related Industry</i>	93
7.3.1.3	<i>Sector – Archaeology and Cultural Heritage</i>	103
8	MONITORING	109
9	CONCLUSIONS	115
	APPENDIX A	116
	APPENDIX B	117
	ACRONYMS	119
	GLOSSARY	120

LIST OF TABLES

Table 5.1	Natura 2000 Sites in Study Area	19
Table 6.1	Port of Foynes Objectives	25
Table 6.2	Ted Russell Dock Objectives.....	26
Table 6.3	Shannon Estuary Objectives	27
Table 6.4	Transport and Connectivity - Port of Foynes Objectives.....	28
Table 6.5	Transport and Connectivity – Limerick Docks Objectives	29
Table 6.6	Society and Community Integration - Implementation.....	30
Table 6.7	Summary of results from SAM at four sites in the Shannon Estuary	38
Table 6.8	Results of C-POD deployments in the Shannon Estuary, including the calculation of a monitoring index %DPM	39
Table 6.9	Summary of Scoring Criteria	46
Table 6.10	Summary of Scoring Criteria for current.....	46

Table 6.11	Summary of Scoring Criteria for Seabed Slope	46
Table 6.12	Summary Scoring Criteria for Water Depth.....	47
Table 6.13	Summary of scoring Criterion A.....	51
Table 6.14	Summary of scoring Criterion B.....	51
Table 6.15	Overall score (Criteria A + B)	51
Table 6.16	Rating of Low-Tide Subsites.....	52
Table 6.17	Potential Effects related to the development of the Marine Related Industry Sector...	55
Table 6.18	Potential Effects (Sector – Shipping and Navigation) (The potential effects for this sector should be read in conjunction with or can also apply to the Marine Related Industry Sector)	61
Table 6.19	Potential Effects (Sector – Archaeology and Cultural Heritage)	68
Table 7.1	Mitigation Measures	83
Table 7.2	Shipping and Navigation Mitigation Measures	87
Table 7.3	Marine Related Industry Mitigation Measures.....	95
Table 7.4	Archaeology and Cultural Heritage Mitigation Measures	103

LIST OF FIGURES

Figure 4.1	Operational Area of SFPC and key terminals within the Estuary.....	17
Figure 4.2	Natura 2000 sites within study area and with potential for effects.	18
Figure 6.1	SFPC Land Holdings Foynes County Limerick	26
Figure 6.2	Locations of Strategic Sites	33
Figure 6.3	C-POD unit by Chelonia Ltd.	35
Figure 6.4	Locations of C-PODs at four deep-water berths in the Shannon Estuary.....	36
Figure 6.5	Photograph of mooring used to deploy C-PODs during SAM monitoring in the Shannon Estuary using fixed structures	36
Figure 6.6	Total Dolphin Positive Minutes (DPM) recorded per day over the deployment period at four sites	38
Figure 6.7	Summary of detection positive days and minutes at each of the four sites	39
Figure 6.8	Predicted proportion of porpoise detection positive hours, in the narrow band high frequency channel from Moneypoint across season, diel (where D = day, E = evening, M = morning and N = night), tidal phase (where Trans. = transitional phase, NT = neap tide and ST = spring tide) and tidal cycle (where E = ebb, L = slack low, F = flood and H = slack high).....	40
Figure 6.9	Predicted proportion of porpoise detection positive hours, in the narrow band high frequency channel from Foynes across season, diel (where D = day, E = evening, M = morning and N = night), tidal phase (where Trans. = transitional phase, NT = neap tide and ST = spring tide) and tidal cycle (where E = ebb, L = slack low, F = flood and H = slack high).....	41

Figure 6.10	Predicted proportion of porpoise detection positive hours, in the narrow band high frequency channel from Aughinish across season, diel (where D = day, E = evening, M = morning and N = night), tidal phase (where Trans. = transitional phase, NT = neap tide and ST = spring tide) and tidal cycle (where E = ebb, L = slack low, F = flood and H = slack high).....	41
Figure 6.11	Predicted proportion of porpoise detection positive hours, in the narrow band high frequency channel from Shannon Airport across season, diel (where D = day, E = evening, M = morning and N = night), tidal phase (where Trans. = transitional phase, NT = neap tide and ST = spring tide) and tidal cycle (where E = ebb, L = slack low, F = flood and H = slack high).....	42
Figure 6.12	Bottlenose Dolphin “Critical Areas” and general habitat. (Source, NPWS).....	45
Figure 6.13	Overall scoring assessment for habitat suitability for bottlenose dolphins in the Shannon Estuary	47
Figure 6.14	Inner Shannon Estuary showing IWeBS and low tide count areas	49
Figure 6.15	Outer Shannon Estuary showing IWeBS and low tide count areas	49
Figure 6.16	Hearing ranges of aquatic animals relative to sources of anthropogenic noise (Source; http://www.science20.com/anthrophysis/rethinking_marine_acoustic_ecology_research_i_t_time_change-8735).....	76

1 INTRODUCTION

1.1 Appropriate Assessment of Natura 2000 Sites

Article 6(3) of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as “The Habitats Directive”, states that any plan or project likely to have significant effects on a Natura 2000 site must undergo the process of appropriate assessment. Proposed plans or projects can only be approved if it has been ascertained that they will not adversely affect the integrity of the Natura 2000 site(s) concerned or, in the case of a negative assessment where there are no alternative solutions, the scheme can only be approved for reasons of overriding public interest.

This report details the appropriate assessment which has been carried out to accompany Shannon Foynes Port Company (SFPC) Vision 2041 which is a thirty year **strategic vision** for the provision of port infrastructure and services for their operations on the Shannon Estuary. The VISION 2041 and associated Natura Impact Report have been informed and guided by the findings of the Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary (See www.shannonestuarysifp.ie) The SIFP has identified key Strategic Sites and Areas of Opportunity within the Shannon Estuary through an evidenced based approach and assessment of scientific, technical and economic information to identify those sites within the Shannon Estuary which are deemed to be the least sensitive in terms of environmental impact and the most feasible in terms of development. SFPC have taken the findings of the SIFP into consideration in developing their VISION 2041 document.

1.2 Project setting and Background

Shannon Foynes Port Company controls approximately 200 square miles of waterway in the Shannon Estuary.

The purpose of the SFPC's vision 2041 is to;

- Clarify SFPC's strategic planning and vision for medium to long term port development;
- Ensure that the port and its infrastructure requirements remain at the heart of national, regional and local planning policy
- Inform port users and the local community of the Port Development Strategy;
- Attract future investment with a clear and concise development strategy;
- Establish a platform for future developments, which will reduce the lead time for individual projects; and
- Provide a clear understanding of the sensitive environment that comprises the Estuary.

1.2.1 *Legal Basis of Vision 2041*

Vision 2041 is a non-statutory document that has been framed within the context of EU, national, regional and local spatial and development policies and strategies. Vision 2041 provides an evidence based framework setting out the ports' future aspirations for the medium and long term. It concentrates on the intensification, expansion and management of SFPC operations and facilities and on the future possibility of accommodating development at other locations on the Shannon Estuary. It will be used to guide future specific proposals and to inform investors and policy makers of SFPCs approach in response to the strategic and national ports policy.

Any projects arising from this strategy need to be examined against a number of economic, environmental and business demand criteria and will also be subject to the normal statutory planning and environmental assessment and consents.

1.2.2 *Requirement for Appropriate Assessment*

The Vision 2041 document is non-statutory with the proposed options at this stage considered as concepts only which may be developed should the predicted growth in tonnage envisaged over the next thirty years transpire. The options presented in the Vision 2041 document are not exhaustive nor are they prescriptive in nature at this stage. The technical details relating to any future development has not been expanded on nor has the engineering or detailed design specification. Therefore as the Vision 2041 document is not a land use plan per se nor are SFPC a plan making authority with no requirement from the Vision 2041 document requiring planning permission a formal appropriate assessment may not actually be required. However, in keeping with the spirit of the Habitats Directive and in particular Article 6.3 & 6.4 together with the European Communities Birds and Habitats Regulations 2011 SFPC have embarked on undertaking an Appropriate Assessment to identify the key data gaps, potential impacts and threats which will need to be addressed by SFPC at a later stage in the event that individual options are developed (e.g. future monitoring requirements for project level Appropriate Assessments). The recent EU Guidance on the implementation of the EU nature legislation in estuaries and coastal zones also recommends pre-assessments to evaluate the potential for impact of a plan on Natura 2000 sites.

The undertaking of an Appropriate Assessment to accompany the Vision 2041 document will allow SFPC to plan for the potential delivery of individual projects as the need arises and consider at an early stage the issues/concerns which relevant stakeholders may have thereby informing the future project level assessments. The AA will assist SFPC in identifying the likely implications of the potential future developments with regard to the Appropriate Assessment process.

The Appropriate Assessment undertaken as part of the Vision 2041 document has taken account of, and been informed largely by, the Natura Impact Report produced as part of the Strategic Integrated Framework Plan for the Shannon Estuary as already outlined.

2 REQUIREMENTS OF A HABITATS DIRECTIVE ASSESSMENT

2.1 Introduction

The Habitats Directive provides legal protection for habitats and species of European importance. The main aim of the Habitats Directive is *“to contribute towards ensuring biodiversity through the conservation of natural habitats of wild fauna and flora in the European territory of the Member States to which the treaty applies”* (92/43/EEC). Actions taken in order to fulfil the Directive must be designed to *“maintain or restore, at a favourable conservation status, natural habitats and species of wild fauna and flora of Community interest”* (92/43/EEC).

The Directive provides for the creation of protected sites, SACs, for a number of habitat types and certain species of flora and fauna. The Directive also seeks to establish Natura 2000, a network of protected areas throughout Europe. SACs, together with SPAs designated under the Birds Directive (79/409/EEC), form the Natura 2000 network. The Directive was incorporated into Irish law by the European Communities (Natural Habitats) Regulations (S.I. No. 94 of 1997) under Regulation 31 (Annex 1.2).

An assessment is required under the Habitats Directive for any plan or project likely to have significant effect on a Natura 2000 site. Article 6, paragraphs 3 and 4 of the Habitats Directive state as follows:

6(3) Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

This means that, where the implementation of the proposed development is likely to have a significant effect on a Natura 2000 site, the Competent Authority must ensure that an appropriate assessment is carried out in view of that site's conservation objectives. The proposed development can only be approved if it has been ascertained that it will not adversely affect the integrity of the Natura 2000 sites concerned or, in the case of a negative assessment and where there are no alternative solutions, the scheme can only be approved for reasons of overriding public interest.

2.2 Guidance

This appropriate assessment of SFPC Vision 2041 document has been carried out using the following guidance:

- Schedule 6(3) of the Habitats Directive 92/43/EEC (Assessment of Plans and project Significantly Affecting Natura 2000 Sites).
- Guidance from the EU Commission and DEHLG (2009. Rev Feb. 2012) Appropriate Assessment of Plans and Projects, Guidance for Planning Authorities.¹
- Department of Environment Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on *Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities* March 2010.
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government 2009; <http://www.npws.ie/en/media/NPWS/Publications/CodesofPractice/AA%20Guidance.pdf>
- Managing Natura 2000 Sites: the provisions of Article 6 of the Habitats Directive 92/43/EEC, European Commission 2000; http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf

¹ (a) European Communities, 2000. Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC

(b) European Communities, 2002. Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance in the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.

(c) European Communities, 2007. Guidance document on Article 6(4) of the 'Habitat Directive' 92/43/EEC.

(d) DEHLG 2009 (Feb 2010). Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities.

- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC; http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf
- Guidance document on the implementation of the birds and habitats directive in estuaries and coastal zones with particular attention to port development and dredging. http://ec.europa.eu/environment/nature/natura2000/management/docs/guidance_doc.pdf
- Working document for Marine Natura Impact Statements in Irish SACs. <http://www.npws.ie/media/npwsie/content/files/publications/Marine%20Assessment%20Working%20Document.pdf>
- Detailed Conservation Objectives for the Lower River Shannon SAC and the River Shannon and Fergus Estuaries SPA together with associated backing and supporting documentation (October 2012).
- The European Communities (Birds and Natural Habitats) Regulations 2011

Based on these guidelines, the assessment process is a four-staged approach as described below. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

Stage 1 *Screening for Appropriate Assessment*

Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the Habitats Directive:

- i) whether a plan or project is directly connected to or necessary for the management of the site, and
- ii) whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2.

Stage 2 *Appropriate Assessment*

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a Natura 2000 site, and includes any

mitigation measures necessary to avoid, reduce or offset negative effects. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to Stage 4, or the plan or project should be abandoned.

Stage 3 *Alternative Solutions*

This stage examines any alternative solutions or options that could enable the plan or project to proceed without adverse effects on the integrity of a Natura 2000 site. The process must return to Stage 2 as alternatives will require appropriate assessment in order to proceed. Demonstrating that all reasonable alternatives have been considered and assessed, and that the least damaging option has been selected, it is necessary to progress to Stage 4.

Stage 4 *Imperative Reasons of Overriding Public Interest (IROPI)/Derogation*

Stage 4 is the main derogation process of Article 6(4) which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a Natura 2000 site to proceed in cases where it has been established that no less damaging alternative solution exists. Compensatory measures must be proposed and assessed. The Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister.

2.3 Other Legislation

Natural Heritage Areas (NHA) are sites of national significance, proposed Natural Heritage Areas (pNHA) are sites that have been proposed but not formally designated. When formally designated, a pNHA is legally protected from damage under Irish legislation in the form of the Wildlife (Amendment) Act 2000. However, as this Appropriate Assessment report deals only the Natura 2000 sites NHAs and pNHAs are not considered further in this study, other than in the description of the study area.

The Wildlife Acts 1976-2010 provides a wide ranging basis for the protection of habitats and species throughout Ireland.

The EU Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds) is the main mechanism for protecting, management and control of bird species and defines rules for their exploitation. According to Article 4 of the Birds Directive “*species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution*”. The key element of the Birds Directive is that it provides for the creation of the Special Protection Areas (SPAs) for the protection of Annex I species as well as for regularly occurring migratory species not listed in

Annex I. The Birds Directive is implemented in Ireland under the Wildlife Act (1976) and the Wildlife (Amendment) Act (2000).

The European Communities (Birds and Natural Habitats) Regulations 2011 seek to address deficiencies in Irish law in implementing the EU Birds and Habitats Directives. The regulations apply to flora, fauna and habitats, with a particular emphasis on strengthening the protection of birds. They also build on several years' experience of implementation of the Directives.

2.4 Relationship with Strategic Environmental Assessment

An early consideration of environmental issues in the process creates an opportunity for environmental factors to be considered explicitly alongside other factors such as social, technical or economic aspects. It also gives Plan makers an opportunity to assess the cumulative environmental impacts associated with several elements of a Plan. As such, Strategic Environmental Assessment (SEA) and Appropriate Assessment are essential tools to help improve the Plan by evaluating, at the earliest appropriate stage, the potential environmental effects of the Plan before it is adopted. In the case of the VISION 2041 report it will not form a Plan which will be adopted but will be used by SFPC to set out their strategic planning and vision for the medium to long term.

SEA addresses all potential environmental impacts from soils, population and human health, archaeology, landscape, while Appropriate Assessment deals explicitly with impacts on Natura 2000 sites from a proposed Plan. Both SEA and Appropriate Assessment give stakeholders an opportunity to shape the Plan through comment at the initial planning stages and allows them to be kept informed of decisions and how they were made.

The finding of the Appropriate Assessment plays a key role in the SEA process and the information derived from the Appropriate Assessment should feed into the findings and assessment of the SEA Environmental Report. Hence, the two processes, both of which are iterative in nature, progress simultaneously with the development of the Plan that is being assessed. SEA and Appropriate Assessment also inform the suitability of proposed amendments to the Plan which arise out of public consultation on the Draft Plan. This is to ensure that the potential environmental effects are taken into account before the Plan is finalised.

2.4.1 Integration with SIFP SEA process

The objective of Article 1 of the SEA Directive is to provide for **a high level of protection of the environment** and to contribute to the integration of environmental considerations into the preparation and adoption of plans or programmes with a view to promoting sustainable development, by ensuring that in accordance with this Directive, an Environmental

Assessment is carried out of certain plans or programmes which are likely to have significant effects on the environment. In sustainably developing the estuary the SIFP considered the capacity of the Shannon Estuary to absorb the impact from future development. This is against the backdrop that almost the entire Shannon Estuary or Plan Area is an SAC and/or SPA or pSPA, NHA, pNHA or Ramsar Site. Under the SEA of the SIFP and the Assessment of Alternatives this issue was addressed and the most Strategic Sites and Areas of Opportunity for the first planning cycle were brought forward into the draft Plan thereby reducing the cumulative impact and meeting the requirements of the SEA Directive by providing a high level of protection to the environment. Environmental considerations were a key factor in the selection of the Strategic Sites and the Areas of Opportunity in support of the Thematic Spatial Plan. The aim of the evidenced based approach was to bring forward those sites with the greatest potential for providing economic benefits, with the least environmental impact in terms of habitats, species, landscape and archaeology amongst others. The evidence based approach which was adopted in the SIFP looked at key environmental factors and objectives at each stage of the selection process and was informed by the strategic environmental objectives and targets.

Analysis and consultation for the SEA informed the site selection process from the outset, with the avoidance of priority habitat areas. Following the identification of opportunities, the Preliminary Screening Table (PST) matrices incorporated a high level environmental review (informed by the SEA and AA processes) to help identify those sites which may be susceptible to greater environmental impact from strategic sites development, in addition to criteria assessing technical, social and planning issues. This allowed those opportunities and the alternatives showing the greatest development potential with the least environmental impact likely to be brought forward for further consideration.

As the SIFP adopted this robust scientific evidenced based approach to site selection, the VISION 2041 report and associated environmental assessments have therefore taken on board the findings from the draft SIFP and does not try to repeat the process. **Rather, the SIFP SEA and AA has informed and shaped the VISION 2041 process and informed the focus of future development opportunities.**

3 STAGE 1 – SCREENING

3.1 Introduction

The screening process addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the Habitats Directive (See **Section 2.1 and 2.2**) namely:

- Whether a plan or project is directly connected to or necessary for the management of the site, and
- Whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the plan or project that is under assessment is subject to Stage 2 Appropriate Assessment (DoEHLG, 2009).

3.2 Is VISION 2041 Connected with or Necessary to the Management of the Natura 2000 Sites?

Whilst it is the case that the majority of the elements of VISION 2041 are not connected with or necessary to the management of the Natura 2000 network through the undertaken of such a vision and associated environmental reports it is intended to ensure the protection of Natura 2000 sites. Therefore, it may be considered to be directly connected to the management of the sites. However, the determination that must be made here is whether or not the overall purpose of the vision as a whole is the management of Natura 2000 sites and in the case of the SFPC VISION 2041 it is clearly not.

3.3 Is VISION 2041 Likely to have Significant Effects on Natura 2000 Sites in View of the Sites Conservation Objectives?

In July 2012 consultation letters were issued to the SEA statutory consultees together with the Department of Arts, Heritage and the Gaeltacht Development Applications Unit and the National Parks and Wildlife Service outlining how the SIFP process was undertaking a Strategic Environmental Assessment and Habitats Directive Assessment. It was felt that the SIFP process and in particular the associated environmental assessment would substantially inform the VISION 2041 together with the SEA and AA and therefore SFPC did not want to duplicate the work which was being undertaken by the SIFP in any way.

In consultation with the EPA a decision was taken to commence and move directly to developing the SEA Environmental Report following consultation on the scoping stage.

Similarly, it was felt that through the SIFP process and the Habitats Directive Assessment which has been undertaken for the draft Plan, SFPC should proceed directly to undertaking full Appropriate Assessment (Stage 2) due to the following;

1. In terms of the planning hierarchy SFPC VISION 2041 comes under the SIFP process therefore it should serve to inform future development and the level of detail required by lower tiered plans.
2. As the SIFP process has already undertaken HDA Screening which incorporates existing facilities at Foynes Port and Limerick Dock together with other key facilities throughout the estuary alongside the development of future key strategic sites it is felt that the key elements of SFPC VISION 2041 are also covered by the SIFP screening process and therefore SFPC should proceed directly to undertaking full Appropriate Assessment in line with the findings of the SIFP HDA Screening.
3. While the SFPC VISION 2041 is not a plan per se it will however set out a development framework upon which development consent can be made therefore it would benefit from carrying out Stage 2 Appropriate Assessment.

Bearing this in mind, there will be limited information available in terms of the detailed design, engineering elements, associated infrastructure and exact layout of the future needs identified by VISION 2041 to allow a full project level AA to be undertaken. However, a more strategic level assessment can be undertaken which can be informed by the SIFP process and which will serve to further inform the project level assessment as and when the need arises. This type of strategic assessment will focus on the potential effects which this type of future development may have on the Natura 2000 sites in the vicinity of the Port Authority lands. It should inform the baseline data collection which will be necessary at project level and provide the Port Authority with the monitoring requirements which they may need to put in place in the short to medium term to inform their project level assessments.

Therefore in accordance with Article 6(3) of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as “The Habitats Directive” the decision was taken to proceed directly to Stage 2 Appropriate Assessment.

4 STAGE 2 APPROPRIATE ASSESSMENT

4.1 Introduction

The purpose of the Stage 2 Assessment is to collect sufficient data and information to make an objective assessment of the potential for implementation of VISION 2041 to have significant adverse effects on any Natura 2000 site. The assessment must describe sufficient mitigation measures such that any significant potential impacts that have been identified can be avoided or offset. The Natura Impact Report must fully document the process and must therefore demonstrate objectively that implementation of VISION 2041 will not result in adverse effects on Natura 2000 sites.

Hence, Stage 2 Appropriate Assessment involves four steps as follows:

- To identify the Conservation Objectives of the Natura 2000 sites under consideration. This is presented in **Section 5.1** and is also discussed in **Section 5.2**.
- To identify those aspects of the VISION that might (alone or in combination with other plans or projects) affect the Conservation Objectives. This is presented in **Section 6**.
- To assess the likely significance of any potential impacts that have been identified in terms of the ecological integrity of the Natura 2000 sites. This is presented in **Section 6.3**.
- To propose mitigation measures (modifications to VISION 2041) to avoid the potential significant impacts that have been identified. This is presented in **Chapter 7**. The requirement for the production of a Natura Impact Report (NIR) following completion of the Stage 2 Appropriate Assessment is specified in the DoEHLG Guidelines (DoEHLG, 2009).

4.2 Description of Shannon Foynes Port Company VISION 2041

SFPC Vision 2041 has been prepared to meet a number of strategic objectives identified by SFPC, its customers and other interest groups as necessary to facilitate the effective operation of the Port in the period to 2041. The key objectives are set out below:

Port Functions

- Provide appropriate infrastructure and facilities to meet future demand and address the needs of existing and new customers.
- Optimise the use of existing port lands and reconfigure service facilities as required.
- Use new and developing technology to increase throughput to its maximum.
- Identify configurations for extending berthage and storage that mitigate impact on adjacent environmentally sensitive /designated areas.

- Provide adequate deep water berths to accommodate larger/deeper draught vessels in accordance with environmental /licencing requirements.

Awareness and Growth

- Utilise Vision 2041 as a framework for investment and growth based on SFPC's projected demand forecasts;
- Ensure that the port and its infrastructure requirements remain at the heart of national, regional and local planning policy;
- Inform port users and the local community of the Port Development Strategy;
- Attract future investment with a clear and concise development strategy.

Movement and Access

- Promote the provision of future transport infrastructure that facilitates shipping and related Port activities;
- Optimise internal port movements and traffic;
- Protect and promote the use of rail transport for goods to and from the Port of Foynes.

Environment and Heritage

- Ensure a development framework that is compatible with the adjoining areas with particular regard to areas on the Shannon Estuary which are designated under the Habitats Directive and the Birds Directive;
- Promote a balanced and sensitive approach to port development;
- Integrate new development with the built and natural landscapes of the surrounding area;
- Secure the preservation of all Protected Structures within the Ports.

Integration with the Built Environment

- Enhance the general aesthetics / visual impact of port activities around the interface of Limerick and Foynes;
- Integrate port activities into the community and enhance visual linkages and connectivity.

Security

- Ensure that key areas of the Port retain good security provision in accordance with ISPS requirements.

Monitoring

- Monitor objectives and targets set out in Vision 2041;
- Identify a strategy for future review of Vision 2041 against Port performance and business opportunities.

In addition the Vision has specific objectives for the Port of Foynes, Limerick Docks and the Shannon Estuary as follows:

Foynes Port

- Effectively utilise existing assets including the upgrading and replacement of 5,109sqm of existing warehousing
- Work in cooperation with Limerick County Council to secure industrial zoning on an additional 89 hectares of land south east of the existing port operations
- Substantially invest in infrastructure and facilities to address the operational and physical constraints that exist in the inner port area, subject to capital approval
- Further investigate the potential for deep water berthage on Foynes Island and to complete a market research in order to identify potential partners.
- Continue to promote significant alignment improvement on the N69 between the Port of Foynes and the Askeaton Business Park and promote and facilitate the use of the existing 92 hectare serviced business park at Askeaton
- Effectively realise the potential of the rail line into the Port of Foynes which is a significant infrastructural asset in the consideration of any port expansion plan.

Limerick Dock Objectives

- Maintain existing port operations around the Ted Russell Dock area
- Accommodate and provide additional warehousing and storage facilities as the need arises, subject to capital appraisal
- Actively promote the use and development of the non-core assets, including the Bannatyne Mills, through the sale or lease of the property or through the formation of partnerships or joint ventures.
- Undertake further research and policy formation into the development designation of a Marine Energy Park at Limerick Docks and in particular the most appropriate operating mechanism.
- Undertake exploratory talks with relevant agencies and bodies to promote the Marine Energy Park concept and secure appropriate designation.

Shannon Estuary Objectives

- Continue to support and service privately operated facilities on the Shannon Estuary, to safeguard the role and function of the Strategic Sites identified for marine related industry.
- To continue to promote the Estuary as an “Ocean Energy Hub” and the “Shannon Energy Valley” thereby offering support frameworks for renewable associated industry.
- To support the implementation of the Shannon Integrated Framework Plan (SIFP)
- To continue to support and service existing privately operated facilities on the Shannon Estuary.

Transport and Connectivity

Port of Foynes Objectives

- SFPC will continue to build up the profile of the N69 as a strategic national route
- SFPC will utilise the data available from the new permanent traffic flow counter in place on the N69 to supplement and support the case for increased investment and priority allocation to the N69 going forward.
- SFPC will work directly with LCC and MWNRDO to prepare a medium-to-long term upgrade strategy for the N69, and will where necessary prepare alternative complementary assessments of upgrade and improvement schemes in order to demonstrate the substantial “hidden” benefits if continues and increased investment along the corridor.
- SFPC will seek to prioritise improvements to the N69 between Foynes and Askeaton as a matter of urgency, and will support the prioritisation of this section of the N69 as part of the ongoing upgrades occurring along the route.
- SFPC will seek the preparation of a signage strategy for the port for the wider Mid-West region, which would seek to implement a consistent and high—quality standard of signage on the major routes in the region.
- SFPC will retain its’ long-held support for direct linkage of the N69 and the N21 by way of a new link road and will pursue this objective should the need arise in the longer-term, however support for a long term comprehensive upgrade of the N69 itself will be priority going forward.

Limerick Docks Objectives

- SFPC will work with Limerick City Council and other State agencies in developing pedestrian and cycle routes between Limerick Docks and the city centre to facilitate the phased re-development of the Docks Lands.
- SFPC will work with Limerick City Council and other state agencies to develop over time a Green Corridor or Bus Rapid Transit Route along the Dock Road (R510) and link the future P&R site and potential rail station to the city centre
- SFPC will seek to ensure that high quality road access to Limerick Docks is in place to ensure the strategic advantage of a city centre port facility may be fully utilised.
- SFPC will seek to ensure that sustainable transport initiatives contained within the Limerick City Development Plan and associated Public Transport Feasibility Study are incorporated in order to ensure that the potential re-development of lands at Limerick Docks can benefit from these proposals and implement modal share targets within the redevelopment proposals, while simultaneously ensuring that the lands at Limerick Docks are better integrated into Limerick City Centre.

Society and Community Integration - Implementation

- Continue to work with relevant bodies to promote the Shannon Estuary as a Cruise Gateway providing support and assistance in the development of call schedules and programmes to cruise liners.
- Ensure public accessibility through the hosting of “open days” and organised tours.
- Improve the visual appearance of the main entrance to the Port of Foynes and the existing vacant warehousing buildings located on the southern side of the Main Street beside SFPC offices
- Undertake significant improvement and landscape works to the main vehicular entrance at Limerick Docks and also the unused gated entrance at the junction of Dock Road and James Casey Walk
- Visually enhance the protected gateway to Limerick Docks from Steamboat Quay.

4.3 Study Area

Vision 2041 encompasses the entire operational area of SFPC. This includes operation ports and other land owned or within the control of SFPC as well as the extent of the Shannon Estuary for which they also have responsibility for navigational safety. The geographical extent of the SFPC navigational remit is shown in **Figure 4.1**.

Within this operational area SFPC services six dedicated facilities on the Shannon Estuary as indicated in **Figure 4.1**.

Foynes Port is the main deepwater facility catering for all key cargo classifications and with a substantial land bank and large storage facilities situated on the southern shores of the Shannon Estuary west of Limerick City (**Figure 4.1**). Foynes Port is a major deepwater facility capable of accommodating ships up to 198m in length, and a draft up to 10.5m. Foynes caters for most cargo types including liquid bulk, dry bulk, break bulk, liquid and project cargoes. Foynes is the principle general purpose terminal on the Estuary.

Limerick Docks also lies on the southern shores of the River Shannon about 11km inland from the Shannon Estuary (**Figure 4.1**). Limerick Docks contain quays totalling 914 meters with alongside depth of at least 5m in an enclosed basin. The berths can accommodate vessels up to 152 meters long. It is a general purpose terminal in Limerick city catering for dry bulk, break bulk, liquid and special cargoes.

There are four other dedicated terminals; Shannon Airport with its aviation fuels terminal, Moneypoint and its coal transshipment facility, Tarbert Island for heavy fuel and Aughinish catering for bauxite and alumina imports and exports.



Figure 4.1 Operational Area of SFPC and key terminals within the Estuary

4.4 Approach to this Assessment

This Section summarises the approach that has been taken to completing this assessment.

This assessment progressed through a series of steps as follows:

- 1) The qualifying features of each of the potentially effected Natura 2000 SACs were tabulated by reference to either the detailed conservation objectives (where available) ,site synopsis, conservation management plans (where available) or generic conservation objectives. (See Table A1.1 in Appendix 1) (See **Figure 4.2**)
- 2) The qualifying features of each of the potentially effected SPAs were tabulated by reference to the detailed conservation objectives (See Table A1.2 in Appendix 1) (**See Figure 4.2**)
- 3) Correlating the Vision objectives and key locations for future development to the Strategic Sites identified as part of the SIFP process and carrying out an assessment of the potential effects from the future realisation of the Vision at project level together with identifying suitable mitigation and monitoring measures which should be applied at project level.

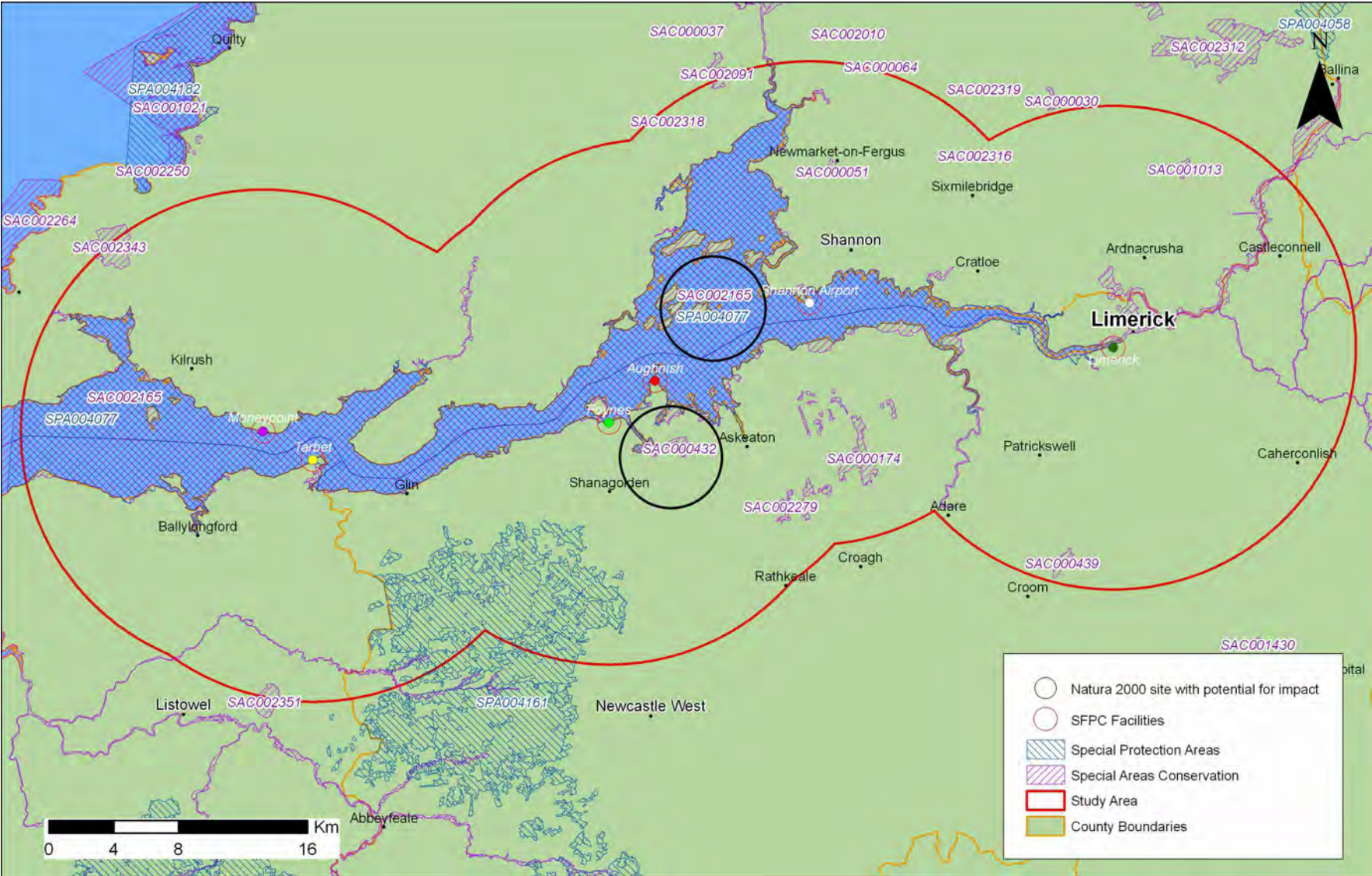


Figure 4.2 Natura 2000 sites within study area and with potential for effects.

5 CONSERVATION OBJECTIVES OF THE NATURA 2000 SITES

5.1 Qualifying Features of the Natura 2000 Sites

Special Areas of Conservation (SAC) are protected under the European Union (EU) Habitats Directive (92/43/EEC) and Special Protection Areas (SPA) are designated under the EU Birds Directive (79/409/EEC) and together these form the backbone of the Natura 2000 network. The Natura 2000 network of European sites comprises Special Areas of Conservation (SACs, including candidate SACs), and Special Protection Areas (SPAs, including proposed SPAs). SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). The Directive lists certain habitats and species that must be protected within SACs. Such habitats include raised bogs, blanket bogs, turloughs, sand dunes, machair (flat sandy plains on the north and west coasts), heaths, lakes, rivers, woodlands, estuaries and sea inlets. SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each site is selected correspond to the qualifying interests of the sites; from these the conservation objectives of the site are derived.

Including proposed and candidate sites there are 12 SAC's and 2 SPA's within the study area, i.e within 15km of SFPC facilities. These Natura 2000 sites are listed in **Table 5.1** and their locations are shown in **Figure 4.2**.

Table 5.1 Natura 2000 Sites in Study Area

Code	Site
SPA Code 004077	River Shannon and River Fergus SPA
SPA Code 004161	Stack's to Mullaghareirks, West Limerick Hills and Mount Eagle SPA
SAC Code 002165	Lower River Shannon SAC
SAC Code 002316	Ratty River Cave
SAC Code 000051	Lough Gash Turlough
SAC Code 001013	Glenomra Wood
SAC Code 002279	Askeaton Fen Complex
SAC Code 000174	Curraghchase Woods
SAC Code 000432	Barrigone
SAC Code 000439	Tory Hill
SAC Code 002318	Knockanira House SAC
SAC Code 002343	Tullagher Lough and Bog SAC
SAC Code 002351	Moanveanlagh Bog

However, of these 14 Natura 2000 sites only three are taken forward for further assessment at Plan level; the River Shannon and River Fergus SPA, Lower River Shannon SAC and Barrigone SAC.

All other sites will not have significant direct or in-direct effects through the publication of this Vision or the implementation of its key objectives. The previously mentioned River Shannon and River Fergus SPA/pSPA (SPA004077) and the Lower River Shannon cSAC (SAC02165) are the primary Natura 2000 sites within which SFPC facilities are located directly in or adjacent to. In addition the Barrigone SAC which is adjacent to or just east of Foynes Port should also be taken into consideration as potential future development may impact on this site. These sites are therefore those most likely to be impacted upon by any development or operations from the SFPC facilities. The River Shannon and River Fergus Estuaries SPA is selected because it regularly supports over 20,000 waterbirds during the non-breeding season making this a site of international importance. In addition, there are 16 species that have populations of national importance and for several of the bird species this is the top site in the country. Three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive (Whooper Swan, Golden Plover and Bar-tailed Godwit). The Lower River Shannon cSAC is selected for the following species listed on Annex II of the Habitats Directive – Bottle-nosed Dolphin (*Tursiops truncatus*), Sea Lamprey (*Petromyzon marinus*), River Lamprey (*Lampetra fluviatilis*), Brook Lamprey (*Lampetra planeri*), Freshwater Pearl Mussel (*Margaritifera margaritifera*), Atlantic Salmon (*Salmo salar*) and Otter (*Lutra Lutra*). The site is also selected for floating river vegetation, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, vegetated sea cliff, reefs and large shallow inlets and bays all habitats listed on Annex I of the Habitats Directive. Barrigone cSAC has been designated based on the presence of semi-natural dry grasslands and scrub facies on calcareous substrates (*Festuco-Brometalia*), Limestone pavement and *Junierus communis* formations on heaths or calcareous grassland Annex I habitats. It has also been selected for Marsh Fritillary which is an Annex II species. The full list qualifying features for each SAC and SPA are presented in Tables A1.1 and A1.2 in Appendix 1 of this report. Two pNHA sites are also located within the study area;

- Site Code 000435 Inner Shannon Estuary - South Shore
- Site Code 002048 Fergus Estuary and Inner Shannon – North Shore
-

However, as outlined in **Section 2.3** this Appropriate Assessment report deals only with Natura 2000 sites.

5.2 Conservation Objectives of the Natura 2000 Sites

5.2.1 Barrigone SAC Conservation Objectives

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas designated as candidate Special Areas of Conservation. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites. According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when

- its natural range, and area it covers within that range, is stable or increasing, and

- the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable as defined below.

The favourable conservation status of a species is achieved when:

- population data on the species concerned indicate that it is maintaining itself, and
- the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

- Objective 1:** To maintain the Annex I habitats for which the cSAC has been selected at favourable conservation status; namely *limestone pavement (20% of site), *semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuca-Brometalia*) (31%) and *Juniperus communis* formations on heaths or calcareous grasslands (9%).
- Objective 2:** To maintain the Annex II species for which the cSAC has been selected at favourable conservation status, Marsh Fritillary (2-15% national population), as well as the protected plant, Hairy Vetch.
- Objective 3:** To maintain other habitats at favourable conservation status, namely scrub (34%), improved grassland (5%), old walls (<1%) and roads (<1%).
- Objective 4:** To establish effective liaison and co-operation with landowners, legal users and relevant authorities.

5.2.2 Lower River Shannon SAC and River Shannon and Fergus Estuaries SPA Conservation Objectives

NPWS released detailed conservation objectives for the Lower Shannon SAC 002165 and the River Shannon and River Fergus Estuaries SPA in September 2012. These contain detailed attribute, measure and target information required to restore or maintain the qualifying features as listed in Table A1.1 in Appendix 1 at favourable conservation condition. These detailed conservation objectives can be viewed on the NPWS web-site:

Lower River Shannon SAC

<http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO002165.pdf>

5.2.3 River Shannon and River Fergus Estuaries SPA

<http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO004077.pdf>

A site specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site. The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long term basis.

5.3 Priority Habitats and Species

A number of Annex I habitats and Annex II species are given “Priority” status under the Habitats Directive. These are habitats and species that are considered to be particularly vulnerable and / or are found mainly, or exclusively, within the territory of the European Union. The importance of these priority habitat types is emphasised at several places in the Directive (Articles 4 and 5 and Annex III), not only in terms of the selection of sites, but also in the measures required for site protection (Article 6) and surveillance (Article 11). Ireland does not host any priority species and the discussion of this issue is therefore limited to priority habitats. Priority habitats and species are of relevance to Appropriate Assessment in cases where the process reaches Stage 4 (see **Section 2.2**), because the normal requirement (*inter alia*) to demonstrate IROPI is not sufficient justification for the competent National Authority to permit significant impacts on priority habitats.

Paragraph 2 of Article 6(4) states that: “Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those

relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.”

In the context of Appropriate Assessment, it is at Stage 4 that the presence of Priority Habitats becomes a crucially significant issue as it increases the requirement to demonstrate “IROPI to a requirement to demonstrate ‘human health or safety considerations’ in order for the Competent Authority to allow an impact on a Natura 2000 site. However it is important that Priority Habitats are identified and considered earlier in the process so that any such eventuality can be anticipated. Hence, at the high-level planning stage the SIFP took this into consideration and only selected Strategic Sites or Areas of Opportunity which would avoid these priority habitats thereby affording the highest level of protection through avoidance of direct impact. As SFPC are not considering any future development in areas outside of those which have already been put forward by the SIFP as Strategic Sites this appropriate assessment for the VISION 2041 will not need to consider the potential impact to this habitats any further and will adhere to the findings of the SIFP.

6 ASPECTS OF THE SFPC VISION 2041 LIKELY TO HAVE IMPACTS ON THE NATURA 2000 SITES

6.1 Introduction

The strategic objectives underpinning the vision as outlined in **Section 4.2** largely relate either to the Shannon Estuary as an whole or specifically to the Port of Foynes and Limerick Docks. These strategic objectives have framed Vision 2041 and have clearly influenced the content and scope of the various elements of the Vision document. These strategic objectives used to inform the vision are not intended as planning objectives per se and are therefore screened out from further assessment. The more site specific objectives as outlined in **Section 4.2** relate to the Port of Foynes, Limerick Docks and the Shannon Estuary. Specific objectives have not been developed for the other ports within the Shannon Estuary which SFPC service. Where locational specific objectives are presented in the vision these elements are discussed and assessment under **Section 6.2** and have largely been informed by the findings of the Natura Impact Report associated with the Strategic Integrated Framework Plan. While these objectives have a more geographical element to them the exact details in terms of structures, design, technical and infrastructural requirements etc are not provided therefore the appropriate assessment is focused on the potential for impact and will serve to inform the potential delivery of individual projects as the need arises and consider at an early stage the issues/concerns which relevant stakeholders may have thereby informing the future project level assessments. The AA will assist SFPC in identifying the likely implications of the potential future developments with regard to the Appropriate Assessment process.

6.2 Methodology

6.2.1 *Detailed Assessment*

According to “The Status of EU Protected Habitats and Species in Ireland” (NPWS, 2008) there are 20 major pressures on Annex I habitats, and 16 major pressures on Annex II species. The Strategic Integrated Framework Plan has taken the EIONET European Topic Centre on Biological Diversity lists of threats and pressures which is a reference portal for Natura 2000 sites and is regularly up-dated by the commission for use by member states. Also within the SIFP the qualifying interest features for each of the Strategic Sites together with the potential effects from future development and the mitigation which will be required at further plan or project level to negate the risk of significant effects to Natura 2000 sites or their qualifying interest features was established across the various themes associated with the draft Plan. As the development of Vision 2041 has been driven by an created under the umbrella of the SIFP and as already mentioned does not go beyond the establishment of key objectives it is possible therefore to incorporate the findings of the SIFP and tailor them to the

Vision. The Habitats Directive assessment associated with Site D – Lands to the Rear of Foynes, Site C- Foynes Island, Site E – Askeaton Business Park and Site I – Limerick Docks are tabulated in Appendix 2 as these relate directly to or correspond to the locations which the Vision objectives relate to.

Tables 6.1 – 6.6 outline the linkages between Vision 2041 Objectives, anticipated location and connection with Strategic Sites identified in the SIFP

Table 6.1 Port of Foynes Objectives

Vision 2041 Objective	Anticipated location from Vision 2041	SIFP Associated Strategic Site	Associated Natura 2000 site
PoF Objective 1: Effectively utilise existing assets including the upgrading and replacement of 5,109sqm of existing warehousing	Foynes Port	N/A	N/A This objective relates to the refurbishment and redevelopment of outdated premises largely consisting of warehousing within Foynes Port current land holding in Foynes, Co. Limerick. These warehousing facilities are located outside or any Natura 2000 site (See Figure 6.1) and any associated works are not envisaged to have adverse effects on the qualifying features of the adjacent designations.
PoF Objective 2: Work in cooperation with Limerick County Council to secure industrial zoning on an additional 89 hectares of land south east of the existing port operations	Area surrounding Foynes Port	Site D - Lands to the rear of Foynes Port	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
PoF Objective 3: Substantially invest in infrastructure and facilities to address the operational and physical constraints that exist in the inner port area, subject to capital approval	Foynes Port	N/A	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
PoF Objective 4: Further investigate the potential for deep water berthage on Foynes Island and to complete a market research in order to identify potential partners.	Foynes Island	Site C - Foynes Island	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
PoF Objective 5: Continue to promote significant alignment improvement on the N69	Askeaton	Site E - Askeaton Business Park	Lower River Shannon SAC River Shannon and

between the Port of Foynes and the Askeaton Business Park and promote and facilitate the use of the existing 92 hectare serviced business park at Askeaton

Fergus Estuaries SPA

Barrigone SAC (Should road improvements take place along the N69 potential effects on the Barrigone SAC will need to be considered, however at present this is outside the scope of the Vision and therefore the impacts on this site are not considered as part of this NIR)

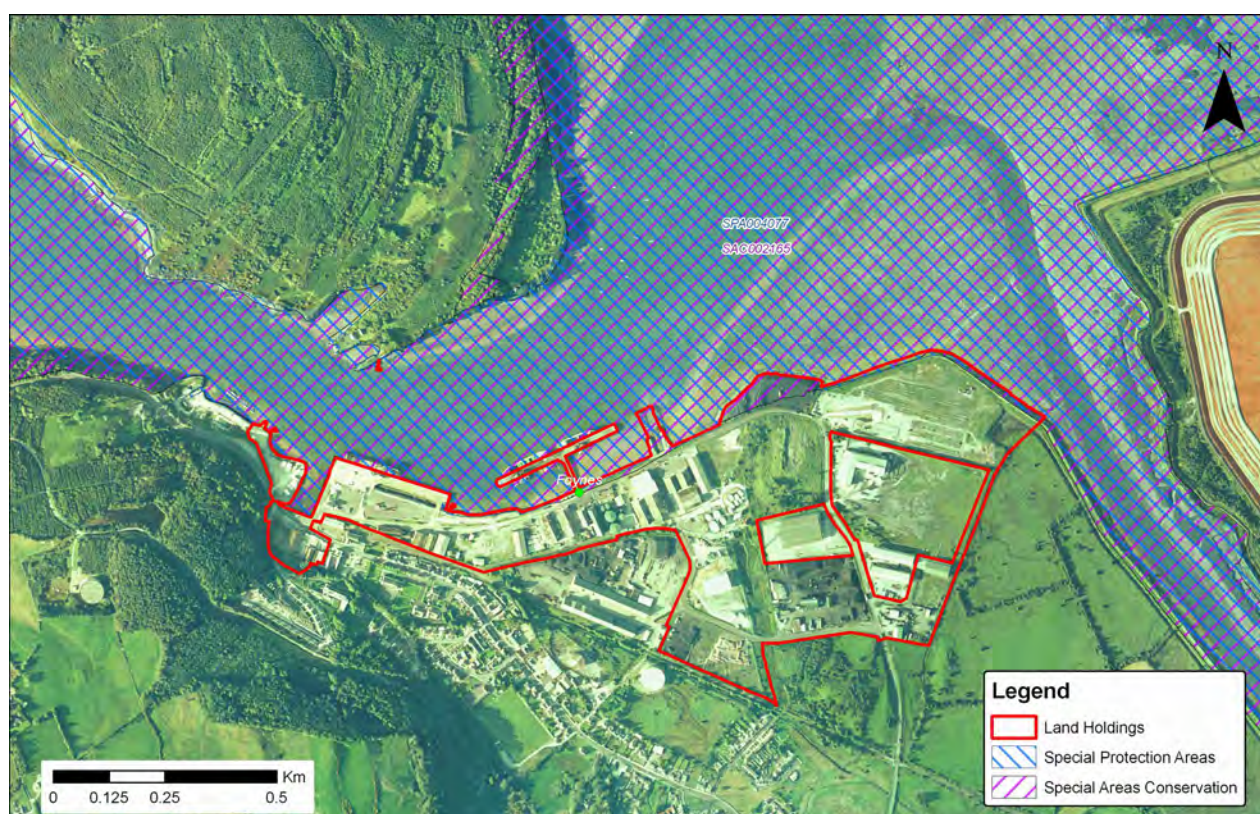


Figure 6.1

SFPC Land Holdings Foynes County Limerick

Table 6.2 Ted Russell Dock Objectives

Vision 2041 Objective	Anticipated location from Vision 2041	SIFP Associated Strategic Site	Associated Natura 2000 site
LD Objective 1: Maintain existing port operations around the Ted Russell Dock area	Ted Russell Dock Area	Site I - Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
LD Objective 2: Accommodate and provide additional warehousing and storage facilities as the need arises, subject to capital appraisal	Ted Russell Dock Area	Site I - Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA

LD Objective 3: Actively promote the use and development of the non-core assets, including the Bannatyne Mills, through the sale or lease of the property or through the formation of partnerships or joint ventures.	Ted Russell Dock Area	Site I - Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
LD Objective 4: Undertake further research and policy formation into the development and designation of a Marine Energy Park at Limerick Docks and in particular the most appropriate operating mechanism.	Ted Russell Dock Area	Site I - Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
LD Objective 5: Undertake exploratory talks with relevant agencies and bodies to promote the Marine Energy Park concept and secure appropriate designation.	Ted Russell Dock Area	Site I - Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA

Table 6.3 Shannon Estuary Objectives

Vision 2041 Objective	Anticipated location from Vision 2041	SIFP Associated Strategic Site	Associated Natura 2000 site
SE Objective 1: Continue to support and service privately operated facilities on the Shannon Estuary, to safeguard the role and function of the Strategic Sites identified for marine related industry.		Site D - Lands to the rear of Foynes Port Site I – Limerick Docks Site C – Foynes Island Site E - Askeaton Business Park	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
SE Objective 2: To continue to promote the Estuary as an “Ocean Energy Hub” and the “Shannon Energy Valley” thereby offering support frameworks for renewable associated industry.	Throughout the Shannon Estuary	Throughout the Shannon Estuary	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
SE Objective 3: To support the implementation of the Shannon Integrated Framework Plan (SIFP)	Throughout the Shannon Estuary	Throughout the Shannon Estuary	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
SE Objective 4: To continue to support and service existing privately operated facilities on the Shannon Estuary.	Moneypoint Aughinish Shannon Airport	Site B – Moneypoint Site F – Aughinish Shannon International Airport	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA

Table 6.4 Transport and Connectivity - Port of Foynes Objectives

Vision 2041 Objective	Anticipated location from Vision 2041	SIFP Associated Strategic Site	Associated 2000 site	Natura
TC PoF Objective 1: SFPC will continue to build up the profile of the N69 as a strategic national route	N69	N/A	N/A	
TC PoF Objective 2: SFPC will utilise the data available from the new permanent traffic flow counter in place on the N69 to supplement and support the case for increased investment and priority allocation to the N69 going forward.	N69	N/A	N/A	
TC :PoF Objective 3: SFPC will work directly with LCC and MWNDRDO to prepare a medium-to-long term upgrade strategy for the N69, and will where necessary prepare alternative complementary assessments of upgrade and improvement schemes in order to demonstrate the substantial "hidden" benefits if continues and increased investment along the corridor.	N69	N/A	N/A	
TC PoF Objective 4: SFPC will seek to prioritise improvements to the N69 between Foynes and Askeaton as a matter of urgency, and will support the prioritisation of this section of the N69 as part of the ongoing upgrades occurring along the route.	N69	N/A	N/A	
TC PoF Objective 5: SFPC will seek the preparation of a signage strategy for the port for the wider Mid-West region, which would seek to implement a consistent and high—quality standard of signage on the major routes in the region.	Port of Foynes	N/A	N/A	
TC PoF Objective 6: SFPC will retain its' long-held support for direct linkage of the N69 and the N21 by way of a new link road and will pursue this objective should the need arise in the longer-term,	N69 & N21	N/A	N/A	

however support for a long term comprehensive upgrade of the N69 itself will be priority going forward.

Table 6.5 Transport and Connectivity – Limerick Docks Objectives

Vision 2041 Objective	Anticipated location from Vision 2041	SIFP Associated Strategic Site	Associated Natura 2000 site
TC LD Objective 1: SFPC will work with Limerick City Council and other State agencies in developing pedestrian and cycle routes between Limerick Docks and the city centre to facilitate the phased re-development of the Dock Lands.	Limerick Docks/City Centre	Site I – Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
TC LD Objective 2: SFPC will work with Limerick city Council and other state agencies to develop over time a Green Corridor or Bus Rapid Transit Route along the Dock Road (R510) and link the future P&R site and potential rail station to the city centre.	Limerick Docks/City Centre	Site I – Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
TC LD Objective 3: SFPC will seek to ensure that high quality road access to Limerick Docks is in place to ensure the strategic advantage of a city centre port facility may be fully utilised.	Limerick Docks/City Centre	Site I – Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
TC LD Objective 4: SFPC will seek to ensure that sustainable transport initiatives contained within the Limerick City Development Plan and associated Public Transport Feasibility Study are incorporated in order to ensure that the potential re-development of lands at Limerick Docks can benefit from these proposals and implement modal share targets within the redevelopment proposals, while simultaneously ensuring that the lands at Limerick Docks are better integrated into Limerick city Centre.	Limerick Docks/City Centre	Site I – Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA

Table 6.6 Society and Community Integration - Implementation

Vision 2041 Objective	Anticipated location from Vision 2041	SIFP Associated Strategic Site	Associated Natura 2000 site
SC Objective 1: Continue to work with relevant bodies to promote the Shannon Estuary as a Cruise Gateway providing support and assistance in the development of call schedules and programmes to cruise liners.	Port of Foynes	N/A	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
SC Objective 2: Ensure public accessibility through the hosting of "open days" and organised tours.	Port of Foynes Limerick Docks	N/A	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
SC Objective 3: Improve the visual appearance of the main entrance to the Port of Foynes and the existing vacant warehousing buildings located on the southern side of the Main Street beside SFPC offices	Port of Foynes	N/A	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
SC Objective 4: Undertake significant improvement and landscape works to the main vehicular entrance at Limerick Docks and also the unused gated entrance at the junction of Dock Road and James Casey Walk	Limerick Docks	Site I – Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
SC Objective 5: Visually enhance the protected gateway to Limerick Docks from Steamboat Quay.	Limerick Docks	Site I – Limerick Docks	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA

Table 6.7 Environmental Key Issues

Vision 2041 Key Issue	Anticipated location from Vision 2041	SIFP Associated Strategic Site	Associated Natura 2000 site
Key Issue 1: Ensure a balanced approach between the conservation of the natural environment, biodiversity and the objectives of Vision 2041 in future development projects, in conjunction with relevant statutory bodies.	All locations	All Strategic Sites	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
Key Issue 2: Develop an Environmental Management System (EMS) for both Limerick Docks and the Port of Foynes and to proactively support and work towards sustainability in the Port areas in accordance with the ESPO Green Guide.	Limerick Docks/Foynes Port	Site I – Limerick Docks Site D – Foynes Island	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
Key Issue 3: Review and implement the necessary objectives and mitigation measures identified in both the SEA Environmental Report and the NIR in the context of future development proposals within Vision 2041.	All locations	All Strategic Sites	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
Key Issue 4: Safeguard the integrity of all designated Natura 2000 sites in accordance with relevant Directive and associated legislation, regulations and guidance.	All locations	All Strategic Sites	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
Key Issue 5: Examine suitability and feasibility of providing for cold ironing in any future potential infrastructure projects.	All locations	All Strategic Sites	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
Key Issue 6: Continue to work with relevant stakeholders and statutory bodies to ensure that continued least impact is achieved in relation to ongoing dredging and explore potential for cooperation cross relevant sectors in preparing a Strategic Dredging Management Plan for the Shannon Estuary.	All locations	All Strategic Sites	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA

Key Issue 7: Meet its obligations under the Planning and Development Act, 2000 in relation to Architectural Heritage in terms of securing the preservation of all Protected Structures within the Port.	All locations	All Strategic Sites	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
Key Issue 8: Minimise and mitigate the impacts arising from Port operations upon nearby residential occupiers within the parameters or operating the business, where practical.	All locations	All Strategic Sites	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA
Key Issue 9: Continue to work closely with the statutory bodies and local authorities to protect water quality on the Shannon Estuary and to ensure that any future development does not conflict with the requirements and objectives of the Water Framework Directive.	All locations	All Strategic Sites	Lower River Shannon SAC River Shannon and Fergus Estuaries SPA

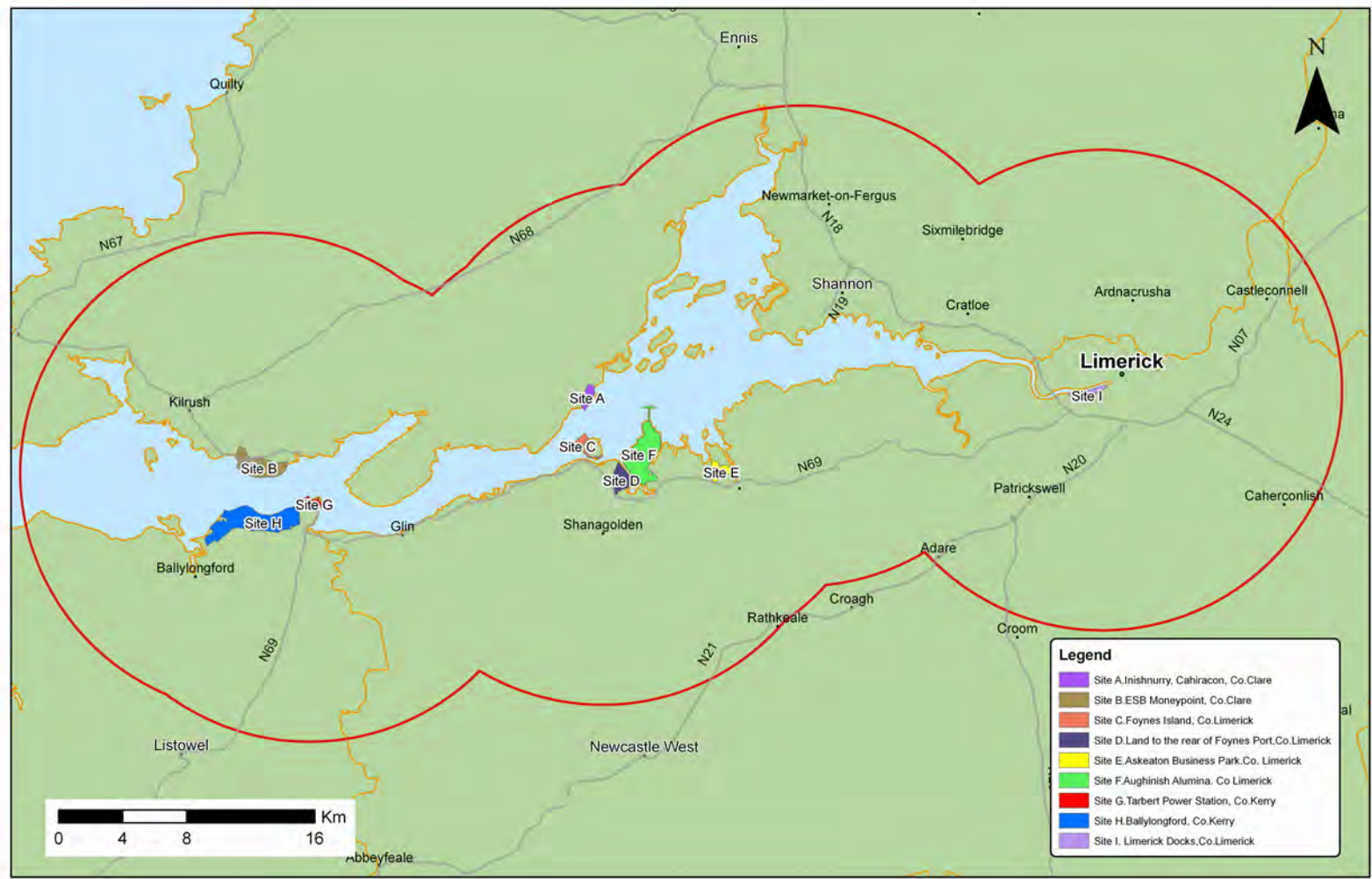


Figure 6.2 Locations of Strategic Sites

6.2.2 Assessment of Likely Potential Effects

The scope of the Article 6(3) assessment is narrower than that for an assessment under Directive 85/337/EEC, the Environment Impact Assessment Directive (EIS directive) and Directive 2001/42/EC, the Strategic Environmental Assessment Directive (SEA Directive). In particular, the appropriate assessment is confined to assessing the implications for the site in view of its conservation objectives. Notwithstanding that appropriate assessment follows an exclusive conservation focus.

As mentioned above, Article 6(3) sets out that significant effect needs to be assessed in view of the sites conservation objectives. Therefore it is desirable for the plan to have a clear idea of what the conservation objectives are. At the onset of the development of Vision 2041 only generic conservation objectives were available from the National Parks and Wildlife Service for the River Shannon and River Fergus estuaries SPA and the Lower River Shannon SAC. Due to the lack of these detailed conservation objectives at the onset of the Strategic Integrated Framework Plan and in order to inform the site selection process further limited field work was undertaken as part of the SIFP process. A key data gap identified through the scoping study was the lack of detailed scientific monitoring information on the usage of the inner estuary by Bottlenose Dolphins.

6.2.2.1 Static Acoustic Monitoring of deep water berths in the Shannon Estuary

Long-term Static Acoustic Monitoring (SAM) was carried out at four deep-water jetties (Moneypoint, Foynes, Aughinish and Shannon Airport) in the Shannon Estuary to assess their use by bottlenose dolphins by the Shannon Dolphin and Wildlife Foundation. SAM was carried out using C-PODs, which are self-contained detectors which log the echo-location clicks of dolphins. A total of 368 C-POD days were monitored across each of the four sites. The proportion of days with dolphin detections decreased further up the estuary with 80% of days with detections at Moneypoint compared with just 21% of days at Shannon Airport. Dolphins were detected off Foynes on 47% of days and off Aughinish on 31% of days. Season had a significant effect on dolphin presence at three sites (Moneypoint, Foynes, Aughinish), while diel cycle was significant at Moneypoint, Foynes and Aughinish, with most detections registered during night-time. Tidal cycle only had a significant effect on detections at Aughinish, with most detection during flood tide. The Shannon Estuary is a very important site for bottlenose dolphins and deep-water berths are important habitats which they use as part of their daily activities and on a regular basis throughout the year. Any future development or operation at these sites must take into account the use of these sites by dolphins.

Methods

This was carried out through the deployment of self-contained click detectors (C-PODs) which log the echolocation clicks of porpoises and dolphins (**Figure 6.3**). A single C-POD can monitor both porpoise and dolphins simultaneously through identifying characteristic click

parameters which can be assigned to either group. Once deployed, the C-POD operates in a passive mode and is constantly listening for tonal clicks within a frequency range of 20-160 kHz. When a tonal click is detected, the C-POD records the time of occurrence, centre frequency, intensity, duration, bandwidth and frequency of the click. Internally, the C-POD is equipped with a Secure Digital (SD) flash card, and all data are stored on this card. Dedicated software (CPOD.exe) is used to process the data and allows for the extraction of data files under pre-determined parameters as set by the user. Additionally, the C-POD also records temperature. It must be noted that the C-POD does not record actual sound files, only information about the tonal clicks it detects. Using the dedicated software, a train detection algorithm is run through the raw data to produce a CP.3 file. Through this process of train detection, C-PODs record a wide range of click types but the train detection searches for coherent trains within them. Recent detection distance trials carried out in the Shannon Estuary suggests a maximum detection distance of 797m for bottlenose dolphins (O'Brien *et al.* 2012).



Figure 6.3 C-POD unit by Chelonia Ltd.

Deployments

A single C-POD was deployed on jetties at each of the four locations, Moneypoint, Foynes, Aughinish and Shannon Airport (**Figure 6.4**). Each of these locations are deep-water shipping berths for loading and unloading cargo vessels of up to 200,000 DWT. These berths and the area monitored (c800m from the unit) were used by ships entering and exiting the berths and travelling in the adjacent shipping channel.

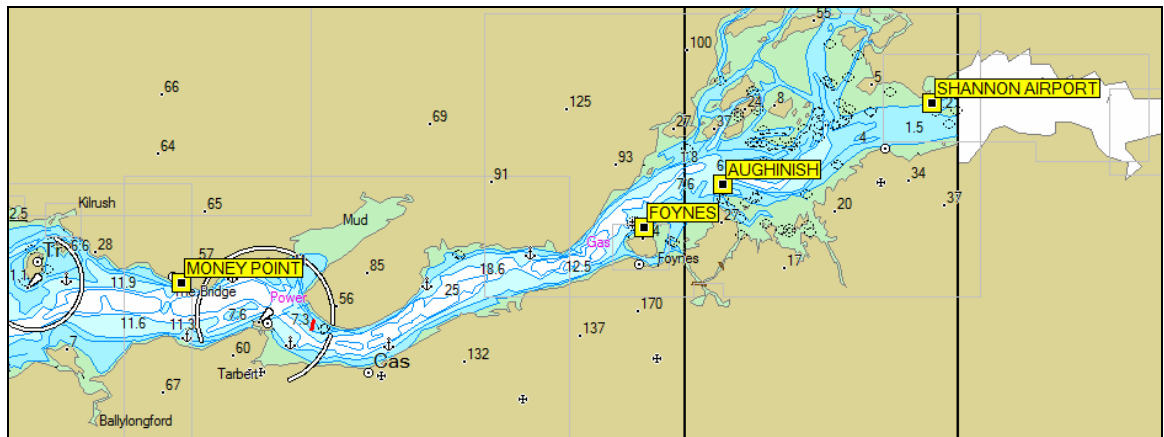


Figure 6.4 Locations of C-PODs at four deep-water berths in the Shannon Estuary

Light weight mooring designs were used at each of the sites by attaching to existing structures e.g. jetties. A roped line was hung from the top of the jetty with a 20kg weight attached to the end. At approximately mid-water a loop was etched in the line and the C-POD units were shackled secure. The units are positively buoyant, but salmon floats are attached to them to ensure they stay upright even in heavy seas and strong currents (**Figure 6.5**).

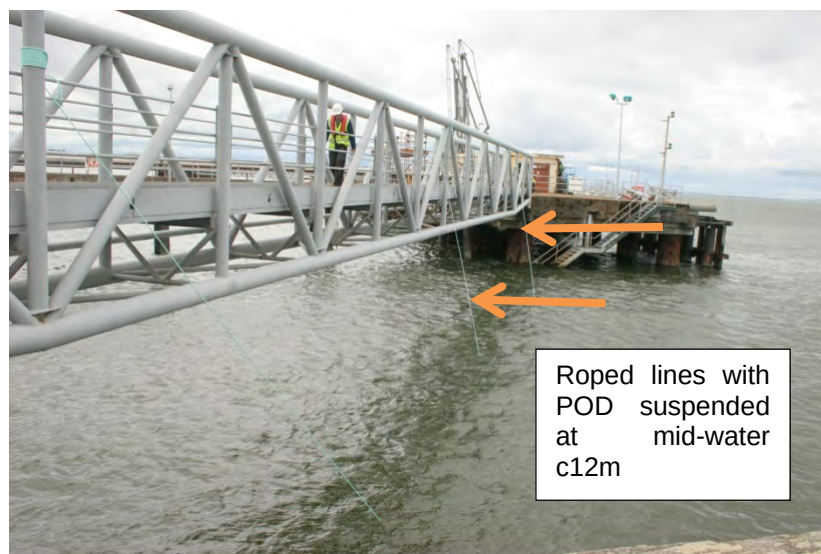


Figure 6.5 Photograph of mooring used to deploy C-PODs during SAM monitoring in the Shannon Estuary using fixed structures

C-PODs were deployed at each site between 5 November 2011 and 4 November 2012, a total of 368 days. Full temporal coverage was not recorded at each site due to equipment malfunction or battery wastage but this did not impact on the models run for each dataset using the four factors selected.

C-POD Calibration

Calibration of C-PODs is important in order to compare results across units. The manufacturers of C-PODs (Chelonia Ltd.) calibrate all units to a standard prior to dispatch. However, these calibrations are carried out under controlled conditions and they highly recommend that further calibrations are carried out in the field prior to their use in monitoring programmes. Field calibration aims to identify differences in sensitivity between units, and also enables better comparisons between datasets from different locations when multiple loggers are used or several units are used across a number of sites (O'Brien *et al.* 2012). If units of differing sensitivities are used, then the data do not accurately reflect the activity at a site. For example, a low detection rate may be caused by a less sensitive C-POD, with a lower detection threshold, which in turn leads to a lower detection range rather than a decline in use of the site by dolphins. It is essential that differences between units are determined prior to their deployment, to allow the use of correction factors to the data. Field trials should be carried out in high density areas in order to determine the detection function (O'Brien *et al.* 2012). Calibration trials were carried out off Moneypoint prior to start of present survey.

Four separate units were used during the present project and all were deployed off Moneypoint for calibration with 12 other units. C-PODs 173, 947, 547 and 548 were deployed with a reference unit (C-POD 169) and deployed simultaneously, strapped together for 23 days. This allowed enough time to establish if sensitivity would be a confounding factor between units before deployment in the present study.

Following calibration the data were extracted under two categories, 1) NBHF (porpoise band) and 2) Other (dolphin band) using the C-POD.exe software (Version 2.013, June 2011). These data were in the form of Excel.xlsx files using C-POD.exe software and analysed as Detection Positive Minutes (DPM) within hourly segments.

Calibration trials

There were some discrepancies between units but C-POD performance was within the acceptable error margin of $\pm 20\%$ DPM per hour and therefore no correction factor was applied to the data to make it comparable.

Static Acoustic Monitoring

A total of 368 days were monitored at the four sites with detections recorded on an average of 45% of days across all sites (**Tables 6.7 and 6.8**). The mean number of number of Detection Positive Minutes per day across all sites was 3.5 (**Figure 6.6**). Harbour porpoise clicks can be distinguished from dolphins through the high frequency clicks generated by the porpoise, but on occasion dolphins in the estuary are found to produce clicks of a similar frequency and inter click interval, hence both categories are used in analyses even though bottlenose dolphins are the only species known to occur here.

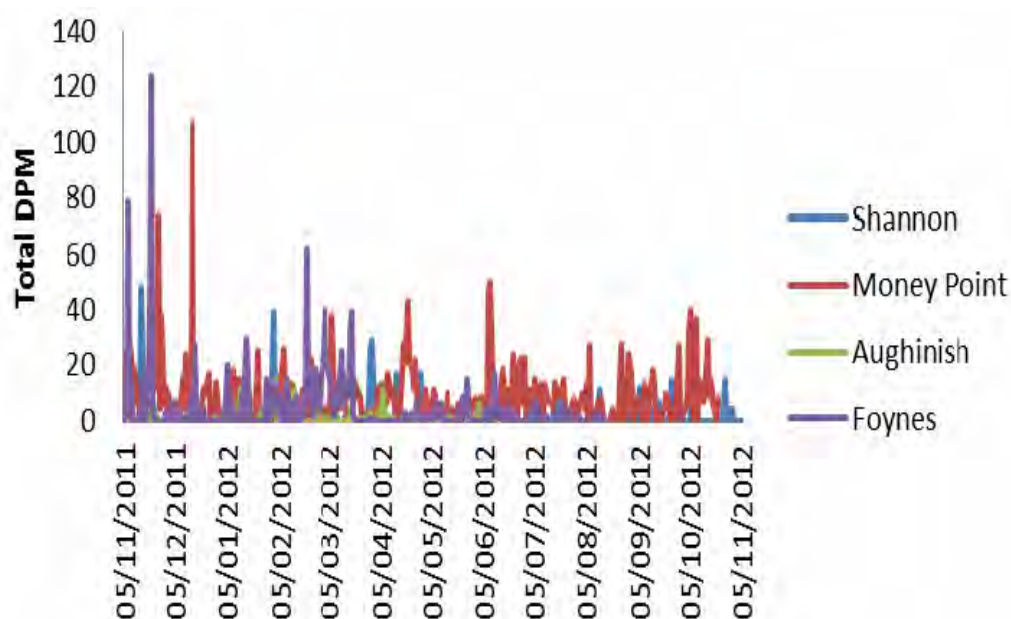


Figure 6.6 Total Dolphin Positive Minutes (DPM) recorded per day over the deployment period at four sites

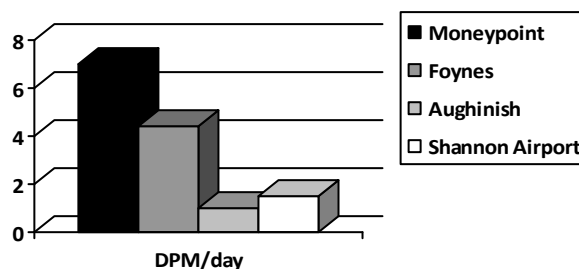
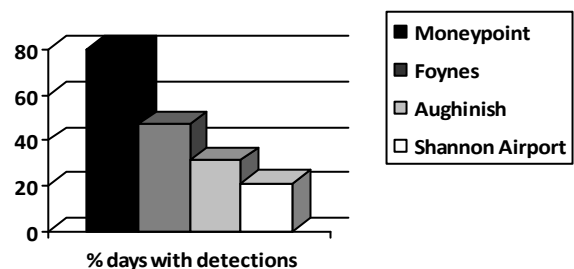
The proportion of days with dolphin detections decreased further up the estuary with 80% of days with detections at Moneypoint compared with just 21% of days at Shannon Airport (**Table 6.7 and Figure 6.6**). An average monitoring index of 0.3% DPM was calculated across the four sites. Moneypoint had the greatest index at 1.0% DPM, while Aughinish had the least with 0.08% DPM. Mean number of DPM at each site showed a similar trend with a slight increase at Shannon Airport compared to Aughinish but both these sites were much less than Moneypoint and Foynes.

Table 6.7 Summary of results from SAM at four sites in the Shannon Estuary

Location	Duration (days)	% of days with detections	Detection Positive Minutes	Porpoise Positive Minutes	Dolphin Positive Minutes	Mean DPM/day (porpoise)	Mean DPM/day (dolphin)
Moneypoint	351	80	2737	244	2493	1.00	7.0
Foynes	288	47	1266	27	1239	0.09	4.4
Aughinish	225	31	252	28	224	0.12	1.0
Shannon	368	21	588	41	547	0.11	1.5
Totals	1232	179	4843	340	4503	1.32	13.9

Table 6.8 Results of C-POD deployments in the Shannon Estuary, including the calculation of a monitoring index %DPM

Location	Total Days	Total Hours	Total Min	DPD	Total DPM	% DPD	% DPM
				Dol	Dol	Dol	Dol
Moneypoint	351	8424	505,440	281	2737	80	0.50
Foynes	288	6912	414,720	134	1266	47	0.30
Aughinish	225	5400	324,000	70	252	31	0.08
Shannon	368	8832	529,920	77	588	21	0.10



Proportion of days with detections Dolphin Positive Minutes (DPM)

Figure 6.7 Summary of detection positive days and minutes at each of the four sites

Generalized linear mixed-effect model (GLMM) analyses

Moneypoint

Results from the generalized linear mixed-effect model (GLMM) analyses (**Figure 6.8**) show that season had a significant effect on the presence of dolphins at the site with a peak in

detections during the winter ($\chi^2 = 788.8$, $p < 0.0001$). Most dolphin detections were recorded during the night ($\chi^2 = 132.4$, $p < 0.0001$) showing they are more active at the site during this period. Tidal cycle and tidal phase were not found to be significant factors influence dolphin presence at the site.

Foynes

Results from the GLMM analyses showed that season had a significant effect on the presence of dolphins at the site (**Figure 6.9**). **A significant peak in detections was recorded during the spring ($\chi^2 = 82.5$, $p < 0.0001$) and at night ($\chi^2 = 82.5$, $p < 0.0001$).** Tidal cycle and tidal phase were not found to be significant factors influencing dolphin presence at the site.

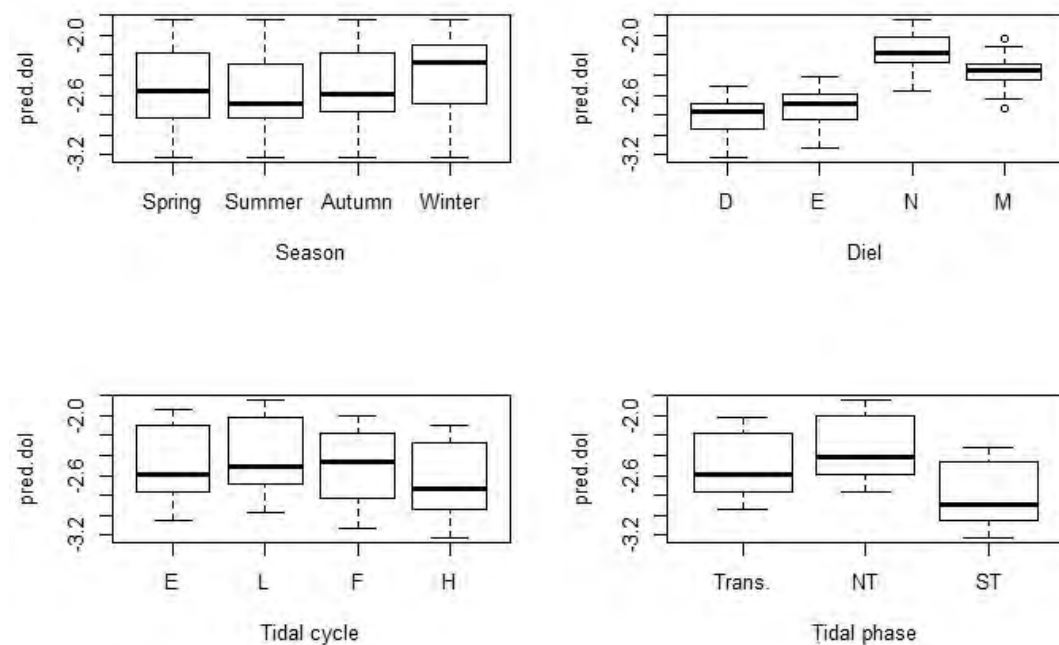


Figure 6.8 Predicted proportion of porpoise detection positive hours, in the narrow band high frequency channel from Moneypoint across season, diel (where D = day, E = evening, M = morning and N = night), tidal phase (where Trans. = transitional phase, NT = neap tide and ST = spring tide) and tidal cycle (where E = ebb, L = slack low, F = flood and H = slack high).

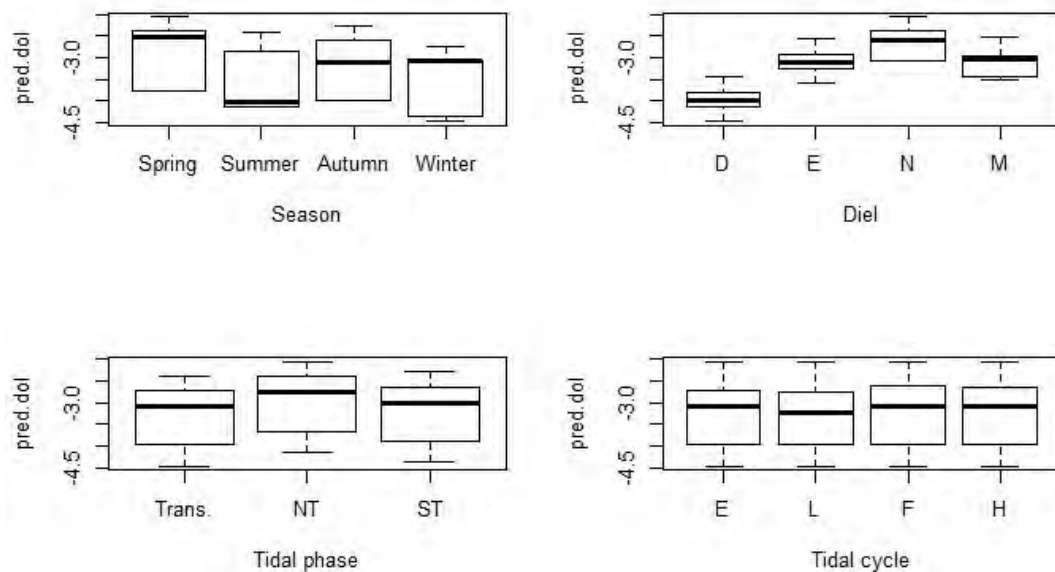


Figure 6.9 Predicted proportion of porpoise detection positive hours, in the narrow band high frequency channel from Foyes across season, diel (where D = day, E = evening, M = morning and N = night), tidal phase (where Trans. = transitional phase, NT = neap tide and ST = spring tide) and tidal cycle (where E = ebb, L = slack low, F = flood and H = slack high).

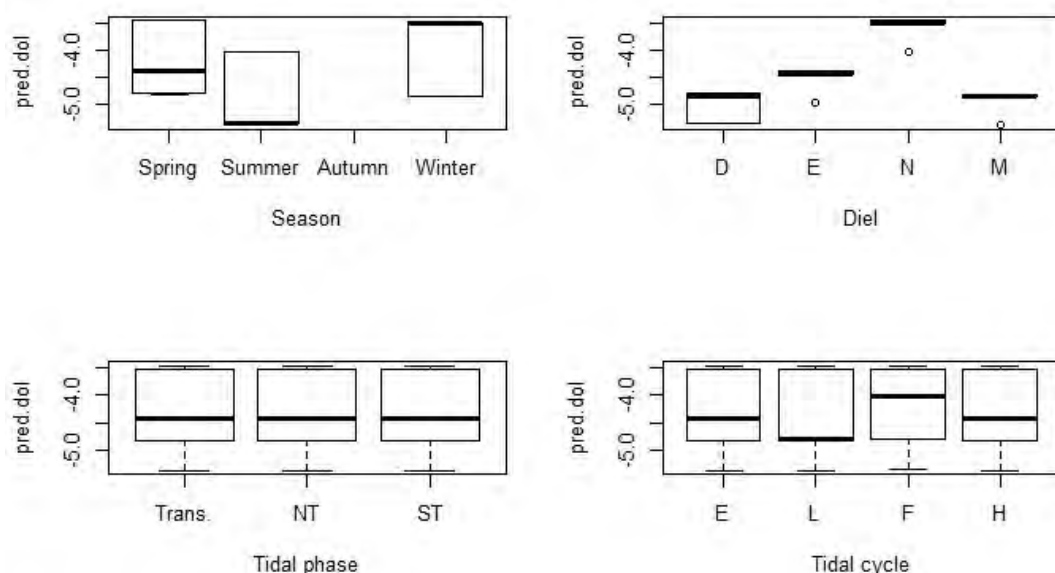


Figure 6.10 Predicted proportion of porpoise detection positive hours, in the narrow band high frequency channel from Aughinish across season, diel (where D = day, E = evening, M = morning and N = night), tidal phase (where Trans. = transitional phase, NT = neap tide and ST = spring tide) and tidal cycle (where E = ebb, L = slack low, F = flood and H = slack high).

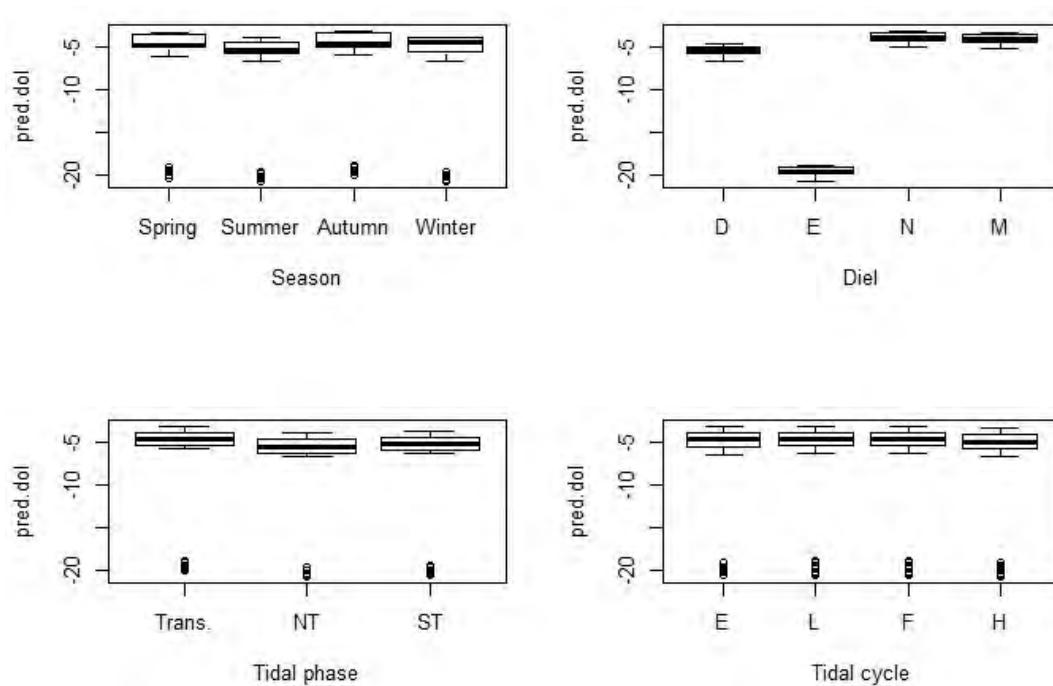


Figure 6.11 Predicted proportion of porpoise detection positive hours, in the narrow band high frequency channel from Shannon Airport across season, diel (where D = day, E = evening, M = morning and N = night), tidal phase (where Trans. = transitional phase, NT = neap tide and ST = spring tide) and tidal cycle (where E = ebb, L = slack low, F = flood and H = slack high).

Aughinish

Season had a significant effect on the presence of dolphins at Aughinish with more detections during the winter months ($\chi^2 = 237.5$, $p < 0.0001$) (**Figure 6.10**). A monitoring gap exists during the autumn, hence this season could not be tested. Similar to Moneypoint and Foynes, most dolphin detections were recorded during the night ($\chi^2 = 253.6$, $p < 0.0001$) and during the flood tide ($\chi^2 = 287.2$, $p < 0.0001$).

Shannon Airport

Season did not have a significant effect on the presence of dolphins at Shannon Airport (**Figure 6.11**). There was no significant effect on detections on diel, tidal phase or tidal cycle.

Discussion

In order to evaluate the importance of an area for dolphins, it is essential that their presence at the site is fully understood. Cetaceans live in an acoustic world and increasingly acoustic monitoring techniques have been developed rather than relying on visual methods, whose efficiency is hugely dependent on light, weather conditions and sea-state. Static Acoustic Monitoring (SAM) involves the recording or detection of cetacean vocalisations or echolocation clicks and is a very useful tool for exploring fine scale habitat use by dolphins. The main

advantage of SAM is that it can provide information on species that can go undetected visually for the majority of their lives and can operate day and night and in all sea conditions. For example, bottlenose dolphins are thought to be underwater for up to 87% of the time (Mate *et al.*, 1995). Patterns of cetacean presence have been described using SAM over seasonal scales (Canning *et al.*, 2008; Bolt *et al.*, 2009; Simon *et al.*, 2010; Gilles *et al.*, 2011), diel cycles (Cox and Read 2004; Carlström, 2005; Todd *et al.*, 2009; Phillpott *et al.*, 2007) and tidal cycles (Philpott *et al.*, 2007; Marubini *et al.*, 2009). Visual monitoring of cetaceans can provide numbers for density and abundance estimation but will be biased due to factors such as observer effect and unfavourable sea conditions. Therefore, to obtain a complete dataset SAM is required to evaluate fully the importance of a site and can be more rapid and cost effective than visual means.

The aim of the present study was to explore the use of deep-water berths in the Shannon Estuary cSAC by bottlenose dolphins. During this study dolphins were recorded at all sites for periods ranging from 80% to 21% of days monitored. This is the first extensive monitoring of dolphins in the inner estuary and it shows they are using these habitats much more than was previously thought. The occurrence of dolphins as far up river as Shannon Airport on 21% of days monitored is much greater than expected. More detections were recorded at night at three of the four sites and thus visual techniques would have greatly under-estimated the dolphins use of these sites.

Season was found to be significant influence of dolphin presence at three of the four sites. At Moneypoint and Aughinish peak detections occurred during winter with peak detections at Foynes during spring. There was no significant seasonal trend at Shannon Airport. This was previously reported at Moneypoint and Foynes by O'Brien *et al.* (2012) during 600 days monitoring between 2009 and 2011. This study shows this trend is consistent and seasonal, and diel patterns also occur further upriver. Additionally, the influence of diel phase, with most detections recorded at night has also been previously described by O'Brien *et al.* (2012) from at Moneypoint and Foynes. There was however no previous data from Aughinish and Shannon Airport. Most dolphin detections at Aughinish were during flood tides while there was no significant influence of tide at the other three sites. This suggests the use of Aughinish by dolphins is different compared to the other three sites and needs further exploration. It might reflect more limited foraging opportunities at Aughinish and dolphins are passing through this site.

Concentrations of dolphins around deep, narrow channels were demonstrated in the Moray Firth, Scotland a site of another resident group of bottlenose dolphins (Hastie *et al.* 2003) and the use of this habitat was consistent over a ten year period. Hastie *et al.* (2004) showed this was linked to foraging and peaked in June and July. Although the identity of the preferred prey could not be determined but suspected it was salmonids. Fury and Harrison (2011) showed

bottlenose dolphins in estuaries in Australia were more abundant in the spring and during a flood tide which they associated with access to their preferred prey of mullet and whiting. This is different to the use of the Shannon as dolphins occur in the Shannon throughout the year but exhibit seasonal preferences in the use of habitats within the estuary.

A monitoring index comprising %DPM was generated for each site and facilitated comparison with previous work carried out in the estuary but can also be used to compare with other sites outside the Shannon (O'Brien *et al.* 2012; O'Brien, 2009).

Clearly the Shannon Estuary is a very important site for bottlenose dolphins and the deep-water berths are important habitats which they use as part of their daily activities and on a regular basis. Although there was a trend with declining detection rates the further up-river monitoring was carried out, the presence of dolphins at Shannon Airport on 21% of days show that dolphins do use the inner estuary on a near daily rate and throughout the year. Any development of deep-water berths in the Shannon Estuary must take into account the use of these sites by bottlenose dolphins and ensure mitigation measures are in place during development and operation.

6.2.2.2 Identification and Rating of Important Areas for Bottlenose Dolphins

In addition to the static acoustic monitoring the SDWF also undertook an assessment of the Shannon estuary in terms of importance to Bottlenose Dolphins. The Shannon Estuary is one of the most important habitats in Ireland, if not Europe, for bottlenose dolphin *Tursiops truncatus*. It is the only site designated as a candidate Special Area of Conservation for bottlenose dolphins in Ireland and one of around twenty such sites designated throughout Europe for this species. Research on the Shannon dolphins started in 1993, when a feasibility study to assess the potential of commercial dolphin-watching was carried out (Berrow *et al.* 1996). This study provided the first information to show individual dolphins were resident and that it was an important calving area. A more detailed study from 1995-1998 confirmed these initial findings and estimated a population of around 120 dolphins used the estuary (Ingram 2000). Ingram and Rogan (2002) explored how dolphins used the estuary and suggested dolphins preferentially used areas with the greatest benthic slope and depth. The population is thought to be stable (Berrow *et al.* 2012).

Bottlenose dolphins are not evenly distributed throughout the Shannon Estuary; however dolphin survey effort is restricted mainly to parts of the outer and middle estuary. The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. However, there is very little survey effort upriver of Tarbert, Co Kerry apart from Berrow (2009) but this was restricted to winter months.

Within its downstream study area, this continued robust research effort has led to the identification of two core locations within which the majority of dolphin records occur. These “critical areas” (**Figure 6.12**) represent high value habitats used preferentially by the species within its overall range at the site and they broadly coincide with areas of steep benthic (i.e. seafloor) slope, greater depth and stronger currents. (NPWS, 2012)

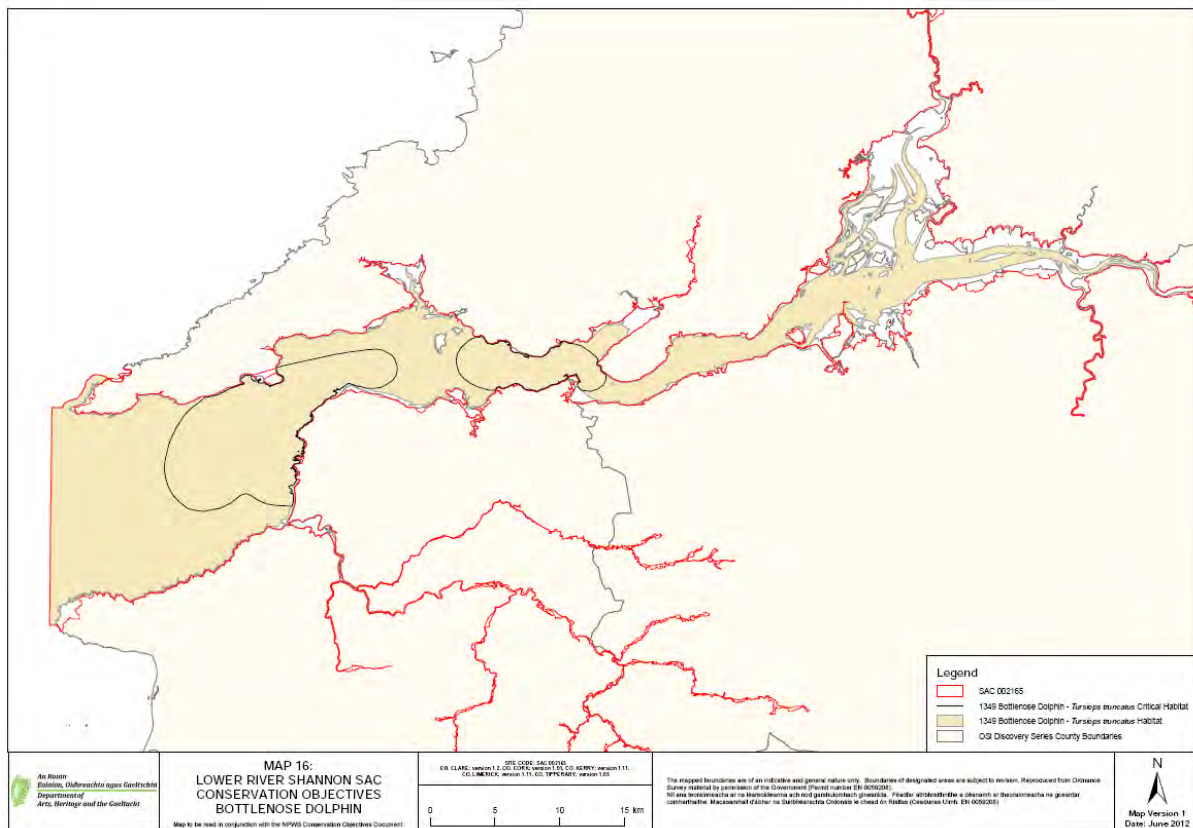


Figure 6.12 Bottlenose Dolphin “Critical Areas” and general habitat. (Source, NPWS)

The key areas for which Vision 2041 has proposed investigation into future expansion or diversification lie outside of these critical areas, nevertheless the potential for in-direct impact to this qualifying interest feature will need to be considered at project level.

Scoring System for Assessing Importance of Sites for Bottlenose Dolphins

In order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data, a habitat scoring system was developed in GIS.

GIS was then used to display the habitat scoring data. A 2.5 km² grid was created, with each grid cell then scored using the criteria below. Three categories were used to score each grid cell; Water depth, seabed slope and current were used as factors and weighted current speed slightly higher than depth or slope (**Table 3.3**).

Table 6.9 Summary of Scoring Criteria

Criteria	Scored out of:
Current Speed	3
Seabed Slope	2
Water Depth	2
Total Rating	7

Current Speed

Bottlenose dolphins are known to prefer areas with strong currents mainly for feeding (Berrow et al. 1996; Ingram 2000). Maximum modelled current speed (metres second⁻¹) on an ebb spring tide was used.

Table 6.10 Summary of Scoring Criteria for current

Observed Current Speed Rating	Score (Out of 3)
Significant current (1.1-1.5 m s ⁻¹)	3
Some current (0.6-1.0 m s ⁻¹)	2
Little current (0-0.5 m s ⁻¹)	1

Seabed Slope

Areas with a strong slope are thought to be used preferentially by bottlenose dolphins in the Shannon Estuary (Ingram and Rogan 2002). We assigned a slope category for each site using the maximum difference in chartered depths within each cell.

Table 6.11 Summary of Scoring Criteria for Seabed Slope

Observed Seabed Slope Rating	Score (Out of 2)
Significant slope (>30m)	2
Some slope (11-30m)	1
No slope (≤10m)	0

Water Depth

Areas with deep water are thought to be used preferentially by bottlenose dolphins in the Shannon Estuary (Ingram and Rogan 2002). We assigned a depth category using the maximum charted depth from Admiralty charts within each cell.

Table 6.12 Summary Scoring Criteria for Water Depth

Observed Water Depth Rating	Score (Out of 2)
>20m	2
5-20m	1
<5m	0

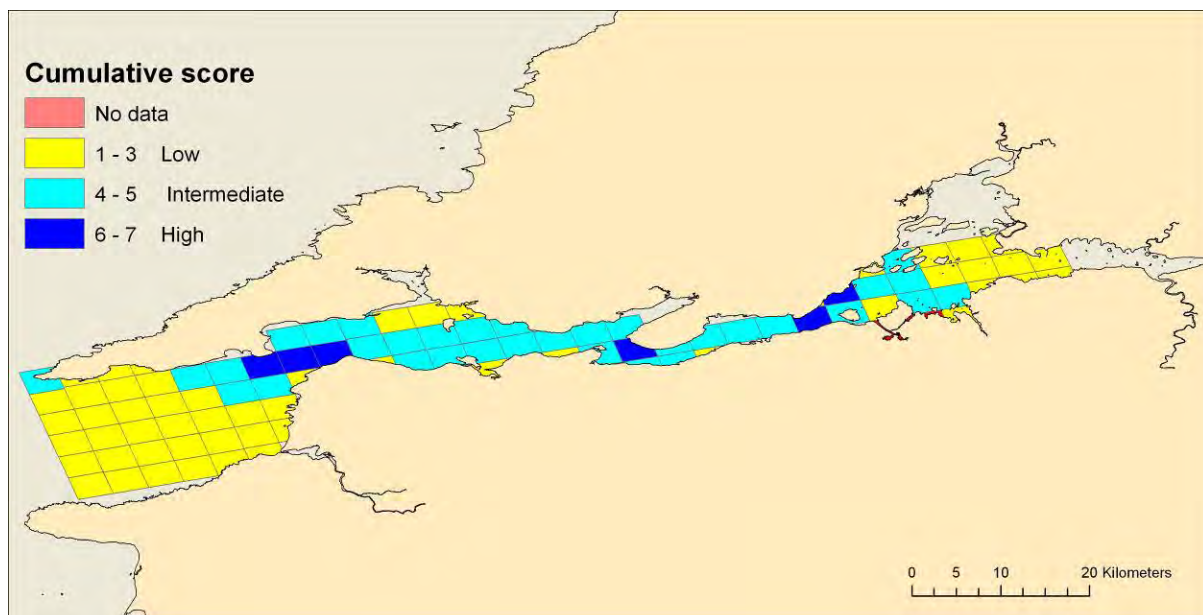


Figure 6.13 Overall scoring assessment for habitat suitability for bottlenose dolphins in the Shannon Estuary

The scoring assessment using these three categories is shown in **Figure 6.13**. Three classifications for habitat suitability equating to cumulative scores were used:

- 1-3 = low habitat priority;
- 4-5 = intermediate habitat priority
- 6-7 = high habitat priority

Two cells were given high priority habitat adjacent to Foynes Island, with the cell immediately surrounding Foynes Island given an intermediate habitat priority. This overall scoring assessment was used to inform the Strategic Site selection process as part of the overall SIFP.

6.2.2.3 Identification and Rating of Bird Areas

A similar approach to that which was undertaken for the assessment and rating of important areas for Bottlenose Dolphins was also undertaken in relation to birds. As part of the SIFP process Natura Environmental Consultants were commissioned to undertake a comprehensive review of all available bird data and based on these data to identify important bird areas within the Shannon Estuary. A desk review was undertaken to identify all possible sources of bird data for the Shannon Estuary. A list of criteria was then used to rank those sites for which bird data was available, according to their vulnerability to future development, based on the number and diversity of bird species recorded within these units.

Desk Review

A desk review was undertaken to identify all possible sources of bird data for the Shannon Estuary. Birdwatch Ireland, the National Parks and Wildlife Service and a number of local ornithologists familiar with the Shannon Estuary were consulted in relation to existing sources of bird data.

The Irish Wetland Bird Survey (I-WeBS) is the most comprehensive on-going survey of birds in the Shannon and Fergus Estuary. The Estuary is the largest in Ireland and extends into three counties. During I-WeBS, full coverage is only achieved through aerial censuses, which are undertaken twice each winter. I-WeBS subsite boundaries are not available in digital format. **Figures 6.14** and **6.15** show approximately those areas of the River Shannon and Fergus Estuaries coastline covered by I-WeBS. Unfortunately the extent of the sites is not available at present. Aerial survey subsites are shown in blue and ground survey subsites in yellow in **Figures 6.14** and **6.15**.

Waterbird counts of the River Shannon and Fergus Estuaries (Co Clare, Limerick, Kerry) SPA undertaken in 2010-2011 (Cummins and Crowe, 2011) identified 66 subsites, shown in red in **Figures 6.14** and **6.15**. These sites provide quite a comprehensive coverage of the inner Estuary and to a lesser extent the outer Estuary. These sites were counted primarily at low tide in order to compliment the I-WeBS surveys; however high tide counts were also included over the season. It should be noted that these sites do not correspond directly to the I-WeBS sites. These sites are referred to as low-tide sites in this report to distinguish them from the I-WeBS sites.

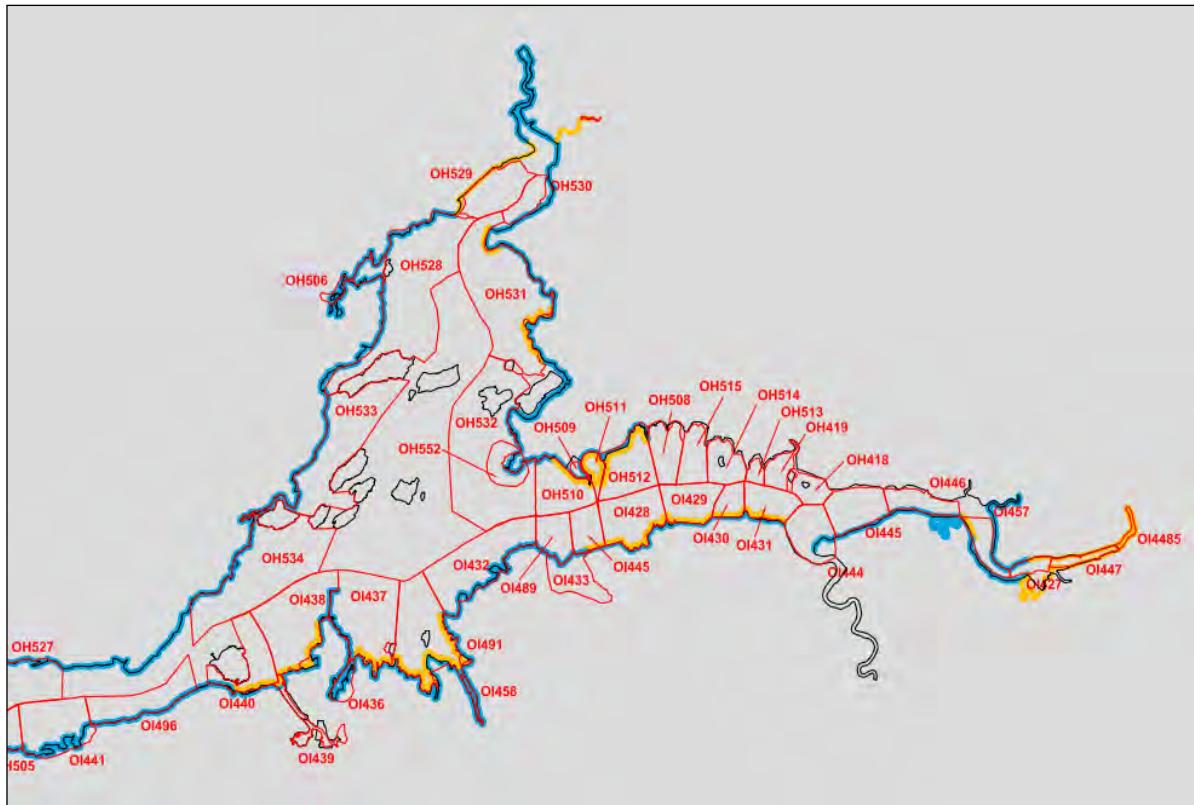


Figure 6.14 Inner Shannon Estuary showing IWeBS and low tide count areas



Figure 6.15 Outer Shannon Estuary showing IWeBS and low tide count areas

Rating of Bird Sites

Overall the I-WeBS and low-tide survey subsites provide the most comprehensive coverage of the Shannon and Fergus Estuaries in terms of bird data. The full I-WeBS counts of the River Shannon and Fergus Estuaries are undertaken by aerial census, therefore a direct comparison of bird numbers with the low-tide survey results is not possible. Numbers of certain species may have been under-recorded on past I-WeBS counts but any such comparisons should not be made.

Even though the data collected from the low-tide survey 2010/2011 is only from one season, it was considered to be the most accurate and up-to-date for the purpose of rating bird areas which are considered to be particularly vulnerable to future development within the Shannon and Fergus Estuaries, for the following reasons:

- The extent of the 66 low-tide subsites is available in digital format and can be overlain with other sites for comparison.
- The data was collected using ground survey counts rather than from aerial survey counts as in I-WeBS.
- The data is collected over a number of visits during the season rather than once or twice a year.
- The data is the most recent available.

The low-tide sites have been ranked using the criteria outlined below. All other sites within the estuary for which bird data exists (i.e. swan sites, geese sites, NEWS sites, terns, seabird 2000) were also collated but not utilised in the ranking system. These sites could not be ranked in a similar fashion to the low-tide subsites as the methodology used to record the data is different and the criteria used for the ranking is not applicable. Many of the sites where bird data exists contain only once species (e.g. Whooper Swan) and others contain species which are not qualifying interests of the SPA (i.e. Greylag Goose). Some sites were only ever surveyed twice (e.g. Swan census in 2005 and 2010 and NEWS survey in 1997/1998 and 2006/2007) compared with the IWeBS sites which are surveyed once a month over the winter season every year. We therefore could not give them a rating as these ratings would not be comparable to the low tide site ratings. Most of these other bird sites are outside of the priority development areas (i.e. outer estuary, lake sites, and cliffs).

Criteria for rating bird sites

The following criteria was used to rate the 66 subsites identified and counted in the 2010/2011 low-tide survey report (Cummins and Crowe, 2011). While the classes chosen for ranking are arbitrary they represent the best possible fit with the data available.

Criterion A

The number of SPA qualifying species present within each 2010/2011 low-tide subsite. A total of 21 qualifying species are Special Conservation Interests (SCIs) for the River Shannon and River Fergus Estuaries SPA.

Table 6.13 Summary of scoring Criterion A

No. of SPA qualifying species or SCIs	Site importance	Score (out of 3)
15-20 species	High	3
7-14 species	Medium	2
1-6 species	Low	1

Criterion B

The overall number of waterbirds recorded within each sub-site based on the sum of the peak number of each species recorded over the 2010/2011 season. While the peaks for different species may have occurred on different dates, they represent the optimum carrying capacity for that species.

Table 6.14 Summary of scoring Criterion B

Sum of peak no. of birds	Site importance	Score (out of 3)
>5,000 – >10,000	High	3
>1,000 – 5,000	Medium	2
1 – 1,000	Low	1

Each subsite was given an overall site rating based on the sum of the scores for Criteria A and B, as shown in **Table 3.15**.

Table 6.15 Overall score (Criteria A + B)

Site importance	Overall score
High	5-6
Medium	3-4
Low	1-2

Bird site ratings

Table 6.16 Rating of Low-Tide Subsites

Subsite Name	Site No.	Criterion A		Criterion B		A + B	Vulnerability to development
		Qualifying Species	Rating	Sum of peak numbers	Rating	Overall Site Rating	
Corkanree	0I447	7	2	870	1	3	Moderate
Foynes Island	0I440	11	2	227	1	3	Moderate
Askeaton	0I458	9	2	287	1	3	Moderate
Aughinish Isl.	0I438	15	3	953	1	4	Moderate
Coonagh Point	0I427	11	2	1024	2	4	Moderate
Aughinish East	0I437	13	2	1915	2	4	Moderate
Poulaweala Creek	0I436	9	2	3111	2	4	Moderate

Conclusions

This analysis is based on the best available bird data for the Shannon and Fergus Estuaries. The ranking system devised within this study was used at a strategic level to highlight bird areas within the Shannon and Fergus Estuaries, for which data is available, which would be particularly vulnerable to future development. Certain bird areas (e.g. tern nesting sites, geese and swan wintering sites) could not be ranked according to the criteria but are considered of high importance. It should also be noted that there are known to be important high tide roost sites for waterbirds, the locations of which were not available at the time of completion of this analysis. However, this data has now become available through the detailed conservation objectives for the River Shannon and River Fergus Estuaries SPA in September 2012. It is also emphasised that the ranking of bird sites in this report is based on only one winter's data and, as bird distribution is dynamic, this may not represent the long term situation. These results should not be taken to infer that these areas are the only ones of high sensitivity that should be avoided. The entire estuary is a continuum as used by the birds. It should be noted that the ranking system is to be used as a guide at a strategic level only and that a full Appropriate Assessment screening exercise, taking account of the whole SPA, will be required at the project level to ensure there are no significant effects to any Natura 2000 site within the Shannon and Fergus Estuaries in the context of the sites Conservation Objectives.

6.3 Identification of Potential Effects

Due to the strategic nature of Vision 2041 which is focused upon driving growth across all sectors but in particular in the areas of bulk solids together with identifying opportunities for the entry into new sectors and expanding existing sectors in line with international and national growth forecasts, including biomass, energy, offshore wind, waste to energy and recycling there still remains a considerable amount of uncertainty as to the exact scale, type and

location of development within the Strategic Sites associated with the objectives of the Vision. However, by undertaken the appropriate assessment process and assessing the cumulative and in-combination effects it is hoped that the most significant effects can be eliminated at project level through avoidance and removal of elements with the likelihood of the most significant effects. In the case of any remaining scientific uncertainty with regard to the effects of the plan at project level or the related mitigation (or compensatory measures should they be deemed necessary under Article 6(4)), the measures should include a pre-defined and validated scheme to monitor the actual impacts and a framework to adapt the mitigation and compensation measures to the actual impacts once the project level details are brought forward.

This appraisal also recognises that a significant amount of further evaluation will be required however, at project level, to assess the potential interrelationships between specific proposals and the natural environment, and understand the nature of the benefits and the impacts. It is hoped that the information provided in the Vision and its associated environmental assessment will also provide direction for such proposals as they are brought forward to the planning stage. Recently developed guidance² in Scotland (SNH, August 2012) describes the circumstances where it may be acceptable for a Plan Level Appropriate Assessment to rely on a later Project Level Appropriate Assessment to ensure no adverse effect on the integrity of a Natura 2000 site. The precautionary principle is embedded in the Directive and should be applied as has been applied through the selection of strategic sites for the SIFP. However, the following points should be borne in mind. Many plans are necessarily strategic in nature. The actual or likely effects of implementing plans such as the Vision, especially in the absence of detailed proposals that will necessarily follow, are inevitably uncertain to a greater or lesser degree. Projects that may flow from the provisions of the Vision will, in any event, be subject to detailed, statutory assessment for their effects on Natura 2000 sites, and will only be permitted if they meet the tests of the Directive.

Nevertheless it is not appropriate merely to delegate consideration of the effects on Natura 2000 sites to project assessment level, or to rely solely on a general policy in the Vision protecting Natura 2000 sites. However, the precautionary principle still needs to be applied, in plan appraisal, in a way that recognises the more general nature of plans, and does not unnecessarily or unreasonably prevent or impede the adoption of plans which in this case equates to the publication of the Vision. If the implications of uncertainty are taken to an

² <http://www.snh.gov.uk/docs/B1116296.pdf>

extreme, it would be impossible for many plans ever to meet such an extreme test, simply because of their non-specific and more general nature.

Despite the many unknown factors associated with any future development by SFPC there are a number of generic activities that are likely to occur as a result of implementation of some of the Vision objectives at project level. Therefore future development was examined under a number of key sector headings which correspond to the themes which were assessed as part of the draft SIFP. **Tables 6.17 to 6.19 provides** an explanation and assessment as to how the potential activities associated with each of the sectors within the Vision relate to the potential effects and locations under SFPC jurisdiction. Where activities at different stages of the development are likely to occur associated with the various sectors from surveying through installation/construction, operation to decommissioning and infrastructure removal they may have similar effects on interest features and have therefore been grouped accordingly. The following assessment of potential effects is not directly related to the publication of the Vision itself but rather the realisation of projects over time through the implementation of the Vision on the ground.

Potential Effects (Sector – Renewable Energy)

Links to Vision element

Associated Areas of Opportunity from SIFP;

- Site Q Tarbert Bay
- Site R Moneypoint
- Site S Carrig Island
- Site T Kilcoony Point

Associated Objectives from Vision;

- LD Objective 4
- LD Objective 5
- SE Objective 2

No potential effects are envisaged arising from the renewable energy sector related objectives in Vision 2041 as they relate to promotion of the estuary as an “Energy Hub” and supporting further research and policy formation for the designation of Limerick Docks as a “Marine Energy Park”.

Potential Effects (Sector – Marine Related Industry) (The potential effects for this sector should be read in conjunction with or can also apply to the Shipping and Navigation Sector) This is the primary sector associated with the Vision objectives.

Links to SFPC Vision element**Associated Strategic Sites;****Associated Objectives;**

- Site A Inishmurry, Cahiracon, Co. Clare *PoF Objective 1*
- Site B ESB Moneypoint, Co. Clare *PoF Objective 3*
- Site C Foynes Island, Co. Limerick *PoF Objective 4*
- Site D Land to Rear of Foynes Port, Co. Limerick *LD Objective 1*
- Site E Askeaton Business Park, Co. Limerick *LD Objective 2*
- Site F Aughinish Alumina, Co. Limerick *LD Objective 3*
- Site G Tarbert Power Station, Co. Kerry *SE Objective 1*
- Site H Ballylongford, co. Kerry *SE Objective 3*
- Site I Limerick Docks, Co. Limerick *SE Objective 4*

Table 6.17 Potential Effects related to the development of the Marine Related Industry Sector

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
Direct effects on habitats or non-mobile species Direct loss of/damage to habitats: Physical damage to or removal/loss/reduction of habitats or removal/loss of non-mobile species due to direct intervention, which may be either permanent loss at site (e.g. reclamation, inputting structures e.g. jetty/pier, dredging) or a substrate change, for example concrete bases for structures.	Foundation/structure installation in particular piled foundations or concrete structures Installation of onshore infrastructure associated with industry such as warehousing, quays, and jetties. Presence and positioning of structures causing hydrodynamic changes/scouring/erosion to substrate and habitats during operation

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
Scouring: There may also be direct effects resulting from scouring, erosion and other sedimentation changes caused by hydrodynamic changes. Smothering: Physical loss of habitat or species due to the presence of new structure and depositing of material. Non-physical disturbance: Noise and Visual People, machinery, etc. Temporary increases in the level of suspended sediments in the water column which can give rise to increased turbidity, and the possible release of oxygen depleting substances (organic or anaerobic sediments), nutrients and contaminants. The potential effects of these changes on marine life are: • Temporary reduction of algal/plant growth due to increased turbidity. • Disturbance to sensitive benthic animals and fish due suspended sediments, which may cause temporary disruption of migration of fish. • Temporary disturbance of marine animals from the depletion of oxygen due to release of organic-rich material. • Nutrient enrichment possibly causing increased food supplies/algal blooms. • Uptake of contaminants by marine life possibly causing direct toxic effects or effects further up the food chain. • Smothering of benthic animals and plants due to resettlement of	Vessel movement during construction causing coastal habitat erosion due to ship wash Repair and maintenance activities to structures (e.g. jetty – painting, replacement etc.) and/or substrate such as dredging of the seabed. Hydrographic surveys Dredging Disposal at approved dump sites within the estuary associated with capital works

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
suspended sediments. Changes in hydrodynamics and geomorphology at dredge and disposal sites: Alteration of bathymetry, tidal currents and sediment-transport processes in the dredge and disposal areas, may cause the alteration of erosion and sedimentation patterns in adjacent areas, which may result in erosion, or creation of intertidal and subtidal habitat.	
Direct effects on mobile species Collision Risk (below surface): Physical damage to mobile species, e.g. injury to fish or marine mammals caused by direct contact (collision) with propeller blades or vessel movement at all stages. Collision Risk (above surface): Collision with above waterline structures associated with the Marine Related Industry includes the addition of navigation lighting which pose a risk to birds or bats Non-physical disturbance: Noise and Visual People, machinery, etc.	Dredging and Disposal at approved dump sites within the estuary associated with capital works. Installation and construction of foundations and structures Increased vessel activity Maintenance activities Decommissioning, removal of infrastructure Presence and positioning of structures such as navigation lights and bouys. Hydrographic surveys Hearing loss (temporary or permanent) or damage to body tissue in terms of marine

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
	mammals from noise impact.
Indirect effects of habitats and non mobile species Smothering: effects of sediment disturbance, suspension and resettlement on species /habitats sensitive to smothering. Changes in water flow: resulting from the installation of structures Changes in suspended sediment levels and turbidity and the effects of this on water quality and sensitive habitats and species. Non-physical disturbance: Noise and Visual People, machinery, etc.	Foundations installation in particular piled foundations Capital dredging associated with new structures Installation of onshore infrastructure associated with Marine Related Industry Increased vessel activity Maintenance activities such as dredging Decommissioning, removal of infrastructure Hydrographic surveys
Indirect effects on mobile species Habitat disturbance: disturbance of mobile species, in particular seabirds, Bottlenose Dolphins and seals in haul out sites from noise and presence of installation vessels/other installation machinery.	Installation of foundations (percussive piling)

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
Noise (installation): effects of noise generated during the installation and construction of structures, in particular piling activities, on marine mammals, fish and seabirds in terms of disturbance and possible longer term displacement from habitats. Noise (Operational): effects of noise generated by Marine Related Industry operations such as cranes, lifts, heavy industrial operations on marine mammals, birds and fish. Habitat exclusion: Physical presence of Marine Related Industry associated structures such as piers, jetties, pipelines leading to long term exclusion from foraging, loafing (birds) and breeding habitats and also exclusion of migration routes. Barrier effects: restricted transit between feeding and breeding are and along migratory routes due to “barriers” created by physical presence of structures outlined under habitat exclusion and perceived risk of collision/effects on noise and general disturbance.	Construction of facility or Marine Related Industry Operation of facility Lights on Marine Related Industry infrastructure such as Jetties, Quays etc. Maintenance activities Decommissioning, removal of infrastructure
Toxic effects Toxic effects on marine species caused by release of contaminants directly or from indirect disturbance of sediments due to propeller movement and anchorage, changes in hydrodynamics, scouring, etc.	Introduction of oil, hydraulic fluid, anti-fouling chemicals, or other substances from vessels. Mobilisation of sediments resulting in release of toxins during construction, maintenance or decommissioning. Spillages from vessels.

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
	Liquid effluents and ballast water discharge Smoke stack emissions
Non-toxic effects (see increased suspended sediment levels and turbidity) Non-toxic effects/disturbance caused by mobilisation of sediments, e.g. increases in turbidity causing disturbance or loss of feeding opportunities for marine pelagic species (fish and mammals) or birds.	Installation of infrastructure (e.g. piling) Operation and maintenance of infrastructure Decommissioning activities causing mobilisation of sediments
Biological disturbance Introduction of invasive, alien or non-native species carried by vessels, etc.	Increased vessel activity during all stages

Table 6.18 Potential Effects (Sector – Shipping and Navigation) (The potential effects for this sector should be read in conjunction with or can also apply to the Marine Related Industry sector)

Links to SFPC Vision element;

Marine Related Industry

- Site A Inishmurry, Cahiracon, Co. Clare
- Site B ESB Moneypoint, Co. Clare
- Site C Foynes Island, Co. Limerick
- Site D Land to Rear of Foynes Port, Co. Limerick
- Site E Askeaton Business Park, Co. Limerick
- Site F Aughinish Alumina, Co. Limerick
- Site G Tarbert Power Station, Co. Kerry
- Site H Ballylongford, co. Kerry
- Site I Limerick Docks, Co. Limerick

Renewable Energy

- Site T Kilcoony Point
- Site Q Tarbert Bay
- Site R Moneypoint
- Site S Carrig Island

Associated Objectives;

PoF Objective 1

PoF Objective 3

PoF Objective 4

LD Objective 4

LD Objective 5

SE Objective 1, 2, 3 & 4

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
Direct effects on habitats or non-mobile species Direct loss of/damage to habitats: Physical damage to or removal/loss/reduction of habitats or removal/loss of non-mobile species due to direct intervention, which may be either permanent loss at site (e.g. reclamation, inputting structures e.g. jetty/pier, dredging) or a substrate change, for example concrete bases for structures. Scouring: There may also be direct effects resulting from scouring, erosion and other sedimentation changes caused by hydrodynamic changes. Abrasion: There may be an impact to SAC features from maintenance activities to shallow infrastructure. Smothering: Physical loss of habitat or species due to the presence of new structure and depositing of material. Non-physical disturbance: Noise and Visual People, machinery, etc. Temporary increases in the level of suspended sediments in the water column which can give rise to increased turbidity, and	Foundation/structure installation in particular piled foundations or concrete structures offshore. Installation of onshore infrastructure associated with industry such as warehousing, quays, and jetties. Presence and positioning of structures causing hydrodynamic changes/scouring/erosion to substrate and habitats during operation Vessel movement during construction causing coastal habitat erosion due to ship wash Repair and maintenance activities to structures (e.g. jetty – painting, replacement etc.) and/or substrate such as dredging of the seabed. Capital and/or maintenance dredging associated with current, increased shipping and maintenance to the navigational channel. This includes Harrowing/Ploughing/Bed Levelling of river bed to smooth irregularities. Smothering of benthic fauna at dredge dump sites. Hydrographic surveys

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
the possible release of oxygen depleting substances (organic or anaerobic sediments), nutrients and contaminants. The potential effects of these changes on marine life are: • Temporary reduction of algal/plant growth due to increased turbidity. • Disturbance to sensitive benthic animals and fish due suspended sediments, which may cause temporary disruption of migration of fish. • Temporary disturbance of marine animals from the depletion of oxygen due to release of organic-rich material. • Nutrient enrichment possibly causing increased food supplies/algal blooms. • Uptake of contaminants by marine life possibly causing direct toxic effects or effects further up the food chain. • Smothering of benthic animals and plants due to resettlement of suspended sediments. Changes in hydrodynamics and geomorphology at dredge and disposal sites: Alteration of bathymetry, tidal currents and sediment-transport processes in the dredge and disposal areas, may cause the alteration of erosion and sedimentation patterns in adjacent areas, which may result in erosion, or creation of intertidal and subtidal habitat	
Direct effects on mobile species Collision Risk (below surface): Physical damage to mobile species, e.g. injury to fish or marine mammals caused by direct contact (collision) with propeller blades or vessel	Installation and construction of foundations and structures

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
movement at all stages. Collision Risk (above surface): Collision with above waterline structures associated with the Marine Related Industry includes the addition of navigation lighting which pose a risk to birds or bats. Non-physical disturbance: Noise and Visual, people, machinery, etc.	Increased vessel activity Maintenance activities Decommissioning, removal of infrastructure Presence and positioning of structures such as navigation lights and bouys.
Indirect effects of habitats and non mobile species Smothering: effects of sediment disturbance, suspension and resettlement on species /habitats sensitive to smothering. Changes in water flow: resulting from the installation of structures Changes in suspended sediment levels and turbidity and the effects of this on water quality and sensitive habitats and species. Non-physical disturbance: Noise and Visual People, machinery, etc.	Foundations installation in particular piled foundations Capital dredging associated with new structures Installation of onshore infrastructure associated with Marine Related Industry Increased vessel activity Maintenance activities such as dredging

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
	Decommissioning, removal of infrastructure
Indirect effects on mobile species Habitat disturbance: disturbance of mobile species, in particular seabirds, Bottlenose Dolphins and seals in haul out sites from noise and presence of installation vessels/other installation machinery. Noise (installation): effects of noise generated during the installation and construction of structures associated with increases in shipping and navigation on marine mammals, fish and seabirds in terms of disturbance and possible longer term displacement from habitats. Noise (Operational): effects of noise generated by increases in shipping and navigational activities such on marine mammals, birds and fish. Habitat exclusion: Physical presence of Marine Related Industry associated structures such as piers, jetties, pipelines leading to long term exclusion from foraging, loafing (birds) and breeding habitats and also exclusion of migration routes. Barrier effects: restricted transit between feeding and breeding are and along migratory routes due to “barriers” created by physical presence of structures outlined under habitat exclusion and perceived risk of	Installation of foundations (percussive piling) Construction of facility or Marine Related Industry Operation of facility Increased shipping and associated pilotage Maintenance activities Decommissioning, removal of infrastructure

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
collision/effects on noise and general disturbance. Non-physical disturbance: Noise and Visual People, machinery, etc.	
Toxic effects Toxic effects on marine species caused by release of contaminants directly or from indirect disturbance of sediments due to propeller movement and anchorage, changes in hydrodynamics, scouring, etc.	Introduction of oil, hydraulic fluid, anti-fouling chemicals, or other substances from vessels. Mobilisation of sediments resulting in release of toxins during construction, maintenance or decommissioning. Spillages from vessels. Liquid effluents and ballast water discharge Smoke stack emissions Introduction of synthetic and non synthetic compounds. Changes in turbidity due to discharge of ballast waters

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
Non-toxic effects (see increased suspended sediment levels and turbidity) Non-toxic effects/disturbance caused by mobilisation of sediments, e.g. increases in turbidity causing disturbance or loss of feeding opportunities for marine pelagic species (fish and mammals) or birds.	Installation of infrastructure (e.g. piling) Operation and maintenance of infrastructure Decommissioning activities causing mobilisation of sediments Changes in turbidity levels
Biological disturbance Introduction of invasive, alien or no-native species carried by vessels, etc.	Increased vessel activity

Table 6.19 Potential Effects (Sector – Archaeology and Cultural Heritage)**Links to SFPC Vision;**

While the Vision does not identify specific objectives or measures in terms of Archaeology or Cultural Heritage potential effects may occur where a proposed development under for example the Marine Related Industry sector require pre-construction surveys, baseline data collation or excavation which can have a potential effect on the qualifying interest features of the associated Natura 2000 sites.

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
Direct effects on habitats or non-mobile species Direct loss of/damage to habitats: Physical damage to or removal/loss/reduction of habitats or removal/loss of non-mobile species due to direct removal or probing associated with site investigations and archaeological investigations which may precede developments Scouring: There may also be direct effects resulting from scouring, erosion and other sedimentation changes caused by hydrodynamic changes. Non-physical disturbance: Noise and Visual People, machinery, etc.	Hydrographic Surveys Marine Geophysical Surveys Benthic investigations Archaeological excavations Vessel movement during investigations

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
Direct effects on mobile species Collision Risk (below surface): Physical damage to mobile species, e.g. injury to fish or marine mammals caused by direct contact (collision) with devices, collision with blades/devices, underwater pressure waves during survey or operation or vessel movement at all stages.	Hydrographic surveys Marine Geophysical surveys Increased vessel activity
Indirect effects of habitats and non mobile species Smothering: effects of sediment disturbance, suspension and resettlement on species /habitats sensitive to smothering. Changes in suspended sediment levels and turbidity and the effects of this on water quality and sensitive habitats and species.	Hydrographic Surveys Marine Geophysical Surveys Benthic investigations Archaeological excavations Vessel movement during investigations
Indirect effects on mobile species Habitat disturbance: disturbance of mobile species, in particular seabirds and marine mammals through vessels movement and the use of certain survey equipment.	Hydrographic Surveys Marine Geophysical Surveys

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
Noise (Operational): effects of noise generated by operational devices on marine mammals, birds and fish. Habitat exclusion: Physical presence of vessels and survey equipment leading to long term exclusion from foraging, loafing (birds) and breeding habitats and also exclusion of migration routes. Barrier effects: restricted transit between feeding and breeding are and along migratory routes due to “barriers” created by physical presence of vessels and survey equipment	Benthic investigations Archaeological excavations Operation of underwater and surface survey devices Lights on devices
Toxic effects Toxic effects on marine species caused by release of contaminants directly or from indirect disturbance of sediments due to underwater investigations, scouring, archaeological excavation.	Introduction of oil, hydraulic fluid, anti-fouling chemicals, or other substances from devices or vessels. Mobilisation of sediments resulting in release of toxins during investigations and surveys.
Non-toxic effects (see increased suspended sediment levels and turbidity) Non-toxic effects/disturbance caused by mobilisation of sediments, e.g. increases in turbidity causing disturbance or loss of feeding opportunities for marine pelagic species (fish and mammals) or birds.	Hydrographic Surveys Marine Geophysical Surveys Benthic investigations

Potential Effects	Potential activities associated with sector, development at strategic sites and associated SFPC Vision objectives
	Archaeological excavations Vessel movement during investigations
Biological disturbance Introduction of invasive, alien or no-native species carried by vessels, etc.	Introduction of vessels and equipment to the estuary which have originated in other waters containing invasive and alien species.

6.4 Description of Potential Effects emanating from the implementation of the Vision at project level

6.4.1 *Direct Physical Loss or Damage to Habitats or Non-Mobile Species*

Direct Physical Loss or Damage

There is potential for **direct physical loss or damage** to the substratum and associated habitat/species located in the vicinity of;

- Marine Related Industry developments
- Archaeological and Cultural Heritage Investigations
- Shipping and Navigation

This is as a result of survey activities (Prior to or associated with development under the various sectors and at the strategic sites), installation of cables, piled foundations, gravity bases or clump weights, deployment of anchors, vessel movements, maintenance activities, installation and decommissioning. Although these effects are likely to be localised they will be permanent.

The overall magnitude and significance of the effect will depend on the total area of habitat affected and the range/type of benthic communities/species present in main area of development. The detailed habitat mapping and assessment of the strategic sites associated with any future development by SFPC and brought forward into the Vision has undertaken a preliminary examination of the significance of effect as best as possible in the absence of site specific details and location of development within the strategic site boundary.

Scouring

Scouring of sediments will occur around the base of any fixed structures or foundations on the seabed such as foundations, jetties, piers, gravity bases, moveable features and anchorage/bouys associated with fishing and aquaculture associated with;

- Marine Related Industry developments
- Shipping and Navigation

This scouring may have potential effects on the existing benthic environment in that immediate location. However, over time, sediment conditions will stabilise with finer sediments being lost and the larger sediment fraction remaining allowing recolonisation by species that may have been absent before. Recolonisation may also lead to increased sediment consolidation and stability which would contribute to further recolonisation success. However, this in itself may increase friction levels with a resulting breakdown of consolidated sediment before equilibrium is reached and a new and changed benthic community becomes established. If scour

protection is used the difference in faunal composition between before and after construction will be greater than without such protection.

Abrasion

Abrasion of the seabed or habitats can occur from an array of maintenance activities associated with a number of sectors in particular shipping and navigation which can apply to other sectors also. This is perhaps most evident in shallow waters where the abrasive action can have a greater impact on the community structure and non-mobile species than in deeper areas where penetration is greater however, the actual impact will depend greatly on the habitat type at the site.

Smothering

The physical loss of habitat or species due to the presence of a new structure or the deposition of dredge spoils. Smothering is inevitable at dredge disposal sites however the significance of impact will depend on the community structure at the site prior to disposal. The communities within regularly used sites are often degraded. Extent of impacts depends on the magnitude and frequency of disposal, background water quality, type and quality of material, size and depth of receiving area, hydrodynamics and the proximity of marine features and sensitive communities. The finer the material, and greater the energy at the disposal site, the higher possibility of increased suspended sediments and far-field effects. Potential impacts are minimised under the EPA Dumping at Sea licensing process. This effect is primarily associated with the following sectors;

- Marine Related Industry developments
- Shipping and Navigation

Non-physical Disturbance

Non-physical disturbance primarily noise but also just general disturbance causing temporary or permanent displacement. This is mainly a concern in terms of disturbance to cetaceans (dolphins and porpoises) and birds. There is some evidence of noise disturbance to cetaceans from vessels. Research is ongoing, but little information is available relating specifically to noise from ships/boats. The percussive noise generated by pile driving has sufficient intensity to produce auditory injury in marine mammals and their prey. Behavioural impacts at greater distances are also likely.

6.4.2 *Direct Physical Damage to Mobile Species*

In terms of direct physical effects on mobile species these include both below water surface and above water surface effects. These effects have the potential to reduce productivity and/or increase mortality rates, and thereby impact on populations. Therefore, before construction is consented, the risks – including the potential impacts on specific seabird breeding colonies – should be identified by developers as part of an Environmental Impact Assessment or

Strategic Environmental Assessment. The foraging distances together with an indication of the range within which protected species and sites may be potentially at risk coupled with colony-specific foraging information need to be established when it comes to assessing individual applications.

Collision Risk with structures above the surface of the water

The main direct effects above the surface of the water relate to potential collision risk between migratory birds and associated structures from the development of;

- Marine Related Industry developments
- Shipping and Navigation

There may also be the risk of collision with other bird species using an area for foraging or breeding and bat species found offshore. Bird collision risk with structures primarily those associated with the Marine Related Industry and the installation of structures associated with the shipping and navigation industry is predominately limited to the operational phase of a development or activity and is influenced by a range of factors including species sensitivity, weather and visibility conditions, the location of bird populations adjacent to the development (i.e. proximity to important sub-unit), bird flight behaviour (height above sea level etc) and migration/flight routes to feeding areas that could potentially occur within the potential area of development. Collision risk is expected to be greater where activities occur closer to shore as this will increase the proximity to flight paths by birds moving between feeding areas, feeding and roosting (e.g. waders and wildfowl) or breeding and feeding areas (e.g. seabird colonies), and larger-scale movements along the coast.

6.4.3 Indirect Effects on Habitats and Non Mobile Species

Increased Turbidity and Smothering

Indirect effects (increased turbidity and smothering) on the surrounding area would also result from the re-distribution of sediment into the water column. These effects will be localised and temporary and are likely to be most significant for construction works associated with the following sectors;

- Marine Related Industry developments
- Shipping and Navigation

The effects on benthic fauna will be limited to localised mortality or displacement, where objects come into contact with the sediment and smothering by resettled sediment occurs. This can include concrete construction of jetties, piers and harbours, anchors, bouys and features associated with shipping and navigation. Recruitment from adjacent unaffected areas should ensure rapid recovery of benthic species.

Changes in Suspended Sediment Levels and Turbidity

Changes in suspended sediment levels and turbidity can occur during seabed disturbing installation or construction activities, as fine particles travel further from the disturbed area, swept by tidal currents. Increased turbidity can have effects on foraging, and predator/prey interactions. The magnitude of this effect will depend on the high number of variables involved in determining both background and project caused suspended sediment levels and turbidity. Developments and activities associated shipping and navigation together with the Marine Related Industry such as dredging, piling for installation of piers, jetties and ancillary features associated with the Marine Related Industry will have a more significant effect where they are not located within high energy areas where sediments are quickly dispersed.

6.4.4 Indirect Effects on Mobile Species

Physical Disturbance

Marine Mammals

There is potential for marine mammals to be physically disturbed during construction works, operational stages associated with a variety of developments under each of the key sectors. The presence of installation vessels and equipment, increases in shipping associated with Marine Related Industry developments and the noise they produce in the vicinity of operations. Noise is a key factor in causing disturbance effects (as described below), but the physical presence of the installation vessels can also cause a disturbance effect.

Seabirds

Physical disturbance to birds in the immediate vicinity of construction activities could potentially have a temporary effect during construction and operational stages. Noise is a key factor in causing the disturbance effect, but the physical presence of the installation vessels can also cause a disturbance effect due to physical and visual intrusion. Bird's likely response to disturbance effects would be to avoid the immediate area during construction, which has implications of foraging and breeding success, stress on individuals and energy budgets. This has been looked at for shore birds, and it is recognised that disturbance may have long term effects if breeding is disrupted, or if birds feeding is disrupted with fitness affected. However, there is no quantified data from which to determine estimated magnitude of effect.

Marine Noise

In terms of Marine Related Industry together with Shipping and Navigation marine noise can be generated during both the installation, construction of infrastructure, buildings etc and during the operation of any of these developments. In general underwater noise is measured in terms of 'sound pressure levels'. Different marine activities also generate different sound pressure levels with different frequencies. Different marine species also have varying

responses to the different sound pressure levels and frequencies. **Figure 6.16** below gives some examples of hearing ranges of aquatic animals relative to sources of anthropogenic noise frequency for certain types of underwater activities, and the ranges within which selected species could be expected to exhibit a behavioural response.

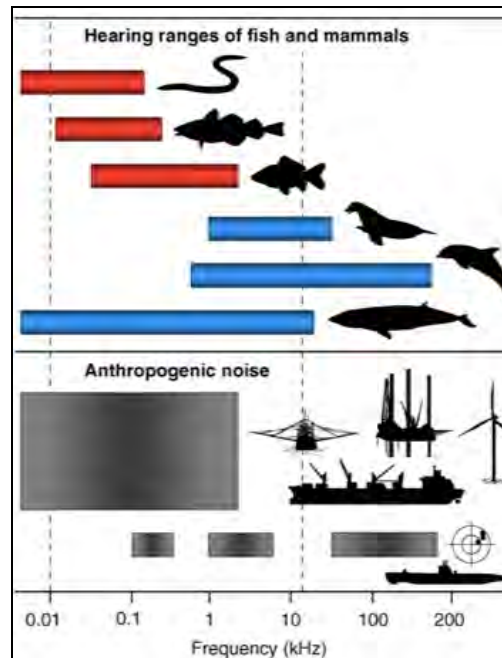


Figure 6.16 Hearing ranges of aquatic animals relative to sources of anthropogenic noise

(Source; http://www.science20.com/anthrophysis/rethinking_marine_acoustic_ecology_research_int_time_change-8735)

A new project funded by the Environment Protection Agency in the Shannon Estuary which enables you to listen to the sounds of the Shannon Estuary has recently gone live. As part of a project being run by the Galway-Mayo Institution of Technology (GMIT) which involves monitoring ocean noise, a hydrophone has been installed off Tarbert Power Station jetty. The sounds of the estuary recorded by the hydrophone are being transmitted by the internet for everyone to listen. These sounds include ships and ferries transiting the estuary and the whistles and clicks of bottlenose dolphins.

(Source; <http://www.shannondolphins.ie/article.asp?id=77>)

<http://www.listentothedeep.com/acoustics/index.html>

The project is a collaboration between GMIT, the Shannon Dolphin and Wildlife Foundation, based in Kilrush, Co Clare and the Laboratory of Applied Bioacoustics of the Technical University of Catalonia, which has established the LIDO system. Listening to the Deep Ocean (LIDO) is an international project which aims to monitor ocean noise throughout the world's

oceans. According to the SDWF Project Manager Dr. Simon Berrow the project is the first of its kind in Ireland and could potentially have a wide range of applications in terms of quantifying the potential effect of future developments within the Shannon Estuary which emanate anthropogenic noise in the marine environment. It is hoped this system can be used not only to monitor ocean noise and bottlenose dolphin activity but support marine tourism and environmental awareness by allowing those interested to tap into sounds from the Shannon.

Installation Noise

Acoustic disturbance of marine mammals, fish and bird species both above and below the surface can occur associated with construction and development of Marine Related Industry sites where jetties, piers, dredging and installation of structures are required. Sound is of key importance to marine mammals in particular. Although marine mammals have good eyesight, below a certain depth it becomes completely dark. Marine mammals have through evolution adapted to use sound as a primary sense to navigate, communicate and find food. It is well known that cetaceans use sound both passively when listening to the environment and actively when communicating. The speed of underwater sound is five times faster than sound travelling in air. Sound travels 334 meters per second (m/s) in air approximately 1500m/s in water. Sound also travels much farther underwater than in air. Therefore, marine animals can perceive sound coming from much further distances than terrestrial animals. The importance of sound to marine mammals is thus apparent and therefore they have the potential to be impacted by high levels of unnatural sound in the estuary. Should any piling or underwater blasting be required, the noise generated by these activities is likely to have a greater disturbance effect than for developments where piling is not required. Whilst piling and blasting noise would only be produced over a temporary period, for the duration of construction activities, the effects may continue for longer, as mammals may not immediately return to an area, particularly if they have been excluded for lengthy periods. This is particularly relevant in constrained areas (such as the mouth of the Shannon Estuary) where loud noise sources may prevent transit, effectively trapping individuals.

The key sources of construction noise related to site preparation and installation include:

- Shipping and machinery; dredging, and pile driving, blasting or drilling.

It is believed that seals and cetaceans could both be generally expected to be able to hear piling noise up to a distance of 80km, and behavioural responses could be expected up to 20km (Thomsen et al, 2006 and Tougaard et al, 2009). In addition, physiological effects on both seals and cetaceans could include temporary or permanent hearing damage or discomfort. Permanent hearing damage in marine mammals is assumed to occur at an exposure of 40 dB above levels in which a temporary threshold shift in hearing occurs. However, these figures are likely to vary, depending on site characteristics (e.g. shielding

affects of islands and affect of water depth). There is also a risk of injury of death associated with exposure to loud noise sources such as close proximity to piling operations.

It has also been identified that migratory salmon might detect pile-driving pulses also at considerable distances from the source. Behavioural effects, like avoidance and flight reactions, alarm response, and changes of shoaling behaviour are possible due to piling noise. There may also be physical effects, such as internal or external injuries or deafness up to cases of mortality, in the close vicinity to pile-driving and underwater blasting.

Operational Noise

As for construction noise, noise produced during operation of any future developments associated with the various sectors could also potentially disrupt prey location, navigation and social interaction behaviour in marine mammals, or result in temporary or permanent hearing damage. Whilst the noise levels likely to be generated during tidal device operation are currently not known, operation noise is considered to be considerably less in magnitude than construction noise. The potential noise sources during operation include: structural noise, moving air, moving water, moorings, electrical noise, and instrumentation noise.

Habitat Exclusion

The physical presence of new or expanding infrastructure associated with the Marine Related Industry will cause loss of habitat during operation. This may including foraging habitat (birds, marine mammals and fish) and loafing areas (seabird). Developments may also lead to the exclusion of seals and seabirds from coastal terrestrial breeding habitats by providing a physical or perceive barrier to these areas or producing noise that results in avoidance behaviour. Cetaceans may also be excluded from areas used as nursery or breeding areas, migration/travelling routes and socialising areas. Exclusion will also limit the available habitat. Evidence from wind farm projects indicates that many species, most notably diver and sea-duck have been displaced as much as between 2 to 4km from offshore wind farm areas, and this wider displacement effect is thought to be due to the bird's perceptual reaction to turbines or maintenance vessels.

Whilst it is considered that alternative foraging areas may be available to these species, the presence of such structures will create a net loss of foraging area and removal of food resource, depending on the means of securing the device to the seabed. There may also be a knock-on effect on adjacent bird populations arising from increased competition for prey species in adjacent areas. However, the installation of marine structures may also create new habitat that could potentially be colonised by benthic species and affect the availability of prey species in the vicinity of these structures.

Barriers to Movement

There is the potential that new marine structures may form a barrier to the usual migration and transit patterns of marine mammals and fish species, either because of collision risk, aversive reactions to operation noise or perceptions of marine structures and associated infrastructure. This is particularly relevant in constrained areas where loud noise sources may prevent transit, effectively trapping individuals.

Toxic Effects

There is potential that the leaching of toxic compounds, antifouling paints or leakage of hydraulic fluids, hydrocarbons, petro-carbons etc during construction, installation and operation of marine structures and devices could have an effect on water quality, habitats and both non mobile and mobile species. Adherence to best practise guidelines and codes or practice should ensure that this potential effect will be of negligible significance. It is not possible to make any realistic estimate of the geographical extent of this effect due to the large numbers of variables involved (quantities leaked, climatic factors etc).

Potentially more significant still are the potential effects from accidental leakage of cargoes or fuel carried by a vessel involved in a collision within the estuary. This impact is impossible to quantify due too the number of variables such as vessel cargo, risk of vessel collision, etc.

6.5 Detailed Appropriate Assessment of Significant expansion opportunities

The only location within the Shannon Estuary which is put forward for significant expansion and infrastructural development in the Vision is the deepwater Port of Foynes.

According to the Vision the Port of Foynes is the one facility on the Estuary most likely to experience significant change over the period of Vision 2041.

Port Estate Expansion

In order to accommodate projected tonnage throughput it has been estimated that some 127 hectares of additional lands will be required to facilitate port operations up to 2040 (high growth scenario). In addition to the existing 10 hectares of undeveloped land within the Port of Foynes, the Limerick County Development Plan has identified an additional 28 hectares of land for industrial use associated with the expansion of port activities thus leaving a requirement for an additional 89 hectares of suitability zoned land. Spatially the only logical expansion area is to the south east of the existing port. This area relates to Site D – Lands to the rear of Foynes from the draft SIFP.

In addition to expanding activities at the Port of Foynes there is also an opportunity for remote operations at the 92 hectare State owned land bank at Askeaton Business Park. This area relates to Site E – Askeaton Business Park from the draft SIFP.

Additional Berthing Facilities

There will be a need for new berthing facilities in the medium term. SFPC acknowledge that operational and physical constraints exist in the inner port area requiring substantial investment to service parcel sizes ranging from 3,000 – 40,000 tonnes. Subject to capital appraisal, SFPC commits to invest in this facility over the short, medium and long term.

Providing Deep Water Berthage

The consultation phase of Vision 2041, highlighted that a Panamax capability should be provided as close as possible to existing customer facilities at Foynes. Following an initial preliminary assessment, Foynes Island has come to the fore as the preferred option from a navigational and capacity perspective. The Island traditionally facilitated port operations with an operational oil jetty until the late 1970's. With extensive access to natural deep water (occurring between 12.5m to 20m depths), the island provides immediate access to the main navigation channel of the Estuary with no capital or maintenance dredging required. This area relates to Site C – Foynes Island from the draft SIFP.

Each of these sites has been assessed for the potential effects on the qualifying interest features associated with the adjacent Natura 2000 sites. The AA tables contained in **Appendix 2** provides an assessment of the potential for impact based on the best available information on the qualifying interest features of the Natura 2000 sites. This assessment aims to inform the future development of these Sites in terms of what should be avoided, the survey required prior to any proposals and future assessments that will be required together with the detailed mitigation measures in order to ensure no significant effect and compliance with Article 6(3) of the Habitats Directive.

7 MITIGATION

7.1 Introduction

For the purposes of Article 6(3), an assessment does not, strictly speaking, need to look beyond the Plan or in this case the Vision proposed to address alternative solutions and mitigations measures however there are a range of benefits in doing so. In particular, an examination of possible **alternative solutions** and **mitigation measures** may make it possible to ascertain that, in light of such solutions or mitigation measures, the Vision will not adversely affect the integrity of the site. While the draft SIFP is not directly connected with or necessary for the management of the Natura 2000 sites located within the Shannon Estuary through its development and prioritisation of Strategic Sites and Areas of Opportunity which have the potential for the least environmental impact across a co-ordinated manner it is a key component in the management of this ecosystem. The Vision has taken on board the findings of the draft SIFP and its prioritisation of Strategic Sites in particular.

Mitigation measures are measures aimed at minimising or even cancelling the negative impact of a plan during or after its completion. Mitigation measures are an integral part of the specification of a plan. They must be proposed by the plan proponent and/or required by the competent national authorities. Mitigation measures should not be confused with compensatory measures which according to European guidance are *“Independent of the project, they are intended to compensate for the effects on a habitat affected negatively by the plan.”* “For example, general tree-planting to soften a landscape impact does not compensate for the destruction of a wooded habitat with quite specific characteristics such as Alluvial woodland.

Compensatory measures should be considered only after having precisely ascertained a negative impact on the integrity of a Natura 2000 site from any aspect of the proposed development. This will relate to the effect on the qualifying features for which the site is designated together with its conservation objectives. An effect which is permanent or long lasting should be regarded as an adverse effect. Proposing compensatory measures from the beginning could exempt from the need to respect beforehand the steps described in Article 6, in particular the study of alternatives and the comparative assessment of the interest of the plan in relation to the natural value of the site. Compensatory measures constitute the “last resort” and would involve applying the principles of IROPI.

It should be noted that the implementation of the Vision through the future development of key Strategic Sites may take some time to be realised however the time lapse should be used to obtain key baseline information which can feed into the site or project level assessments.

In the context of the Vision, mitigation measures are put forward to prevent, reduce and, as fully as possible, offset any predicted significant adverse effects on the environment through implementation of the Vision. They are formulated based on impact assessment results and enable integrating SEA and AA findings into the proposal. Mitigation measures can generally be hierarchically divided into those that:

- Avoid the identified potential effects – which generally entail removing objectives that have an impact on the environment
- Reduce the magnitude, extent, probability or severity of potential effects – which commonly entails re-wording of the objectives
- Offset effects after they have occurred – which entail devising positive measures to compensate for biodiversity impacts deriving from unavoidable actions (this is often the case in light of a statement of case for IROPI). This option is considered, to some extent, a remedial action

Four tiers of mitigation have been adopted in the appropriate assessment process and documented in this Natura Impact Report as follows;

- The inclusion of appropriate assessment criteria at the forefront of the site selection process through the SIFP process which utilised Preliminary Screening Tables and Multi Criteria Analysis to ensure sites with the highest risk of impact to Natura 2000 sites were scored accordingly in terms of the potential for impact. Vision 2041 has taken on board the findings of this process.
- Appropriate Assessment of the Strategic Sites as outlined in **Chapter 6 of the NIR** provides mitigation on the qualifying interest features specific to each Strategic Site which covers the locations under SFPC jurisdiction.
- Overarching mitigation measures arising from the appropriate assessment of the Vision in general as outlined in **Chapter 7 of the NIR**.
- General mitigation measures per sector as outlined in **Chapter 7 of the NIR**

This assessment aims to inform the future development in particular of Foynes Port as is outlined in the Vision, the Port of Foynes is the one facility on the Estuary most likely to experience significant change over the period of Vision 2041.

7.2 Over-Arching Mitigation (Recommendations from the AA to Feed into the Plan)

The Natura Impact Report has highlighted the more significant potential positive and negative environmental impacts from the implementation of the Vision. The following mitigation measures have been identified to reduce the negative impacts identified. It is recommended that the mitigation measures (as listed in **Table 7.1**) are adopted as part of the Vision. The mitigation measures are listed under each of the SEA topics and have been incorporated into

the SEA Environmental Report. It is recommended that the mitigation measures listed in this chapter are integrated into and adopted as part of the Vision. Detailed mitigation measures to those detailed within this chapter and integrated into the Vision are likely to be required at individual project level, e.g. through habitat and Species survey, Ecological Impact Assessment and Habitats Directive Assessments.

Due to the nature of the Vision there still remains a considerable amount of uncertainty as to the exact scale, type and location of development. However, by undertaken the appropriate assessment process it is hoped that the most significant effects can be eliminated. In the case of any remaining scientific uncertainty with regard to the effects of the Vision at project level or the related mitigation (or compensatory measures should they be deemed necessary under Article 6(4)), the measures should include a pre-defined and validated scheme to monitor the actual impacts and a framework to adapt the mitigation and compensation measures to the actual impacts once the project level details are brought forward.

Table 7.1 Mitigation Measures

Measure Number	Mitigation Measure
	Biodiversity Flora and Fauna
BFF 1	At a project level it is not sufficient to defer the production of construction method statements these should be completed at the project design stage and subject to Habitats Directive Assessment.
BFF 2	Requirements for consents and the design of project level mitigation should be covered in the overall assessment of the site.
BFF 3	Pre-construction surveys should be conducted by suitable qualified ecologists in areas of future development which require the loss of structures, tress or suitable feeding areas for nesting bird and bat species. Should any important species be found during the surveys the sequential approach of avoid, reduce or mitigate should be adopted to prevent significant effects.
BFF 4	A “No net loss” principle for habitats should be adopted for the Lower Shannon Estuary ecosystem.
	Water Related Mitigation Measures
W 1	To ensure the impacts from development/change in land use practices (including flood plain development) minimises interference with aquatic habitats, it is essential that those areas adjacent to the waterways (riparian buffer zones) are managed in a manner which will reduce impacts on these habitats. These should be drawn up in consultation with NPWS and IFI.
W 2	Consideration of issues that may result in increased nutrient loading into the water; increased human activity, traffic, lighting, disruption of hydrological regimes and disturbance in the immediate vicinity of an important bird feeding and roosting area will be necessary. Development that may result in significant negative impacts and disturbance for the internationally important number of Annex 1 bird species that

Measure Number	Mitigation Measure
	use the site will not be allowed.
W 3	Ongoing monitoring to assess the real environmental impact of any development on the water quality and fishery element of the estuarine ecosystem will be required at Project Level.
W 4	Development arising from this Vision will only take place where appropriate and sustainable waste water infrastructure is in place or can be up-graded to accommodate the scale of development which will secure the objectives of the Shannon River Basin Management Plan and the protection of Natura 2000 sites with water dependant habitats or species. This must be provided and be operational in advance of the commencement of any discharges from development. Waste water infrastructure must be capable of treating discharges to ensure that water quality in the receiving river (The main River Shannon and/or its tributaries) does not fall below legally required levels. Sustainable Urban Drainage Systems (SUDS) will be required for all developments discharging within or upstream from Natura 2000 sites with water dependant habitats or species.

7.3 General Mitigation Measures per Sector

7.3.1 General Mitigation Measures

A Habitat Directive Assessment will be required of any proposed developments coming forward for any of the Strategic Sites or locations within the Vision likely to have an impact on the Natura 2000 site network. The undertaking of an Appropriate Assessment and production of associated Natura Impact Report does not negate the requirement for Project Level Appropriate Assessment.

The Habitats Directive Assessment and mitigation will be informed by the strategic level assessment undertaken in the SIFP and will ensure that proposed development will not have an impact and take full account of the habitats and species identified within assessment.

These mitigation measures relate to the Potential for Likely Significant Effects from the implementation of the Vision objectives and development of Strategic Sites or locations as part of the Vision under each of the key sectors arising from the Vision and in the absence of site specific details in terms of exact spatial location and design.

7.3.1.1 Sector – Shipping and Navigation – Associated with a variety of developments and other sectors within the Shannon Estuary

It is the responsibility of the developer proposing any project or future development to ensure their activities do not cause an impact to the qualifying interest features of any Natura 2000 site or any protected habitat or species located within the vicinity of the proposal or through in-

direct effects in another location. Should any development at any of the strategic sites identified under the Marine Related Industry, Renewable Industry sector require; Dredging and/or Drilling, Pile Driving, Geophysical Acoustic Surveys or Blasting or the generation of any other anthropogenic noise the DAHG Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters should be adhered to.

Dredging – For all ports currently located within the Shannon Estuary it is a necessity to keep the shipping lands accessible therefore potential conflicts with the obligation to preserve the integrity of Natura 2000 sites exist. However, an absence of dredging would prevent the ports from functioning, with all the negative consequences this would entail. As a matter of principle, port access maintenance by means of dredging is therefore deemed as a service of general economic interest³. While maintenance dredging is an existing (albeit intermittent) activity associated with Marine Related Industry at present in the estuary it should be designed in a way that it does not adversely affect the integrity of the Natura 2000 sites or their conservation objectives. Existing dredge requirements should deal with dredged materials in an estuary-friendly way. Sediment placement strategies which look at the relocation of sediments in a part of the estuary where there is a lack of sediments should be investigated.

In terms of new requirements for dredging (i.e. Capital dredging) together with maintenance dredging associated with existing industries the development of innovative dredging concepts accompanied by strict monitoring scheme can contribute to achieving both navigation objectives and Natura 2000 conservation objectives. The use of sustainable dredging and sediment management schemes should be favoured within any dredging management plan for the estuary. These recurring maintenance activities necessary to facilitate port operations and navigational access could also be integrated into the conservation management plan for the estuary and designed in such a way that they are not detrimental to the conservation objectives of the site.

Dredging and disposal causes temporary increases in the level of suspended sediments in the water column which can give rise to increased turbidity, and the possible release of oxygen depleting substances (organic or anaerobic sediments), nutrients and contaminants.

The potential effects of these changes on marine life are:

- Temporary reduction of algal/plant growth due to increased turbidity.
- Disturbance to sensitive benthic animals and fish due to suspended sediments, which may cause temporary disruption of migration of fish.
- Temporary disturbance of marine animals from the depletion of oxygen due to release of organic-rich material.

³ Under Article 86(2) of the Treaty

- Nutrient enrichment possibly causing increased food supplies/algal blooms.
- Uptake of contaminants by marine life possibly causing direct toxic effects or effects further up the food chain.
- Smothering of benthic animals and plants due to resettlement of suspended sediments.

The suspension of sediments is inevitable, the extent depends on magnitude and frequency of dredging, background water quality, type of material, methods used, channel size and depth, hydrodynamics and the proximity of marine features and sensitive communities. The effects tend to be short term (<1 week after dredge activity) and near-field (<1km from activity). Dredging often generates no greater suspended sediments than natural events or other human activities.

- Depends on background water quality, and proximity of algae/plants.
- Depends on background water quality, proximity of sensitive species, sediment type and timing.
- Only when dredging sediments with high organic content or very anaerobic sediments.
- Depends on sediment and water quality.
- Depends on sediment quality (most dredged material not polluted, generally low level contaminants).
- Some smothering inevitable, depends on hydrodynamic conditions and proximity of sensitive species.

Changes in hydrodynamics and geomorphology at dredge and disposal sites are site specific and very difficult to isolate from other natural or man-induced causes (for example sea level rise or reclamation). Effects depend on the scale and frequency of dredge and disposal, and the local conditions at the dredge and disposal site (overall system size, hydrodynamics and sediment-transport processes). Adverse effects are more commonly associated with capital dredging.

The mitigation measures outlined in the following section per sector should be read in conjunction with the mitigation measures identified for the Strategic Sites. (See **Appendix 2.**)

Table 7.2 Shipping and Navigation Mitigation Measures

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Habitats & benthic fauna	Direct physical loss / damage to habitats	- Careful site selection within Strategic Sites avoiding sensitive features for construction and installation of structures associated with the Marine Related Industry. - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the Strategic Sites - Avoid installation during sensitive seasons
	Impacts at the dredge disposal site	
	Key process: Physical damage & (siltation & smothering)	- Consider alternative beneficial use options to reduce amounts of material disposed at sea.
	Toxic contamination	- Use approved dump site only subject to licencing and consents process and in accordance with Marine Institute and EPA guidelines
	Non-toxic contamination (suspended sediments, turbidity & organic/nutrient enrichment)	- The potential effects at the disposal site are minimised under the EPA licensing process.
	Potential impact: Disposal of dredged material at sea causes smothering of benthic communities at the disposal site and may cause disturbance and damage to adjacent subtidal and intertidal communities from increased suspended sediments (possibly containing contaminants, organic	

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	matter and nutrients) and smothering (see above). Disposal of dredged material may lead to the creation of new subtidal or intertidal habitat, either inadvertently (see below) or through planned sediment recharge schemes.	
	Indirect disturbance or loss of habitats	- Avoid construction or disturbance within 500m of areas of known sediment contamination - Habitat surveys to characterise the seabed and identify sensitive habitat and species
	Toxic effects	- Develop risk assessment and contingency planning - Implementation of SOPEP (Shipboard Oil and Pollution Emergency Plan) in line with MARPOL 73/78 on all vessels associated with the development of this theme. - Incorporation and up-dating of the equipment held and operations deployed by the Shannon Estuary Anti-Pollution Team to combat any potential incidents associated with the increase in vessel movements and potential for larger vessel movement within the estuary.
	Biological disturbance	- Careful site selection with the Strategic Sites to avoid sensitive features during dredging or shipping operations associated with docking, navigation or exiting areas. - Habitat surveys to characterise the seabed and identify sensitive habitat and species
Marine Mammals	Direct physical damage to mobile species	- Detailed surveys would be required to examine the marine mammal (primarily Bottlenose Dolphin) distribution and use around, and within, the Strategic Sites together with the primary shipping lane if not already known or insufficient research exists for the area in order to fully understand and mitigate for this risk of increased shipping in terms of

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		numbers or size. - Avoid sites for sensitive species - Avoid installation during sensitive seasons - Design facilities for minimal impact - Avoid siting structures and associated infrastructure required for docking or associated with navigational devices in sensitive areas such as feeding and breeding areas - Enforce speed limits for vessels used in construction and establish a code of conduct to avoid disturbance to marine mammals during research associated with the investigations for the potential development of Marine Related Industrial sites (construction and Operation) together with any long term decommissioning activities. This code of conduct should also apply to vessels in transit to construction area if entering areas of high abundance - Use of protective netting or grids - Seasonal restrictions on certain operations which are deemed detrimental to avoid impacting on marine mammals at vulnerable times of the year - Any new structures within the marine environment should not present a barrier effect to the free passage of marine mammals within the estuary. - Relative abundance, or use of the site, by marine mammals in the Shannon Estuary should not be significantly modified by the operation of any marine related industry - Sub-surface noise generated by any shipping activity should not cause a level of disturbance to marine mammals sufficient to displace them from areas important for foraging and social activities.
	Indirect disturbance or loss of species	- Minimise the use of high noise emission activities such as impact pilling and blasting associated with shipping/navigation activities - Avoid installation during sensitive periods - Soft starting pilling activities / passive acoustic deterrents –

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		gradually increasing noise produced do allow mammals to move away from activities - Use of mammal observers and passive acoustic monitoring to facilitate implementation of exclusion area during noisy activities - Adherence to the risk assessment and menu of management options outlined in the NPWS Draft Guidance to manage the risk to Marine Mammals from Man-Made Sound Sources in Irish Waters⁴
Fish and Freshwater	Direct physical damage to	- Design structures and installation of infrastructure associated with shipping and navigation for minimal impact - Do not site structures in particularly sensitive sites e.g. migratory routes feeding and breeding areas
Birds	Direct physical damage to mobile species	- Avoid siting the structures within sensitive sites - Avoid installation during sensitive seasons (i.e. breeding and moulting) - Site specific surveys at project level to identify the presence of key foraging hotspots and / or resting areas and to aid site selection for any structures associated with shipping and navigation - Appropriate siting of developments e.g. away from breeding colonies, important feeding and roosting areas, near shore areas and migration corridors - No construction between resting and foraging areas - Avoiding large-scale continuous illuminations
	Indirect disturbance or loss of species	- Minimise the use of high noise emission activities such as impact piling or blasting - Avoid installation during sensitive periods - Review and consideration of noise reduction techniques (e.g. bubble curtains around the pile)

⁴ http://www.npws.ie/media/npwsie/content/files/Guidance_Consultation%20Draft.pdf

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		- Use of sound insulation on plant equipment and device design.
Benthic Fauna	Direct physical damage to mobile species (Extraction through dredging causes the removal of benthic fauna at the dredge site)	- Consider timing of dredge to avoid sensitive periods for benthic communities
Water Quality	Physical damage (siltation) Non-toxic contamination (suspended sediments, turbidity & organic/nutrient enrichment) Toxic contamination The potential effects of these changes on marine life are: Temporary reduction of algal/plant growth due to increased turbidity. Disturbance to sensitive benthic animals and fish due to suspended sediments, which may cause temporary disruption of	Select appropriate dredger to minimise resuspension of sediments. Consider timing to dredge and disposal at most favourable points in the tidal cycle to limit extent of effects. Use silt curtains where practicable. Consider timing of dredging to avoid sensitive periods for marine animals.

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	migration of fish. Temporary disturbance of marine animals from the depletion of oxygen due to release of organic-rich material. Nutrient enrichment possibly causing increased food supplies/algal blooms. Uptake of contaminants by marine life possibly causing direct toxic effects or effects further up the food chain. Smothering of benthic animals and plants due to resettlement of suspended sediments.	
	Changes in hydrodynamics and geomorphology at dredge & disposal sites. Changes to physical regime (bathymetry, tidal flows, currents, waves & sediment transport) Erosion & accretion	Consider site capacity for sediment containment or dispersal when selecting a disposal site. Consider the disposal of sediments within the system where it is the best practical environmental option. Consider and undertake where possible beneficial use schemes for habitat creation/restoration in consultation with NPWS, IFI, EPA and Marine Institute.

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	Potential impact: Alteration of bathymetry, tidal currents and sediment-transport processes in the dredge and disposal areas, may cause the alteration of erosion and sedimentation patterns in adjacent areas, which may result in erosion, or creation of intertidal and subtidal habitat.	

7.3.1.2 Sector – Marine Related Industry

It is the responsibility of the developer proposing the project to ensure their activities do not cause an impact to the qualifying interest features of any Natura 2000 site or any protected habitat or species located within the vicinity of the proposal or through in-direct effects in another location. Should any development realised as part of the Vision require; Dredging and/or Drilling, Pile Driving, Geophysical Acoustic Surveys or Blasting or the generation of any other anthropogenic noise the DAHG Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters should be adhered to.

Dredging – For all ports currently located within the Shannon Estuary it is a necessity to keep the shipping lands accessible therefore potential conflicts with the obligation to preserve the integrity of Natura 2000 sites exist. However, an absence of dredging would prevent the ports from functioning, with all the negative consequences this would entail. As a matter of principle, port access maintenance by means of dredging is therefore deemed as a service of general economic interest⁵. While maintenance dredging is an existing (albeit intermittent) activity associated with Marine Related Industry at present in the estuary it should be designed in a way that it does not adversely affect the integrity of the Natura 2000 sites or their conservation objectives. Existing dredge requirements should deal with dredged materials in an estuary-friendly way. Sediment placement strategies which look at the relocation of sediments in a part of the estuary where there is a lack of sediments should be investigated. The removal of

⁵ Under Article 86(2) of the Treaty

benthic animals is unavoidable, however the communities within regularly dredged channels are likely to be degraded and there is relatively rapid recovery.

In terms of new requirements for dredging (i.e. Capital dredging) together with maintenance dredging associated with existing industries the development of innovative dredging concepts accompanied by strict monitoring scheme can contribute to achieving both navigation objectives and Natura 2000 conservation objectives. The use of sustainable dredging and sediment management schemes should be favoured within any dredging management plan for the estuary. These recurring maintenance activities necessary to facilitate port operations and navigational access could also be integrated into the conservation management plan for the estuary and designed in such a way that they are not detrimental to the conservation objectives of the site.

Dredging and disposal causes temporary increases in the level of suspended sediments in the water column which can give rise to increased turbidity, and the possible release of oxygen depleting substances (organic or anaerobic sediments), nutrients and contaminants.

The potential effects of these changes on marine life are:

- Temporary reduction of algal/plant growth due to increased turbidity.
- Disturbance to sensitive benthic animals and fish due suspended sediments, which may cause temporary disruption of migration of fish.
- Temporary disturbance of marine animals from the depletion of oxygen due to release of organic-rich material.
- Nutrient enrichment possibly causing increased food supplies/algal blooms.
- Uptake of contaminants by marine life possibly causing direct toxic effects or effects further up the food chain.
- Smothering of benthic animals and plants due to resettlement of suspended sediments.

The suspension of sediments is inevitable, the extent depends on magnitude and frequency of dredging, background water quality, type of material, methods used, channel size and depth, hydrodynamics and the proximity of marine features and sensitive communities. The effects tend to be short term (<1 week after dredge activity) and near-field (<1km from activity). Dredging often generates no greater suspended sediments than natural events or other human activities.

Depends on background water quality, and proximity of algae/plants.

- Depends on background water quality, proximity of sensitive species, sediment type and timing.
- Only when dredging sediments with high organic content or very anaerobic sediments.
- Depends on sediment and water quality.

- Depends on sediment quality (most dredged material not polluted, generally low level contaminants).
- Some smothering inevitable, depends on hydrodynamic conditions and proximity of sensitive species.

Changes in hydrodynamics and geomorphology at dredge and disposal sites are site specific and very difficult to isolate from other natural or man-induced causes (for example sea level rise or reclamation). Effects depend on the scale and frequency of dredge and disposal, and the local conditions at the dredge and disposal site (overall system size, hydrodynamics and sediment-transport processes). Adverse effects are more commonly associated with capital dredging.

The detailed project level mitigations outlined below should then be applied. The mitigation measures outlined in the following section per sector should be read in conjunction with the mitigation measures identified for the Strategic Sites tables.

Table 7.3 Marine Related Industry Mitigation Measures

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Habitats & benthic fauna	Direct physical loss / damage to habitats Impacts at the dredge disposal site Key Physical process: (siltation smothering) damage & Toxic contamination	- Careful site selection within strategic sites avoiding sensitive features for construction and installation of structures associated with the Marine Related Industry identified for the strategic site within the Shannon Estuary - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the strategic site - Avoid installation during sensitive seasons

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	Non-toxic contamination (suspended sediments, turbidity & organic/nutrient enrichment) Potential impact: Disposal of dredged material at sea causes smothering of benthic communities at the disposal site and may cause disturbance and damage to adjacent subtidal and intertidal communities from increased suspended sediments (possibly containing contaminants, organic matter and nutrients) and smothering (see above). Disposal of dredged material may lead to the creation of new subtidal or intertidal habitat, either inadvertently (see below) or through planned sediment recharge schemes.	- Consider alternative beneficial use options to reduce amounts of material disposed at sea. For this sector re-use should initially be considered on the local scale. - Use approved dump site only when no other beneficial re-use option is available and once an alternative options report has been completed. - The potential effects at the disposal site are minimised under the EPA licensing process.
	Indirect disturbance or loss of habitats	- Avoid construction or disturbance within 500m of areas of known sediment contamination - Habitat surveys to characterise the seabed and identify sensitive habitat and species
	Toxic effects	- Design structures within the marine environment and associated land based elements to minimise risk of leakage of pollutants - Develop risk assessment and contingency planning - Implementation of SOPEP (Shipboard Oil and Pollution Energy Plan) in line with MARPOL 73/78 on all vessels

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		associated with the development of this sector. - Incorporation and up-dating of the equipment held and operations deployed by the Shannon Estuary Anti-Pollution Team to combat any potential incidents associated with the investigation, research, construction, operation and decommissioning associated with the development of a Marine Related Industry site in the Shannon Estuary.
	Biological disturbance	- Careful site selection with the strategic site to avoid sensitive features. - Habitat surveys to characterise the seabed and identify sensitive habitat and species
Marine Mammals	Direct physical damage to mobile species	- Detailed surveys would be required to examine the marine mammal (primarily Bottlenose Dolphin) distribution and use around, and within, the strategic site if not already known or insufficient research exists for the area in order to fully understand and mitigate for this risk - Avoid sites for sensitive species - Avoid installation during sensitive seasons - Design facilities for minimal impact - Avoid siting structures and associated infrastructure in sensitive areas such as feeding and breeding areas - Enforce speed limits for vessels used in construction and establish a code of conduct to avoid disturbance to marine mammals during research associated with the investigations for the potential development of Marine Related Industrial sites (construction and Operation) together with any long term decommissioning activities. This code of conduct should also apply to vessels in transit to construction area if entering areas of high abundance - Use of protective netting or grids - Seasonal restrictions on certain operations which are deemed detrimental to avoid impacting on marine mammals at vulnerable times of the year - Any new structures within the marine environment should not present a barrier effect to the free passage of marine mammals within the estuary. - Relative abundance, or use of the site, by marine mammals

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		in the Shannon Estuary should not be significantly modified by the operation of any marine related industry - Sub-surface noise generated by any marine related industry should not cause a level of disturbance to marine mammals sufficient to displace them from areas important for foraging and social activities.
	Indirect disturbance or loss of species	- Minimise the use of high noise emission activities such as impact piling and blasting - Avoid installation during sensitive periods - Soft starting piling activities / passive acoustic deterrents – gradually increasing noise produce do allow mammals to move away from activities - Use of mammal observers and passive acoustic monitoring to facilitate implementation of exclusion area during noisy activities - Adherence to the risk assessment and menu of management options outlined in the NPWS Draft Guidance to manage the risk to Marine Mammals from Man-Made Sound Sources in Irish Waters⁶ - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary which can be used across all sectors.
Fish and Freshwater	Direct physical damage to	- Design structures and installation of infrastructure for minimal impact - Do not site structures in particularly sensitive sites e.g. migratory routes feeding and breeding areas
Otters	Direct physical loss / damage to habitats	- Detailed otter surveys would be required in order to fully understand and mitigate for this risk - Avoid sensitive habitat areas

⁶ http://www.npws.ie/media/npwsie/content/files/Guidance_Consultation%20Draft.pdf

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	Direct physical damage to mobile species	- Detailed otter surveys would be required in order to fully understand and mitigate for this risk - Avoid installation during the sensitive seasons - Use of protective netting or grids
	Indirect disturbance or loss of habitats	- Avoid construction in sensitive areas such as feeding and breeding areas - Minimise the use of high noise emission activities such as impact piling and blasting - Enforce speed limits for vessels used in construction and establish a code of conduct to avoid disturbance to otters both during construction activities and in transit to construction area if entering areas of high abundance - Avoid installation during sensitive periods - Use of sound installation on equipment - Soft starting piling activities / passive acoustic deterrents – gradually increasing noise produce do allow otters to move away from activities
	Toxic effects	- Design construction and operation to minimise risk of leakage of pollutants - Risk assessment and contingency planning - Implementation of SOPEP (Shipboard Oil and Pollution Energy Plan) for all ships associated with the proposed industry as per MARPOL 73/78
Bats	Direct physical damage to mobile species	- Avoid siting the sections of industry within sensitive areas known to contain feeding or roosting areas for bats. - Site specific surveys at project level to identify the presence of key commuting/foraging flightlines to aid site selection - Appropriate siting of developments e.g. away from roost sites and commuting/foraging flightlines - Avoiding large-scale continuous illuminations and only use

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		appropriate sensitive lighting suitable for bats
	Indirect disturbance or loss of species	- Avoid installation during sensitive periods
Birds	Direct physical damage to mobile species	- Avoid siting the structures within sensitive sites - Avoid installation during sensitive seasons (i.e. breeding and moulting) - Site specific surveys at project level to identify the presence of key foraging hotspots and / or resting areas and to aid site selection within the strategic site - Appropriate siting of developments e.g. away from breeding colonies, important feeding and roosting areas, near shore areas and migration corridors - No construction between resting and foraging areas - Avoiding large-scale continuous illuminations
	Indirect disturbance or loss of species	- Minimise the use of high noise emission activities such as impact piling or blasting - Avoid installation during sensitive periods - Review and consideration of noise reduction techniques (e.g. bubble curtains around the pile) - Use of sound insulation on plant equipment and device design.
Benthic Fauna	Direct physical damage to mobile species (Extraction through dredging causes the removal of benthic fauna at the dredge site)	- Consider timing of dredge to avoid sensitive periods for benthic communities
Water	Physical damage	Select appropriate dredger to minimise resuspension of

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Quality	(siltation) Non-toxic contamination (suspended sediments, turbidity & organic/nutrient enrichment) Toxic contamination The potential effects of these changes on marine life are: Temporary reduction of algal/plant growth due to increased turbidity. Disturbance to sensitive benthic animals and fish due to suspended sediments, which may cause temporary disruption of migration of fish. Temporary disturbance of marine animals from the depletion of oxygen due to release of organic-rich material. Nutrient enrichment possibly causing increased food	sediments. Consider timing to dredge and disposal at most favourable points in the tidal cycle to limit extent of effects. Use silt curtains where practicable. Consider timing of dredging to avoid sensitive periods for marine animals.

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	supplies/algal blooms. Uptake of contaminants by marine life possibly causing direct toxic effects or effects further up the food chain. Smothering of benthic animals and plants due to resettlement of suspended sediments.	
	Changes in hydrodynamics and geomorphology at dredge & disposal sites. Changes to physical regime (bathymetry, tidal flows, currents, waves & sediment transport) Erosion & accretion Potential impact: Alteration of bathymetry, tidal currents and sediment-transport processes in the dredge and disposal areas, may cause the alteration of erosion and sedimentation patterns in adjacent areas, which may result in erosion, or creation of intertidal and subtidal habitat.	Consider site capacity for sediment containment or dispersal when selecting a disposal site. Consider the disposal of sediments within the system where it is the best practical environmental option. Consider and undertake where possible beneficial use schemes for habitat creation/restoration in consultation with NPWS, IFI, EPA and Marine Institute.

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures

7.3.1.3 Sector – Archaeology and Cultural Heritage

It is the responsibility of the developer proposing the project to ensure their activities do not cause an impact to the rich and diverse archaeology and cultural heritage of the Shannon Estuary and its environs as identified through the dedicated desk based assessments undertaken as part of the SIFP process. It is also their responsibilities to ensure when carrying out pre-construction archaeological associated surveys or excavations do not cause an impact to the qualifying interest features of any Natura 2000 site or any protected habitat or species located within the vicinity of the proposal or through in-direct effects in another location. The strategy within the SIFP is to have due regard for archaeological concerns in assessing all development proposals that could potentially impact on historic and archaeological interest and seek appropriate mitigation measures as required, in accordance with the advice and recommendations of The National Monuments Service and other relevant statutory agencies.

Table 7.4 Archaeology and Cultural Heritage Mitigation Measures

Potential Effects	Potential activities associated with development at sites and objectives	Suggested Project Level Mitigation Measures
Direct effects on habitats or non-mobile species Direct loss of/damage to habitats: Physical damage to or removal/loss/reduction of habitats or removal/loss of non-mobile species due to direct removal or probing associated with site investigations and archaeological investigations which may precede developments Scouring: There may also be	Hydrographic Surveys Marine Geophysical Surveys Benthic investigations	Avoid carrying out surveys during sensitive seasons such as migration periods for fish. Undertake at least Appropriate Assessment Screening for any hydrographic, Geophysical surveys, excavations etc associated with Archaeological investigations and excavations.

Potential Effects	Potential activities associated with sector, development at strategic sites and associated objectives	Suggested Project Level Mitigation Measures
direct effects resulting from scouring, erosion and other sedimentation changes caused by hydrodynamic changes. Non-physical disturbance: Noise and Visual, People, machinery, etc.	Archaeological excavations Vessel movement during investigations	
Direct effects on mobile species Collision Risk (below surface): Physical damage to mobile species, e.g. injury to fish or marine mammals caused by direct contact (collision) with devices, collision with blades/devices, underwater pressure waves during survey or operation or vessel movement at all stages.	Hydrographic surveys Marine Geophysical surveys Increased vessel activity	Avoid sites for sensitive species Avoid carrying out surveys during sensitive seasons Enforce speed limits for vessels used in surveys and associated excavations and establish a code of conduct to avoid disturbance to marine mammals during research associated with the investigations. This code of conduct should also apply to vessels in transit to construction area if entering areas of high

Potential Effects	Potential activities associated with sector, development at strategic sites and associated objectives	Suggested Project Level Mitigation Measures
		abundance. Use of protective netting or grids Seasonal restrictions on certain operations which are deemed detrimental to avoid impacting on marine mammals at vulnerable times of the year Sub-surface noise generated by any survey work or site investigations should not cause a level of disturbance to marine mammals sufficient to displace them from areas important for foraging and social activities.
Indirect effects of habitats and non mobile species Smothering: effects of sediment disturbance, suspension and resettlement on species /habitats sensitive to smothering.	Hydrographic Surveys Marine Geophysical Surveys	Avoid surveying during sensitive periods Adherence to the risk assessment and menu of management options outlined in the NPWS Draft Guidance to manage the risk to Marine

Potential Effects	Potential activities associated with sector, development at strategic sites and associated objectives	Suggested Project Level Mitigation Measures
Changes in suspended sediment levels and turbidity and the effects of this on water quality and sensitive habitats and species.	Benthic investigations Archaeological excavations Vessel movement during investigations	Mammals from Man-Made Sound Sources in Irish Waters⁷ Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary which can be used across all sectors.
Indirect effects on mobile species Habitat disturbance: disturbance of mobile species, in particular seabirds and marine mammals through vessels movement and the use of certain survey equipment. Noise (Operational): effects of noise generated by operational devices on marine mammals, birds and fish.	Hydrographic Surveys Marine Geophysical Surveys Benthic investigations Archaeological excavations	Adherence to the risk assessment and menu of management options outlined in the NPWS Draft Guidance to manage the risk to Marine Mammals from Man-Made Sound Sources in Irish Waters⁸ Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary which can be used across all sectors.

⁷ http://www.npws.ie/media/npwsie/content/files/Guidance_Consultation%20Draft.pdf

⁸ http://www.npws.ie/media/npwsie/content/files/Guidance_Consultation%20Draft.pdf

Potential Effects	Potential activities associated with sector, development at strategic sites and associated objectives	Suggested Project Level Mitigation Measures
Habitat exclusion: Physical presence of vessels and survey equipment leading to long term exclusion from foraging, loafing (birds) and breeding habitats and also exclusion of migration routes. Barrier effects: restricted transit between feeding and breeding are and along migratory routes due to “barriers” created by physical presence of vessels and survey equipment	Operation of underwater and surface survey devices Lights on devices	
Toxic effects Toxic effects on marine species caused by release of contaminants directly or from indirect disturbance of sediments due to underwater investigations, scouring, archaeological excavation.	Introduction of oil, hydraulic fluid, anti-fouling chemicals, or other substances from devices or vessels. Mobilisation of sediments resulting in release of toxins during investigations and surveys.	Ensure strict adherence to the construction method statement which should take into consideration archaeological excavations and also be covered by the associated Habitats Directive Assessment.
Non-toxic effects (see increased suspended sediment levels and turbidity) Non-toxic effects/disturbance	Hydrographic Surveys Marine Geophysical Surveys	Adherence to the risk assessment and menu of management options outlined in the NPWS Draft Guidance to manage the risk to Marine Mammals from Man-

Potential Effects	Potential activities associated with sector, development at strategic sites and associated objectives	Suggested Project Level Mitigation Measures
caused by mobilisation of sediments, e.g. increases in turbidity causing disturbance or loss of feeding opportunities for marine pelagic species (fish and mammals) or birds.	Benthic investigations Archaeological excavations Vessel movement during investigations	Made Sound Sources in Irish Waters ⁹ Ensure strict adherence to the construction method statement which should take into consideration archaeological excavations and also be covered by the associated Habitats Directive Assessment
Biological disturbance Introduction of invasive, alien or no-native species carried by vessels, etc.	Introduction of vessels and equipment to the estuary which have originated in other waters containing invasive and alien species.	Ensure bio-security measures are adhered to.

Project Level mitigation measures outlined in **Tables 7.1 – 7.4** are only applicable following the completion of baseline data collection and gap filling within the estuary and once a detailed Environmental Impact Assessment and associated Appropriate Assessment at the Project Level has taken place taking into account the design specifics related to the specific associated project. The detailed project level mitigations outlined below should then be applied. The mitigation measures outlined within these tables per sector should be read in conjunction with the mitigation measures identified for the Strategic Sites as outlined in **Appendix 2**.

⁹ http://www.npws.ie/media/npwsie/content/files/Guidance_Consultation%20Draft.pdf

8 MONITORING

Monitoring as part of the Vision should focus on key data gaps or recommendations which have been identified through the SEA and HDA process or aspects of the environment that are likely to be significantly impacted by the Plan. The following provides a list of recommendations in terms of monitoring which should be considered for inclusion in the Vision and commenced in order to close out ambiguity or remove uncertainty in terms of potential for impact at a project level. These proposals have arising from the assessment of the strategic locations proposed for future development together with the outputs from the limited but dedicated field work which has taken place to date as part of the SIFP process and for which SFPC have been a project partner.

- As per the findings of the Static Acoustic Monitoring undertaken by the Shannon Dolphin and Wildlife Foundation it is recommended that this is continued at Foynes Port and Foynes Island as a very cost-effective means of determining the long-term use of these sites.
- A short survey for the presence of *Salicornia* should be undertaken on Foynes Island to assess the potential presence of this species/habitat.
- Spot bird counts should be undertaken to the north west of Foynes Island throughout the year to establish if suitable foraging habitat is present/absent or whether birds are in fact utilising this part of the Island. This would eliminate or reduce any uncertainty in terms of potential impacts.

The list of biodiversity datasets from the EPA *Integrated Biodiversity Impact Assessment Streamlining AA, SEA and EIA Processes – Best Practise Guidance, 2012* has been used to inform the **Table 8.1** and the source of monitoring data. This report and its Appendix of datasets should also be used to inform the project level assessment.

Table 8.1 Environmental Monitoring Programme

Target	Indicator	Data Availability, Source and Frequency
BFF: Halt spread of Alien and Invasive Species and their associated impact to the aquatic environment. Ensure future development by SFPC within the Shannon Estuary does not facilitate the introduction of new species or assist the spread of existing species such as <i>Spartina</i> .	Geographical spread of Alien and Invasive Species in the Lower Shannon Estuary	National Invasive Species Database from Invasive Species Ireland. Compilation is ongoing. Monitoring information from IFI and NPWS (Infrequent) Irish Didemnum Species Database (NBDC). Irish Wire Weed Database (Irish Seaweed Centre; Stefan Kraan). National Invasive Species Database (NBDC).
BFF: Halt deterioration of habitats or their associated species due to future expansion of existing facilities under the jurisdiction of SFPC and the development of new sites.	<u>Interim Indicator:</u> Publication of habitat and species specific conservation management plans and monitoring information which provide a percentage of unique habitat and species lost in designated sites.	Threat response plan for Vesper Bats Threat response plan for Otters Conservation Plan for Irish Cetaceans Cetacean sighting (IWDG, SDWF & NPWS) ongoing National Bat Database (Bat Conservation Ireland) Atlas of breeding birds in Ireland (Birdwatch Ireland) Biodiversity Records from Ireland (NBDC) Regular up-dates Saltmarsh Monitoring Information (NPWS) Any on going targeted monitoring implemented by SFPC.
	<u>Long Term Indicator:</u> Status of EU Protected Habitats and Species.	The Status of EU Protected Habitats and Species in Ireland report. NPWS. Published every 6 years – next up-date due in 2013.
	<u>Long Term Indicator:</u> Condition of Selection Features in sites designated for nature conservation (SACs, SPAs, Ramsar and NHAs).	Detailed Conservation Objectives for the Lower River Shannon SAC and the River Shannon and Fergus Estuary SPA as release in September 2012.
	<u>Long Term Indicator:</u> Condition of qualifying interest features of Natura 2000 sites as per conservation objectives and targets.	Adherence to detailed Conservation Objectives for the Lower Shannon SAC and SPA (September 2012). Awaiting Conservation Management Plan.
BFF: Protect and enhance Natura 2000 sites (SACs & SPAs) under Article 6 of the Habitats Directive. To avoid significant adverse impacts, including direct, cumulative and indirect impacts, to relevant habitats or species by developing within or adjacent to these sites.	<u>Medium to Long Term Indicator:</u> Percentage of unique habitat and species lost in designated sites through the survey reports.	Finding of no significant impact through HDA process in consultation with NPWS
BFF: No loss of protected habitats and species during the lifetime of the Vision. Submission of HDA for proposed developments with planning applications in and/or near Natura 2000 sites.	Provision/No. of HDAs with developments proposed for sites in &/or near Natura 2000 sites	Finding of no significant impact through HDA process in consultation with NPWS.
BFF: In order to supplement biodiversity data gaps additional data gathering to be subsequently used during the Vision review or at project level should be undertaken.	Increase in availability of baseline biodiversity data on the Lower Shannon Estuary.	Establish regular monitoring programmes as part of the Vision.

BFF- Biodiversity, Flora, Fauna

8.1 SUMMARY OF MONITORING AND MITIGATION

The Strategic Environmental Assessment and Habitats Directive Assessment carried out on the draft Vision has ensured that any potential significant environmental impacts have been identified and given due consideration, and taken into account in the development of the Vision. The proposed monitoring programme should be carried out as implementation of the Vision progresses and, depending on monitoring results, adjustments to targets and indicators may be made to ensure the continued effectiveness of the monitoring programme in the interest of optimal environmental protection.

9 CONCLUSIONS

ESPO checklist on good practise for balancing Natura 2000 with port and waterway development and operations (December 2009). (Source; EC Guidance on the implementation of the EU nature legislation in estuaries and coastal zones)¹⁰

Maintenance and Capital Dredging

Checklist Item	Action under SFPC Maintenance Dredging Application
A maintenance dredging strategy has been set up taking into account hydro-morphological and ecological aspects.	SFPC are currently in the process of signing up to ECOPORTS www.ecoports.com which will involve the development of an Environmental Management System (EMS) for both Limerick Dock and Foynes Port. It will also allow for the exchange of experiences and the implementation of good practise in respect of port-related environmental issues across Europe. By developing this EMS it also meets with recommendations outlined in the EC Guidance on the implementation of the EU nature legislation in estuaries and coastal zones
Based on latest information and a feedback-process involving all relevant stakeholders, dredging activities are – in compliance with economical and legal requirements – aiming to achieve the least impact on Natura 2000 conservation objectives possible.	By carrying out this Appropriate Assessment SFPC are aiming to achieve the least impact on Natura 2000 conservation objectives through the identification of all appropriate mitigation measures.
A sustainable maintenance dredging strategy or scheme is part of an integral management plan. Based on general principles in compliance with conservation objectives, dredging is flexible according to the requirements of a dynamic tidally influenced estuarine, river or coastal system.	SFPC will be bound by the conditions set upon them by the EPA in their dumping at sea permit. This will ensure a sustainable maintenance/or capital dredging strategy is adopted. The EPA will consult with all statutory parties including the NPWS and IFI prior to consent and therefore this will ensure the general principles are in compliance with conservation objectives. A key recommendation of the SIFP is for the development of a dredging management plan for the Shannon Estuary which all stakeholders can feed into. SFPC will assist and support the development of such a plan.
Dredging activities have been optimized according to the following order:	SFPC will ensure dredging operations are optimized in line with the ESPO checklist provided here.
- Technical feasibility - Availability of dredgers	

¹⁰ http://ec.europa.eu/environment/nature/natura2000/management/docs/guidance_doc.pdf

-
- Safety, nautical requirements, navigability
 - Legally binding ecological requirements (BHD, WFD etc.)
 - Administrative regulations (e.g. management plans, site specific objectives)
 - Full integration of long-term comprehensive hydro morphologic, sediment related and ecological criteria
 - Short-term and/or local criteria
 - Cost-effectiveness
 - Other non-binding aspects such as agreements with stakeholders

Natura 2000 site management and maintenance measures

The aim should be to meet feasible conservation objectives for sites in balance with long term ports and waterways development.

SFPC by undertaking this Habitats Directive Assessment aim to meet the conservation objectives of the sites in which their ports are located in order to work in harmony with the designations and their qualifying interest features. They have also played a key role in the development of the Strategic Integrated Framework Plan for the estuary for which both an SEA and HDA have been undertaken.

Port and waterways authorities should be actively involved in the setting up of management plans from the start.

SFPC are currently in the process of signing up to ECOPORTS www.ecoports.com which will involve the development of an Environmental Management System (EMS) for both Limerick Dock and Foynes Port. It will also allow for the exchange of experiences and the implementation of good practise in respect of port-related environmental issues across Europe. By developing this EMS it also meets with recommendations outlined in the EC Guidance on the implementation of the EU nature legislation in estuaries and coastal zones

In dealing with uncertainties (ecosystem knowledge, cause-effect relationships), research and monitoring schemes should be included as part of the management plan.

As part of this HDA key mitigation measures have been identified to ensure uncertainties in terms of impacts to qualifying interests are monitored during the course of the dredging operations.

Following the implementation of the mitigation described in this Appropriate Assessment, it is expected that the proposed Vision will avoid significant negative impacts to key sensitive receptors and qualifying features of the SAC and SPA both along and in-combination with the other elements identified in this report. It is recommended that, following approval of this Appropriate Assessment, the mitigation measures detailed herein are developed further with National Parks and Wildlife Service

and Inland Fisheries Ireland and that finalised measures are included in the contract documents for the proposed scheme.

There should therefore be no requirement for Stage 3 (*Assessment of Alternative Solutions*) and 4 (*Assessment Where Adverse Impacts Remain*), of the appropriate assessment process.

REFERENCES

Construction Industry Research and Information Association. Good practice guidelines on the control of water pollution from construction sites (C532)

Council Directive 79/409 EEC on the Conservation of Wild Birds

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora

Department of the Environment, Heritage and Local Government (2009). Appropriate Assessment of Plans and Projects in Ireland, Guide for Planning Authorities, Dublin.

European Commission (2000a) Communication from the Commission on the Precautionary Principle, Office for Official Publications of the European Communities, Luxembourg.

European Commission (2000b) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg.

European Commission (2001) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg.

European Commission (2008) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission, Office for Official Publications of the European Communities, Luxembourg.

European Communities (Natural Habitats) Regulations (S.I. No. 94 of 1997)

Shannon International River Basin District Project (2008) Review of Best Practice Measures to Address Morphology Pressures, Limerick.

Guidance document on the implementation of the birds and habitats directive in estuaries and coastal zones with particular attention to port development and dredging.

Strategic Integrated Framework Plan for the Shannon Estuary (Draft Plan, Strategic Environmental Assessment and Natura Impact Report, draft December 2012 (www.shannonestuarysifp.ie))

APPENDIX A

Natura 2000 Qualifying Interest Features

Site Code	Site Name	Annex I Habitats	Annex II Species
SAC000432	Barrigone SAC	(6210) *Semi-natural dry grasslands and scrub facies on calcareous substrates <i>Festuco-Brometalia</i> (*important orchid sites) (8240) *Limestone pavement (5130) <i>Juniperus communis</i> formations on heaths or calcareous grassland	(1065) Marsh Fritillary <i>Euphydryas aurinia</i>
SAC002165	Lower River Shannon SAC	(1110) Sandbanks which are slightly covered by sea water all the time (1130) Estuaries (1140) Mudflats and sandflats not covered by seawater at low tide (1150) *Coastal lagoons (1160) Large shallow inlets and bays (1170) Reefs (1220) Perennial vegetation of stony banks (1230) Vegetated sea cliffs of the Atlantic and Baltic coasts (1310) <i>Salicornia</i> and other annuals colonizing mud and sand (1330) Atlantic salt meadows (<i>Glauco-Puccinellieralia maritimae</i>) (1410) Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (3260) Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation (6410) <i>Molinia</i> meadows on calcareous, peaty or clayey-silt laden soils (<i>Molinion caeruleae</i>)	(1029) Freshwater Pearl Mussel <i>Margaritifera margaritifera</i> (1095) Sea Lamprey <i>Petromyzon marinus</i> (1096) Brook Lamprey <i>Lampetra planeri</i> (1106) Atlantic Salmon <i>Salmo salar</i> (only in fresh water) Bottlenose Dolphin <i>Tursiops truncatus</i> (1349) Otter <i>Lutra lutra</i> (1355)

		(91EO)* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	
--	--	---	--

*indicates priority habitat as listed in Annex I of the Habitats Directive

Table A1.1 Qualifying Interests of Special Areas of Conservation

Site Code	Site Name	Qualifying Interests
SPA004077	River Shannon and River Fergus Estuaries SPA	A017 Cormorant <i>Phalacrocorax carbo</i> (Breeding and wintering) A038 Whooper Swan <i>Cygnus Cygnus</i> (Wintering) A046 Ligh-bellied Brent Goose <i>Branta Bernicla hrota</i> (Wintering) A048 Shelduck <i>Tadorna tadorna</i> (Wintering) A050 Wigeon <i>Anas penelope</i> (Wintering) A052 Teal <i>Anas crecca</i> (Wintering) A054 Pintail <i>Anas acuta</i> (Wintering) A056 Shoveler <i>Anas clypeata</i> (Wintering) A062 Scaup <i>Aythya marila</i> (Wintering) A137 Ringed Plover <i>Charadrius hiaticula</i> (Wintering) A140 Golden Plover <i>Pluvialis apricaria</i> (Wintering) A141 Grey Plover <i>Pluvialis squatarola</i> (Wintering) A142 Lapwing <i>Vanellus vanellus</i> (Wintering) A143 Knot <i>Calidris canutus</i> (Wintering) A149 Dunlin <i>Calidris alpina</i> (Wintering) A156 Black-tailed Godwit <i>Limosa limosa</i> (Wintering) A157 Bar-tailed godwit <i>Limosa lapponica</i> (Wintering) A160 Curlew <i>Numenius arquata</i> (Wintering) A162 Redshank <i>Tringa totanus</i> (Wintering) A164 Greenshank <i>Tringa nebularia</i> (Wintering) A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> (Wintering) A999 Wetlands and Waterbirds (As listed in the NPWS River Shannon and River Fergus Estuaries SPA004077 Conservation Objectives 17th September 2012)

Table A1.2 Qualifying Interests of Special Protection Areas

APPENDIX B

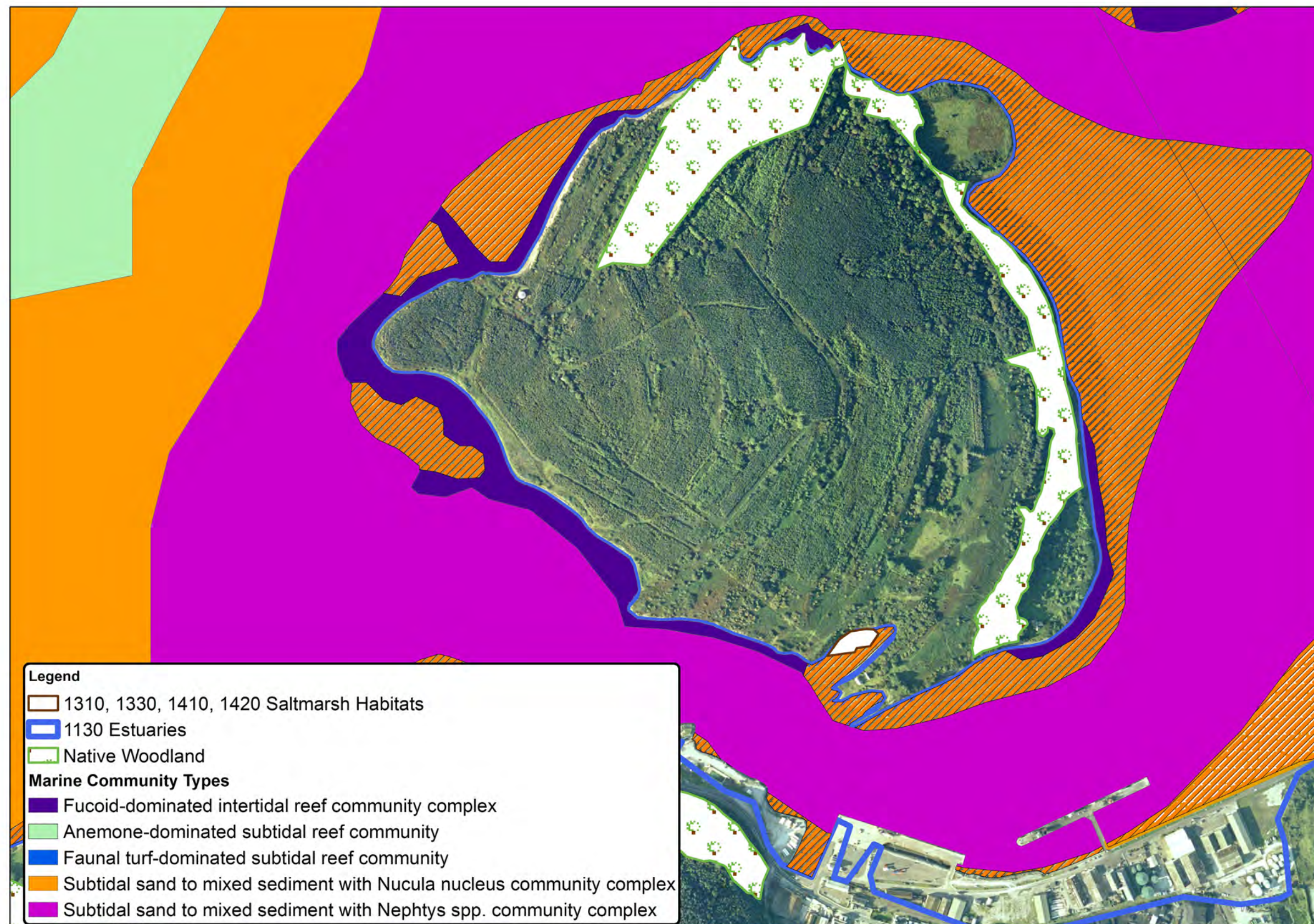
Detailed Appropriate Assessment of Strategic Sites

Marine Related Industry Appropriate Assessment of Alternatives which correspond to Strategic Sites from SIFP process

Please note these tables are best printed on A3 paper or viewed digitally. The associated constraints mapping are based on the best available GIS layers at the time of the assessment (November 2012)



Appendix 2 Figure 1.0 Foynes Island (Alternative 6, Strategic Site C), Co. Limerick.



Appendix 2 Figure 2.0 Qualifying features located within close proximity to site



Appendix 2 Figure 3.0 Subsite rating based on SIFP assessment of low tide survey locations within close proximity to site

Appendix 2 Table 1.0 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Foynes Island, Co.Limerick from draft SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon Theme/Strategic Site Marine Related Industry at Foynes Island	Estuaries Potential Impacts: Habitat present (Lower Shannon Estuary)	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Introduction of non synthetic & synthetic compounds - Removal of target & non-target species - Scouring - Smothering - Temporary increases in the level of suspended sediments in the water column - Changes in hydrodynamics and geomorphology at dredge and disposal sites	- Careful site selection within strategic sites avoiding sensitive features for construction and installation of structures associated with the Marine Related Industry identified for this site. - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the strategic site - Avoid installation during sensitive seasons - Consider alternative beneficial use options to reduce amounts of material disposed at sea. - Use approved dump site only - The potential effects at the disposal site are minimised under the EPA licensing process which should include an appropriate assessment. - The disturbance to the seabed during the construction phase of any project at this site may result in the removal of benthic species around the construction footprint of any future development. This action will not result in the permanent removal of species from the site and those areas not directly beneath for example a pile structure will recover in time (1-2 recruitment cycles). Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). - The permanent habitat area is stable or increasing, subject to natural processes. - Conserve the marine community type "Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex" surrounding this strategic site. - Early consultation or scoping with the Department of the Environment in advance of formal application is advisable for such proposals in order to determine the project level requirements under Article 6.3 & 6.4 of the Habitats Directive. Any future development within this Strategic Site will need to assess the impacts to water quality and how it will affect the WFD Status and objectives together with the requirements arising from the Marine Strategy Framework Directive.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed.
	Mudflats and sandflats not covered by seawater at low tide. Potential Impacts: Habitat present on small portion of site surrounding existing jetty located on Foynes Island together with a small portion on the site boundary nearest Foynes Port.	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Loss of available prey items to foraging birds - In-direct effects - Water flow - Non synthetic & synthetic compounds - Removal of target & non-target species	Any future development within this Strategic Site will need to assess the impacts to the structure and function of the recorded intertidal areas and any nett loss of habitat will need to be assessed against the integrity of the overall SAC and the use of the site in terms of biomass availability to the conservation interests of the adjacent SPAs. This may require detailed site specific surveys.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			during construction with no disturbance of the areas of mudflats and sandflats located on the verges of the site boundary - Habitat surveys to characterise the seabed and identify sensitive habitat and species	
	<u>Coastal Lagoons</u> No Potential Impacts: No Coastal Lagoons located within the vicinity of the opportunity			
	<u>Vegetated sea cliffs of the Atlantic and Baltic Coasts</u> No Potential Impacts: No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	<u>Salicornia and other annuals colonizing mud and sand</u> Potential Impacts: No record exists for this habitat within the area of interest. However, Foynes Island was not included in the Saltmarsh Monitoring Project carried out by NPWS/DEHLG. Therefore; further un-surveyed areas may be present within the site. Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive.			
	<u>Atlantic salt meadows (Glauco-Puccinellietalia maritima)</u> Potential Impacts: No record exists for this habitat within the area of interest. However, Foynes Island was not included in the Saltmarsh	• Habitat loss - to land • Habitat change - to another marine habitat • Physical disturbance • Siltation rate changes • Water flow • Non synthetic & synthetic compounds • Removal of target & non-target species	• Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. • As Salt marsh is a priority habitat and future development will need to determine whether it will impact on the habitat either within or outside the SAC boundary. • Any future development within this Strategic Site will need to ensure it does not encroach on ASM habitat or an overall nett loss of the habitat within the SAC occurs. Future development	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	Monitoring Project carried out by NPWS/DEHLG Therefore; further un-surveyed areas may be present within the site. Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive.		within this site must also take in consideration the potential for the loss of habitat due to the spread of <i>Spartina anglica</i> and must not encourage the spread of <i>Spartina</i> or any alien or invasive species. <i>Spartina</i> has been documented as potentially being present in a small bay on the southern side of the island through the Saltmarsh Monitoring Project 2007-2008 but this has only been documented through desktop edits in 2009. Therefore, ground truthing may be required. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). • Area stable or increasing, subject to natural processes, including erosion and succession • Habitat distribution: No decline, subject to natural processes. • Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions • Maintain creek and pan structure, subject to natural processes, including erosion and succession • Maintain natural tidal regime • Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession • Maintain structural variation within sward • Maintain more than 90% of the saltmarsh area vegetated • Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009) • No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%	None anticipated
	<u>Mediterranean salt meadows (<i>Juncetalia maritimi</i>)</u> Potential Impacts: No record exists for this habitat within the area of interest. However, Foynes Island was not included in the Saltmarsh Monitoring Project carried out by NPWS/DEHLG Therefore; further un-surveyed areas may be present within the site. Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive.		Surveys will be required to determine whether this habitat is present or not within the Strategic Site.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>Watercourses of plain to montance levels with the Rannunculon fluitantis and Callitricho-Batrachion vegetation</u> No Potential Impacts: Not present			
	<u>Sandbanks which are slightly covered by sea water all the time</u> No Potential Impacts: Not present			
	<u>Large shallow inlets and bays</u> No Potential Impacts: Not present			
	<u>Reefs</u> Potential Impacts: Present on the verges of the Strategic Site boundary co-insiding with areas of Furoid dominated inter-tidal reef complex along shoreline of site	Potential for direct habitat loss and degradation of community type located within this Strategic Site	Depending on type, scale and location of development within this strategic site impact on this reef habitat can be avoided through the careful selection of areas for development, type of infrastructure used, scale of project, construction methodologies etc. The exact location should avoid rare or protected marine benthic species found at the proposed development site associated with this habitat which will need to be determined at project level. Through the use of the existing pier infrastructure potential damage to the extent of reef community can be avoided. Any development associated with the development of marine related industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Ensure the distribution of Reefs is stable, subject to natural processes • The permanent habitat area is stable, subject to natural processes • Conserve the following reef community types in a natural condition: Faunal turf dominated subtidal reef complex • Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>Perennial vegetation of stony banks</u> No Potential Impacts: Not present			
	<u>Molinia meadows on calcareous, peaty or clay-silt-laden soils (<i>Molinion caeruleae</i>)</u> No Potential Impacts: Not present			
	<u>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> also <i>Salix spp.</i> And sometimes <i>Quercus robur</i></u> No Potential Impacts: Not present			
	<u>River Lamprey</u> No Potential Impacts: No records for this site			
	<u>Brook Lamprey</u> No Potential Impacts: No records for this site			
	<u>Sea Lamprey</u> Potential Impacts: Known records through out the Shannon Estuary. Foynes Island is documented within its current range through “The Status of EU Protected Habitats and Species in Ireland”	• Loss of migration route • Artificial barriers can block lampreys’ upstream migration or passage, thereby limiting species to lower stretches and restricting access to spawning areas Any future development associated with the alteration to the sea bed will need to take into consideration the Sea Lamprey and its passage within this area. The Sea Lamprey has been listed in The Red List of Amphibians, Reptiles & Freshwater Fish, 2011 as near threatened. Sea Lamprey may use the section of the Shannon Estuary adjacent to this site for migration from the Sea into Freshwater and therefore in-direct effects will need to be considered at project level.	• In the absence of detailed baseline data on fish communities in the Strategic Site a marine fish community composition and abundance survey will be required in the overall marine aquatic footprint for which the develop ment will take place prior to the commencement of any works. • These detailed fishery surveys will be required to determine the use (if any) by Sea Lamprey of this Strategic Site across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) • Where Sea Lmaprey are found to utilise this site detailed project level mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. • This should ensure there is; No decline in extent and distribution of spawning beds (Surveys may be needed here to determine distribution of spawning areas, if any, within site) At least three age/size groups present Juvenile density at least 1/m2 More than 50% of sample sites positive in terms of available juvenile habitat.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>Atlantic Salmon</u> Potential Impacts: Known records through out the Shannon Estuary	• Medium risk of impact to Atlantic Salmon during migration period when they may use the adjacent river channel for passage. • Should development of this site require dredging works, infilling, reclamation or any type of coastal protection works the risk could be raised to high.	• In-direct impacts will need to be assessed at project level. • In the absence of detailed baseline data on fish communities in the Strategic Site a marine fish community composition and abundance survey will be required in the overall marine aquatic footprint for which the development will take place prior to the commencement of any works. • These detailed fishery surveys will be required to determine the use (if any) by Atlantic Salmon of this Strategic Site across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) • Suitable mitigation measures would be required specifically for Atlantic salmon should the risk of impact to this species be determined as high at project level once details of the type of development and the level of engineering works and morphological alteration are known. • The design of the project and required mitigation measures should be developed in consultation with IFI. Any development associated with the development of a Marine Related Industry at this site must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • 100% of river channels down to second order accessible from estuary • Conservation Limit for each system consistently exceeded • Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling • No significant decline in out-migrating smolt abundance • No decline in number distribution of spawning redds due to anthropogenic causes • Access to all water courses down to first order streams • At least Q4 at all sites sampled by the EPA (Freshwater)	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>Bottle-nosed Dolphin</u> Potential Impacts: Bottle-nose dolphins are present in the greater Shannon Estuary The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. However, there is very little survey effort upriver of Tarbert, Co Kerry apart from Berrow (2009) but this was restricted to winter months. The results of the static acoustic monitoring undertaken as part of the SIFP project focused on deep water berths within the estuary one of these water berth monitoring locations was located on the jetty at Foynes Island. Overall, their occurrence is progressively less the further upriver but is still significant at Foynes Island (47% days with detections). Further static acoustic monitoring was carried out by the SDWF on behalf of SFPC for the capital land reclamation project throughout 2011. While bottlenose dolphins were frequently detected acoustically this was a surprise as bottlenose dolphins are very rarely recorded in Foynes harbour. With an estimated detection distance of around 800-1000m, dolphins may be detected in the approaches to the harbour in either the west or east channels without dolphins actually entering the	As this area of opportunity is located within the Shannon Estuary the following potential impacts may arise in relation to Bottlenose Dolphins; • Disturbance through construction, operational and decommissioning works (Physical disturbance – noise) • Disturbance through dumping of dredge spoil at sea should it be required • Impacts to water quality in the water Shannon Estuary as a result of increased discharges • Collision with any infrastructure associated with development, increased shipping	- Background noise assessments would be required in any project level appropriate assessment or licencing for such an activity by the NPWS - Minimise the use of high noise emission activities such as impact pilling and blasting associated with shipping/navigation activities - Avoid installation during sensitive periods for bottlenose dolphins - Soft starting pilling activities / passive acoustic deterrents – gradually increasing noise produced do allow mammals to move away from activities - Use of mammal observers and passive acoustic monitoring to facilitate implementation of exclusion area during noisy activities - Adherence to the risk assessment and menu of management options outlined in the NPWS Draft Guidance to manage the risk to Marine Mammals from Man-Made Sound Sources in Irish Waters¹ - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary which can be used across all sectors. - The findings from the Static Acoustic Monitoring undertaken at this site should be used to inform any future development and timing of any associated works given the significant findings in relation to site usage across season and throughout the day/night. - Due to the lack of detailed studies in the estuary continuation of the static acoustic monitoring using CPODs under taken as a pilot project by the SIFP will be required to assess the longitudinal use of this sites as there use may change with changes in fish distribution throughout the year. - Given the international nature of reducing risk of collisions this issue is being considered further and progressed within the Marine Strategy Framework Directive implementation process. Any project level development should consider the findings of this work. Any development associated with the development of a Marine Related Industry at this site must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC. • Species range within the SAC should not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins should be maintained in a natural condition • Human activities should occur at levels that do not adversely affect the bottlenose dolphin population within the SAC. • The DAHG Draft “Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters” should be adhered to at all times • Consultation should be undertaken with the Marine	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

¹ http://www.npws.ie/media/npwsie/content/files/Guidance_Consultation%20Draft.pdf

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	harbour area. From previous monitoring at Foynes during PReCAST http://old.iwdg.ie/precast/?id=92 significant seasonal, diel and tidal influences in detections, were noted indicating the dolphins are probably using the site in different ways at different states of tide and when feeding on different prey types. (Dr. O'Brien, <i>pers comm.</i>) . This was confirmed following the completion of the static acoustic monitoring where peak detections were recorded at Foynes during spring additionally the influence of diel phase with most detection recorded at night was recorded for Foynes. The results of the SAM therefore shows the trend in monitoring are consistent. While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction may cause disturbance, should dredging and associated dumping at sea be required impacts to the resident group of bottlenose dolphins in the estuary will also need to be considered.		research Unit of NPWS, Irish Whale & Dolphin Group and the Shannon Dolphin & Wildlife Foundation prior to the commencement of any works.	
	<u>Freshwater Pearl Mussel</u> No Potential Impacts: Not present			
	<u>Otter</u> Potential Impacts: The closest record of Otters to this site is from 1982 (Source; Biodiversity Ireland) on a stream near church on N69. Quercus are currently undertaking a National Otter Survey on behalf of NPWS. Following the publication of these results records may exist for this site. The outer shoreline of Foynes	• In-direct disturbance • Loss of habitat • Loss of access to feeding areas • Loss of breeding areas	- Avoid construction in sensitive areas such as feeding and breeding areas - Minimise the use of high noise emission activities such as impact piling and blasting - Enforce speed limits for vessels used in construction and establish a code of conduct to avoid disturbance to otters both during construction activities and in transit to construction area if entering areas of high abundance - Avoid installation during sensitive periods - Use of sound installation on equipment - Soft starting piling activities / passive acoustic deterrents – gradually increasing noise produce do allow otters to move away from activities - Use of bubble curtains (this may only be effective in shallow water) - The use of acoustic deterrents such as pingers or acoustic	None anticipated

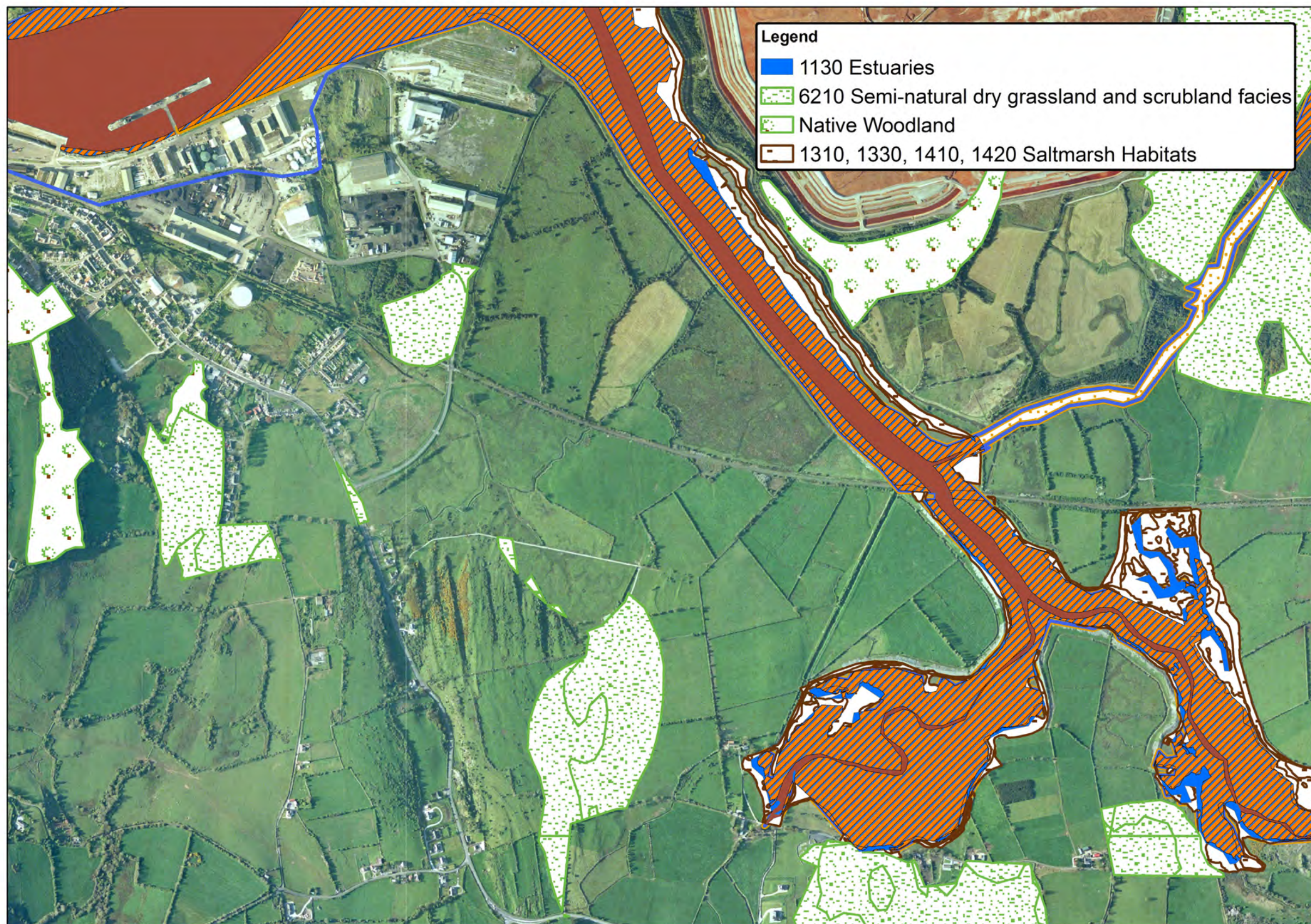
Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	Island has been indicated as part of the 250m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17 While no records exist for this site this is most likely as a result of lack of survey or reporting within this site rather than an absence of the species from the site. Therefore, at project level an Otter survey should be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.		harassment devices. - Noise from operating turbines can be reduced by using isolators. However this has not been tested in the long term and to account for cumulative effects	

Location	Qualifying Interests & Potential Impacts ²	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA Theme/ Strategic Site Marine Related Industry at Foynes Island	Sub-site OI440: <u>Shelduck</u> <u>Wigeon</u> <u>Teal</u> <u>Cormorant</u> <u>Lapwing</u> <u>Black tailed Godwit</u> <u>Bar tailed Godwit</u> <u>Curlew</u> <u>Greenshank</u> <u>Redshank</u> <u>Black necked Grebe</u> (As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012) Potential Impacts: The sub-site OI440 surrounds the eastern side of Foynes Island and the area directly in front of Foynes Port. (See Figure 3.0) The overall site has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 11 of the qualifying species being recorded at this site coupled with 227 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI440 is moderately sensitive to future development at a strategic level. It should be noted that this sub-site boundary for which the counts are based on is quite large and stretches from Robertstown Creek in the east around the eastern side of Foynes Island and along Foynes Port it does not take into account the existing jetty area located on Foynes Island. Therefore depending on the actual usage and location of 227 waterbirds recorded within this site the impact may be more or less. In addition the summary roost survey data from February 2010 which forms part of the NPWS SPA Conservation Objectives supporting document indicates roosting areas for Cormorant, Great Black backed Gull, Greenshank, Shelduck and	As this site (Foynes Island) is located adjacent to the sub-site OI440 disturbance is the key impact There is a very moderate potential for direct impact to feeding areas of loss of habitat	A full Project Level Appropriate Assessment, taking account of the whole SPA, will be required to ensure there are no significant effects to the Natura 2000 site in the context of the sites conservation objectives. Dedicated site counts throughout the summer and winter months will be required for any application at a project level to establish the use, if any, of birds within this Area of Opportunity. Direct physical damage to mobile species: - Avoid siting the structures within sensitive sites - Avoid installation during sensitive seasons (i.e. breeding and moulting) - Site specific surveys at project level to identify the presence of key foraging hotspots and / or resting areas and to aid site selection within the strategic site - Appropriate siting of developments e.g. away from breeding colonies, important feeding and roosting areas, near shore areas and migration corridors - No construction between resting and foraging areas - Avoiding large-scale continuous illuminations Indirect disturbance or loss of species: - Minimise the use of high noise emission activities such as impact piling or blasting - Avoid installation during sensitive periods - Review and consideration of noise reduction techniques (e.g. bubble curtains around the pile) - Use of sound insulation on plant equipment and device design. Any development associated with the testing of tidal energy devices must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Long term population trend stable or increasing • The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. Reference should also be made to the relevant species specific targets for Shelduck, Wigeon, teal, Cormorant, Lapwing, Black tailed Godwit, Bar Tailed Godwit, Curlew, Greenshank, Redshank & Black Necked Grebe as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives This rating may change at project level depending on the scale and detail of the project. Foynes Island is located adjacent to the sub-site therefore depending on the scale of the project no potential impact may occur however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. It should be noted that the ranking system is to be used as a guide at a strategic level only and that a full Appropriate Assessment screening exercise, taking account of the whole SPA, will be required at the project level to ensure there are no significant effects to the Natura 2000 site in the context of the sites conservation objectives. At a strategic level within the estuary developing at this location on Foynes Island would have less of an impact on the qualifying interest features of the	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

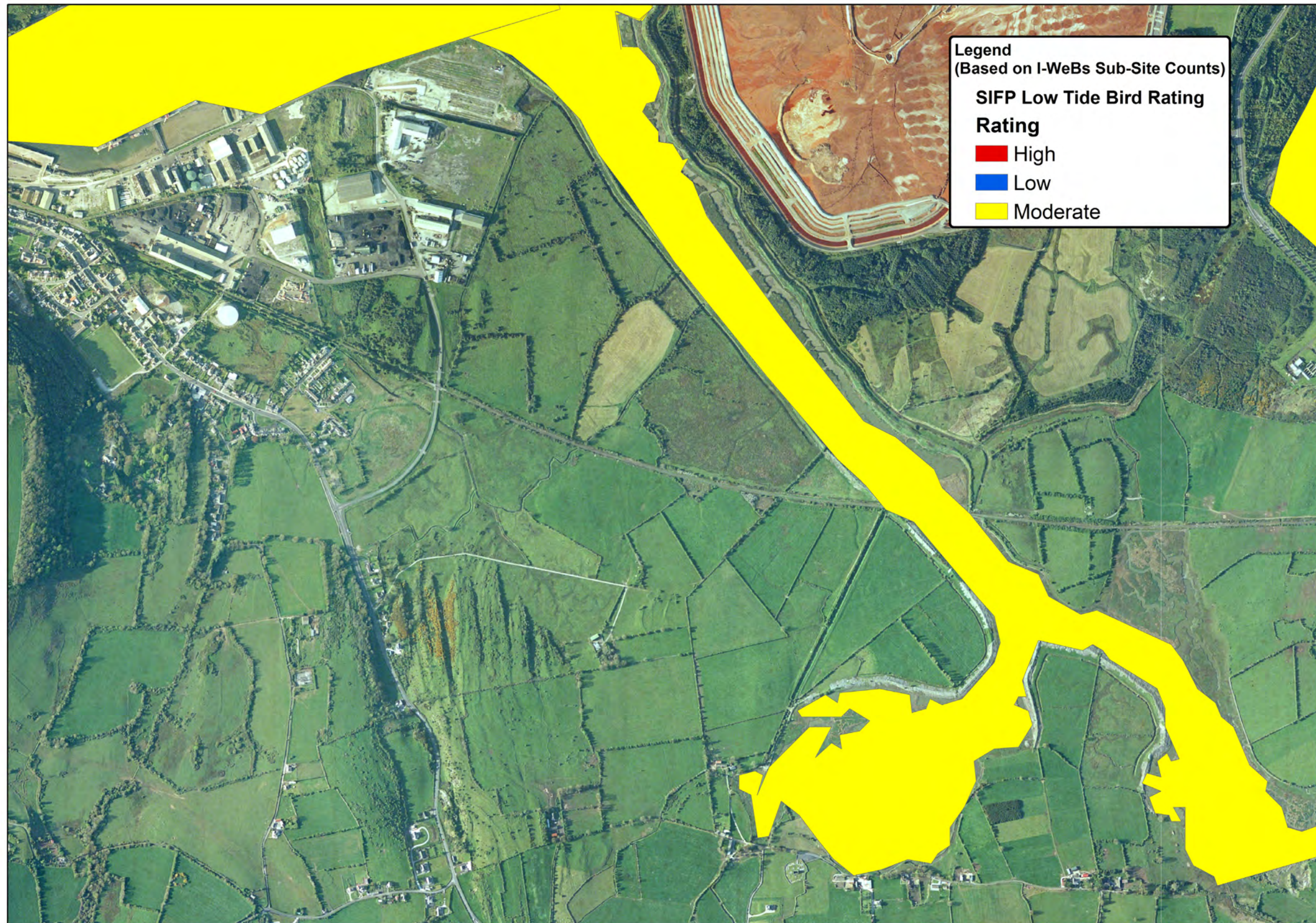
	Teal on Sturamus Island which lies to the east of Foynes Island and within Sub-Site 01440.		SPA then other sites within the estuary which have been given a high impact potential rating. Within the site to the north and north east of the island and existing jetty no important bird wintering or feeding areas have been identified and therefore any future development within this area of the island should not cause any impact to the qualifying interest features of the SPA or pSPA. Consultation with Oscar Merne, one of the primary waterbird counters for the Shannon and Fergus Estuary since the 1970's, identified the areas of deep water in the Shannon Estuary including Foynes Island as being relatively unimportant for waterbirds. The main feeding areas for waders and gulls within this area are between Foynes Port and Aughinish Island to the east and on the east side of Foynes Island, where extensive intertidal mudflats are exposed at low tide. The main channel between the East Jetty and Foynes Island is relatively deep and is never exposed at low tide. Some of the intertidal areas along the southern and eastern shores of Foynes Island are exposed at low tide, including a number of small inlets. The southern shore directly opposite the Jetty is only ever used by a small number of birds including mostly gulls and some duck species. The eastern side of the Island is used more extensively by other species including Shelduck, Wigeon, Teal and Mallard therefore any development to the west of the island should not impact on these feeding areas. Through the confinement of any future development to the western portion of the island this should provide a barrier in term of direct and in-direct effects through disturbance to the roosting colonies located on Sturamus.	
--	---	--	--	--



Appendix 2 Figure 4.0 Lands to the rear of Foynes Port (Alternative 2, Strategic Site D), Co. Limerick.



Appendix 2 Figure 5.0 Qualifying features located within close proximity to Alternative Site 2 or Strategic Site D from SIFP.



Appendix 2 Figure 6.0 Subsite rating based on SIFP assessment of low tide survey locations within close proximity to site

Table 2.0 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Land to the rear of Foynes, Co.Limerick from draft SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon Theme/Strategic Site Marine Related Industry at Land to the rear of Foynes	Estuaries Potential Impacts: Habitat present outside of site boundary but adjacent to the site along Robertstown Creek (Lower Shannon Estuary)	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Introduction of non synthetic & synthetic compounds - Removal of target & non-target species - Scouring - Smothering - Temporary increases in the level of suspended sediments in the water column - Changes in hydrodynamics and geomorphology at dredge and disposal sites	- Careful site selection within strategic sites avoiding sensitive features for construction and installation of structures associated with the Marine Related Industry identified for this site. - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the strategic site - Avoid installation during sensitive seasons - Consider alternative beneficial use options to reduce amounts of material disposed at sea. - Use approved dump site only - The potential effects at the disposal site are minimised under the EPA licensing process which should include an appropriate assessment. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). - The permanent habitat area is stable or increasing, subject to natural processes. - Conserve the marine community type “Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex” surrounding this strategic site. - Early consultation or scoping with the Department of the Environment in advance of formal application is advisable for such proposals in order to determine the project level requirements under Article 6.3 & 6.4 of the Habitats Directive. Any future development within this Strategic Site will need to assess the impacts to water quality and how it will affect the WFD Status and objectives together with the requirements arising from the Marine Strategy Framework Directive.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed.
	Mudflats and sandflats not covered by seawater at low tide. Potential Impacts: Habitat present within Robertstown Creek not directly within strategic site	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Loss of available prey items to foraging birds - In-direct effects - Water flow - Non synthetic & synthetic compounds - Removal of target & non-target species	- Any future development within this Strategic Site will need to assess the impacts to the structure and function of the recorded intertidal areas and any nett loss of habitat will need to be assessed against the integrity of the overall SAC and the use of the site in terms of biomass availability to the conservation interests of the adjacent SPAs. This may require detailed site specific surveys. - If deemed to be of good quality these areas should be avoided during construction with no disturbance of the areas of mudflats and sandflats located on the verges of the site boundary ~~Habitat surveys to characterise the seabed and identify sensitive habitat and species~~	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			to natural processes. Please also refer to specific targets under estuaries. - Conserve the following communities' types in a natural condition: Intertidal sand with <i>Scolecopsis squamata</i> and <i>Pontocrates spp</i> community and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex. - Due to the location of this habitat within and adjacent to the site project level assessment will be required to meet the requirements of Article 6.3 & 6.4 of the Habitats Directive. Much of this site is bounded on the coastal side by embankments which serve to protect both the agricultural land from inundation and the inter-tidal habitat from encroachment. Maintaining this embankment is critical to the qualifying interest feature. As the detailed conservation objectives for this SAC has identified this site as having a marine community dominated by intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community and intertidal sand with <i>Scolecopsis squamata</i> and <i>Pontocrates spp</i> community the actual loss of foraging habitats (if any) will need to be determined in terms of potential impact on wader and waterfowl populations at or adjacent to the site.	
	<u>Coastal Lagoons</u> No Potential Impacts: No Coastal Lagoons located within the vicinity of the strategic site.			
	<u>Vegetated sea cliffs of the Atlantic and Baltic Coasts</u> No Potential Impacts: No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	<u>Salicornia and other annuals colonizing mud and sand</u> Potential Impacts: No site Salicornia and other annuals colonizing mud and sand within site boundary			
	<u>Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>)</u> Potential Impacts: Located adjacent to the site only and not within. Documented through Saltmarsh Monitoring	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Water flow	- Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. - As Salt marsh is a priority habitat and future development will need to determine whether it will impact on the habitat either within or outside the SAC boundary.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	Project 2007-2008 and through desktop edits in 2009 NB: It should be noted that saltmarsh habitat extends outside the survey site along the Robertstown River Channel and north of the railway bridge, but this was not surveyed. (Based on McCrory & Ryle, 2009) Therefore, further un-surveyed areas may be present within the site. Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive.	- Non synthetic & synthetic compounds - Removal of target & non-target species	- Any future development within this Strategic Site will need to ensure it does not encroach on ASM habitat or an overall nett loss of the habitat within the SAC occurs. Future development within this site must also take in consideration the potential for the loss of habitat due to the spread of <i>Spartina anglica</i> and must not encourage the spread of <i>Spartina</i> or any alien or invasive species. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). - Area stable or increasing, subject to natural processes, including erosion and succession - Habitat distribution: No decline, subject to natural processes. - Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions - Maintain creek and pan structure, subject to natural processes, including erosion and succession - Maintain natural tidal regime - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession - Maintain structural variation within sward - Maintain more than 90% of the saltmarsh area vegetated - Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009) - No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%	
	<u>Mediterranean salt meadows (<i>Juncetalia maritimi</i>)</u> Potential Impacts: While this habitat is not directly located within the site it is located within the Barrigone SAC therefore potential does exist for impact.	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Water flow - Non synthetic & synthetic compounds - Removal of target & non-target species	- Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. - As Salt marsh is a priority habitat and future development will need to determine whether it will impact on the habitat either within or outside the SAC boundary. - Any future development within this Strategic Site will need to ensure it does not encroach on ASM habitat or an overall nett loss of the habitat within the SAC occurs. Future development within this site must also take in consideration the potential for the loss of habitat due to the spread of <i>Spartina anglica</i> and must not encourage the spread of <i>Spartina</i> or any alien or invasive species. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). - Area stable or increasing, subject to natural processes, including erosion and succession - Habitat distribution: No decline, subject to natural processes. - Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			• Maintain creek and pan structure, subject to natural processes, including erosion and succession • Maintain natural tidal regime • Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession • Maintain structural variation within sward • Maintain more than 90% of the saltmarsh area vegetated • Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009) • No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1% NB: It should be noted that saltmarsh habitat extends outside the survey site along the Robertstown River Channel and north of the railway bridge, but this was not surveyed. (Based on McCrory & Ryle, 2009) Therefore, further un-surveyed areas may be present within the site. Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. Any future development within this site should consider the impacts to this habitat in particular the knock on effects from any reclamation, infilling or excavation works which could lead to accretion or erosion within the adjacent site.	
	<u>Watercourses of plain to montance levels with the Rannunculon fluitantis and Callitricho-Batrachion vegetation</u>			
	No Potential Impacts: Not present			
	<u>Sandbanks which are slightly covered by sea water all the time</u>			
	No Potential Impacts: Not present			
	<u>Large shallow inlets and bays</u>			
	No Potential Impacts: Not present			
	<u>Reefs</u>			
	No Potential Impacts: Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>Perennial vegetation of stony banks</u> No Potential Impacts: Not present			
	<u>Molinia meadows on calcareous, peaty or clay-silt-laden soils (Molinion caeruleae)</u> No Potential Impacts: Not present			
	<u>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> also <i>Salix</i> spp. And sometimes <i>Quercus robur</i></u> No Potential Impacts: Not present			
	<u>River Lamprey</u> Potential Impacts: There are no records for this site. However, it is likely that they occur in most rivers that allow access to spawning and nursery areas from the sea.	- Loss of migration route - Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas The main threats to this species include channel maintenance works, barriers to migration such as weirs, gross pollution and specific pollutants.	- In the absence of detailed baseline data on fish communities in the Strategic Site a freshwater fish community composition and abundance survey will be required in any freshwater rivers/streams for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by River Lamprey of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Where River Lamprey are found to utilise this site detailed project level mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. - This should ensure there is; - Access to all water courses down to first order streams - At least three age/size groups of river/brook lamprey present - Mean catchment juvenile density of river/brook lamprey at least 2/m² - No decline in extent and distribution of spawning beds - More than 50% of sample sites positive in terms of available juvenile habitat The Red List of Amphibians, Reptiles & Freshwater Fish, 2011 has classified the River Lamprey as "of least concern" as the juvenile stages are widely distributed in catchments where suitable habitat exists. While no records exist at this site it is likely that they occur in most rivers that allow access to spawning and nursery areas from the sea. As the Shanagolden River feeds in at the back of this site to the inter-tidal area in-direct effects should be considered at project level assessment.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

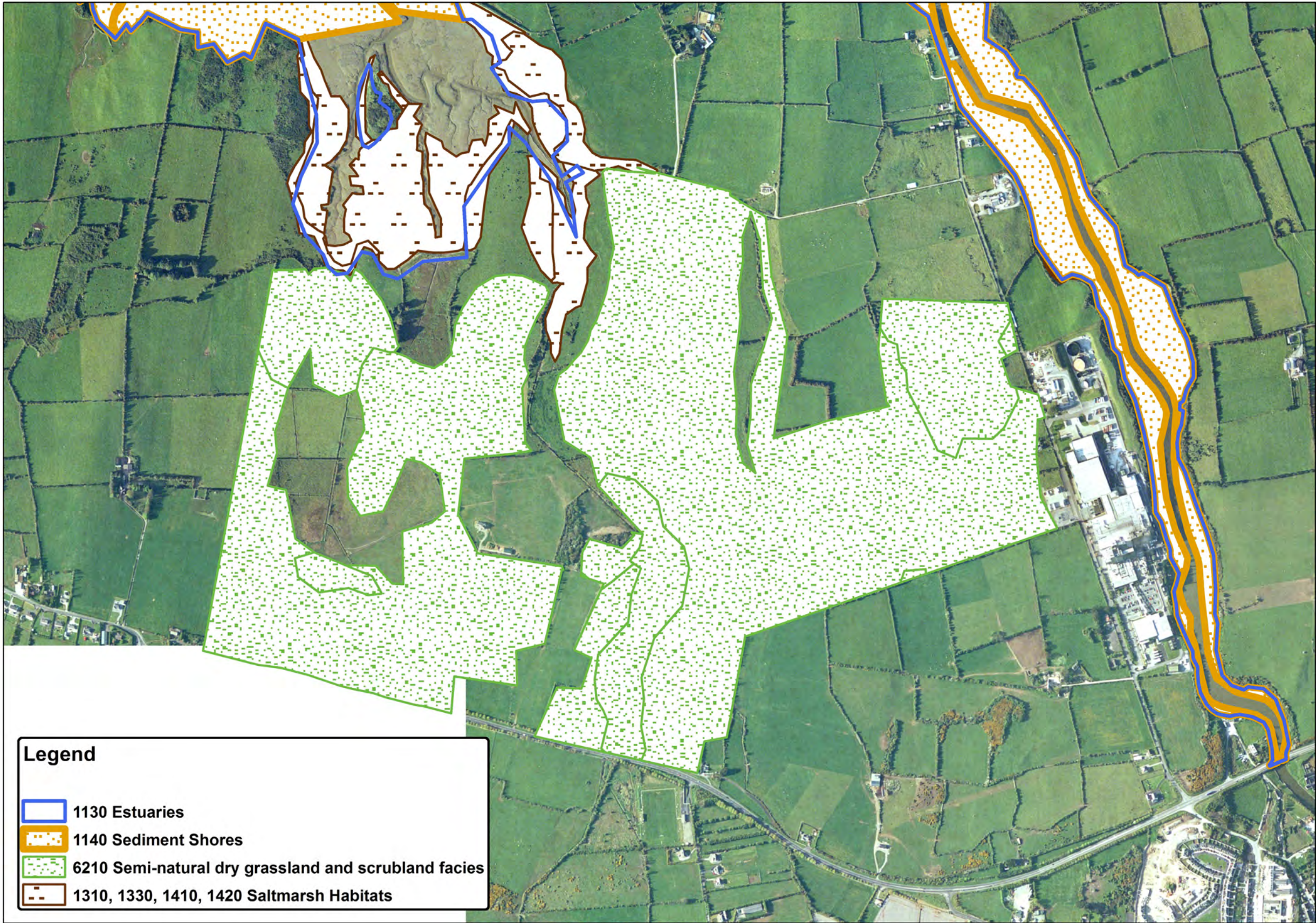
Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>Brook Lamprey</u> Potential Impacts: No records for this site. Unlikely to occur as the brook lamprey does not migrate to the marine environment. However, Within the immediate site two streams traverse the site which may contain potential habitat.	- Loss of migration route. - Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas The main threats to this species include channel maintenance works, barriers to migration such as weirs, gross pollution and specific pollutants.	- In the absence of detailed baseline data on fish communities in the Strategic Site a freshwater fish community composition and abundance survey will be required in any freshwater rivers/streams for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by Brook Lamprey of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Where Brook Lmaprey are found to utilise this site detailed project level mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. - This should ensure there is; - Access to all water courses down to first order streams - At least three age/size groups of river/brook lamprey present - Mean catchment juvenile density of river/brook lamprey at least 2/m2 - No decline in extent and distribution of spawning beds - More than 50% of sample sites positive in terms of available juvenile habitat The brook lamprey does not migrate to the marine environment, and the adults do not feed. As the adjacent site is inter-tidal it is highly unlikely that Brook Lamprey will be present. Within the immediate site two streams traverse the site which may contain potential habitat.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.
	<u>Sea Lamprey</u> Potential Impacts: Known records through out the Shannon Estuary and distribution mapped as present along this stretch in the "The Status of EU Protected Habitats and Species in Ireland, 2008"	- Loss of migration route - Artificial barriers can block lampreys' upstream migration or passage, thereby limiting species to lower stretches and restricting access to spawning areas Any future development associated with the alteration to the sea bed will need to take into consideration the Sea Lamprey and its passage within this area. The Sea Lamprey has been listed in The Red List of Amphibians, Reptiles & Freshwater Fish, 2011 as near threatened. Sea Lamprey may use the section of the Shannon Estuary adjacent to this site for migration from the Sea into Freshwater and therefore in-direct effects will need to be considered at project level.	- In the absence of detailed baseline data on fish communities in the Strategic Site a marine fish community composition and abundance survey will be required in the overall marine aquatic footprint for which the develop ment will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by Sea Lamprey of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Where Sea Lmaprey are found to utilise this site detailed project level mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. - This should ensure there is; - No decline in extent and distribution of spawning beds (Surveys may be needed here to determine distribution of spawning areas, if any, within site) - At least three age/size groups present Juvenile density at least 1/m2 - More than 50% of sample sites positive in terms of available juvenile habitat.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>Atlantic Salmon</u> Potential Impacts: Known records through out the Shannon Estuary and distribution mapped as present along this stretch in the <i>"The Status of EU Protected Habitats and Species in Ireland, 2008"</i>	- Medium risk of impact to Atlantic Salmon during migration period when they may use the adjacent river channel for passage. - Should development of this site require dredging works, infilling, reclamation or any type of coastal protection works the risk could be raised to high.	- In-direct impacts will need to be assessed at project level. - In the absence of detailed baseline data on fish communities in the Strategic Site a marine fish community composition and abundance survey will be required in the overall marine aquatic footprint for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by Atlantic Salmon of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Suitable mitigation measures would be required specifically for Atlantic salmon should the risk of impact to this species be determined as high at project level once details of the type of development and the level of engineering works and morphological alteration are known. - The design of the project and required mitigation measures should be developed in consultation with IFI. Any development associated with the development of a Marine Related Industry at this site must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. 100% of river channels down to second order accessible from estuary - Conservation Limit for each system consistently exceeded - Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling - No significant decline in out-migrating smolt abundance - No decline in number distribution of spawning redds due to anthropogenic causes - Access to all water courses down to first order streams - At least Q4 at all sites sampled by the EPA (Freshwater)	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.
	<u>Bottle-nosed Dolphin</u> Potential Impacts: Bottle-nose dolphins are present in the greater Shannon Estuary but are not located within the Strategic Site or the adjacent Robertstown Estuary.			
	<u>Freshwater Pearl Mussel</u> No Potential Impacts: Not present (nearest populations are located on the north shore in the Cloon and Doonbeg catchments in County Clare)			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	Otter Potential Impacts: The closest record of Otters to this site is from 1982 (Source; Biodiversity Ireland) on a stream near church on N69. Dedicated field surveys undertaken as part of the Foynes Port Land Reclamation EIS 2012 for Otters found no evidence of Otters presence or foraging within the immediate area of Foynes Port. Quercus are currently undertaking an National Otter Survey on behalf of NPWS. Following the publication of these results records may exist for this site. The strategic site has not been identified as containing commuting habitat as per NPWS, 2012 Conservation Objectives Ref; Map 17 While no records exist for this site this is most likely as a result of lack of survey or reporting within this site rather than an absence of the species from the site. Therefore, at project level an Otter survey should be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.	• In-direct disturbance • Loss of habitat • Loss of access to feeding areas • Loss of breeding areas	- Avoid construction in sensitive areas such as feeding and breeding areas - Minimise the use of high noise emission activities such as impact pilling and blasting - Enforce speed limits for vessels used in construction and establish a code of conduct to avoid disturbance to otters both during construction activities and in transit to construction area if entering areas of high abundance - Avoid installation during sensitive periods - Use of sound installation on equipment - Soft starting pilling activities / passive acoustic deterrents – gradually increasing noise produce do allow otters to move away from activities - Use of bubble curtains (this may only be effective in shallow water) - The use of acoustic deterrents such as pingers or acoustic harassment devices. - Noise from operating turbines can be reduced by using isolators. However this has not been tested in the long term and to account for cumulative effects	None anticipated
	<u>Bat species (All bat species are protected where they occur under Annex IV of the Habitats Directive either within or outside an SAC)</u> Potential Impacts: Daubenton's Bat, Soprano pipistrelle and Leislars Bat have all been recorded during the course of surveys carried out in 2003 within this site. Source; Biodiversity Ireland.	A diverse range of threats and impacts currently affect bats and their habitat in Ireland. Wetland drainage and serious water pollution are concerns for Daubenton's Bat. Accidental and deliberate exclusion of nursery roosts from buildings is the main threat to Leisler's bat. Use of pesticides, removal of hedgerows, copses and scrub; and illegal disturbance of roosts in domestic dwellings and other buildings are the main threats identified for the Soprano pipistrelle.	Any future development of this site would require site specific surveys to establish a) any roosting habitats located within the site boundary b) any feeding areas or habitat corridors utilised within the site. As the site contains riparian habitats which have been shown as a key favoured habitat of these three species through the habitat association work carried out by Bat Conservation Ireland (Ref; Lundy <i>et al</i>, 2011) species specific surveys will be required at this site.	

Location	Qualifying Interests & Potential Impacts ³	Likely Potential Impacts from the Strategic Site include	Detailed Assessment	Residual Impacts
Natura 2000 Site Code 4077-River Shannon and River Fergus Estuaries SPA Theme/Strategic Site Marine Related Industry at Land to the rear of Foynes Port	<u>Shelduck</u> <u>Wigeon</u> <u>Teal</u> <u>Lapwing</u> <u>Knot</u> <u>Dunlin</u> <u>Bar-tailed Godwit</u> <u>Black-tailed Godwit</u> <u>Curlew</u> <u>Greenshank</u> <u>Black Headed Gull</u> <u>Redshank</u> <u>Cormorant</u> (As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012) Potential Impacts: The sub-site OI439 which is adjacent to the Robertstown Creek (See Figure 6.0) site has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 14 of the qualifying species being recorded at this site coupled with 1421 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI439 is moderately sensitive to future development at a strategic level. In addition the summary roost survey data from February 2010 which forms part of the NPWS SPA Conservation Objectives supporting document indicates roosting areas for Great Black backed Gull, Greenshank, Teal and Wigeon within Sub-Site OI439.	As this potential site (Land to the rear of Foynes Port) is located adjacent to the sub-site OI439 disturbance is the key impact. There is a very low potential for direct impact to feeding areas or loss of habitat.	A full Project Level Appropriate Assessment, taking account of the whole SPA, will be required to ensure there are no significant effects to the Natura 2000 site in the context of the sites conservation objectives. Dedicated site counts throughout the summer and winter months will be required for any application at a project level to establish the use, if any, of birds within this Area of Opportunity. Direct physical damage to mobile species: - Avoid siting the structures within sensitive sites - Avoid installation during sensitive seasons (i.e. breeding and moulting) - Site specific surveys at project level to identify the presence of key foraging hotspots and / or resting areas and to aid site selection within the strategic site - Appropriate siting of developments e.g. away from breeding colonies, important feeding and roosting areas, near shore areas and migration corridors - No construction between resting and foraging areas - Avoiding large-scale continuous illuminations Indirect disturbance or loss of species: - Minimise the use of high noise emission activities such as impact piling or blasting - Avoid installation during sensitive periods - Review and consideration of noise reduction techniques (e.g. bubble curtains around the pile) - Use of sound insulation on plant equipment and device design. Any development associated with the testing of tidal energy devices must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Long term population trend stable or increasing • The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference should also be made to the relevant species specific targets for Shelduck, Wigeon, Teal, Lapwing, Knot, Dunlin, Bar-tailed Godwit, Black-tailed Godwit, Curlew, Greenshank, Black Headed Gull, Redshank, Cormorant as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives This rating may change at project level depending on the scale and detail of the project. The site (Land to the rear of Foynes Port) is located adjacent to the sub-site OI439 and not within the sub-site. Therefore depending on the scale of the project no potential direct impact may occur however in-direct impacts may occur through disturbance however this is thought to be short lived during construction only for which mitigation measures can be incorporated. The entire estuary is a continuum as used by the birds. It should be noted that the ranking system is to be used as a guide at a strategic level only and that a full Appropriate Assessment screening exercise, taking account of the whole SPA, will be required at the project level to ensure there are no significant effects to the Natura 2000 site in the context of the sites conservation objectives. Species within this sub-site have been given a High, Moderate and low ranking based on the site usage. As further details become available as to the exact type of proposals which will be brought forward for this strategic site an assessment of the % loss of principal supporting habitat should be undertaken, its ability to utilise alternative habitats as outlined in the NPWS detailed conservation objectives	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts ³	Likely Potential Impacts from the Strategic Site include	Detailed Assessment	Residual Impacts
			and through reference with the waterbird distribution discussion notes from the conservation objectives supporting documents which outline the foraging and roosting distribution of each species within the River Shannon and River Fergus Estuaries. In looking at the individual species which have been identified for this site the assessment should consider whether principal supporting habitat from another sub-site will also be effected or is currently being development elsewhere with the SPA in order to make an assessment of the in-combination and cumulative impacts. Given the location of the roosting birds (outside of the Strategic Site) recorded during the 2010-2011 NPWS surveys direct effects are unlikely however, as further project level details become available in-direct effects should be considered.	



Appendix 2 Figure 7.0 Qualifying features located within close proximity to Alternative Site 4 or Strategic Site E from SIFP.



Appendix 2 Figure 8.0 Subsite rating based on SIFP assessment of low tide survey locations within close proximity to site

Table 3.0 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Askeaton Business Park, Co.Limerick from draft SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon Theme/Strategic Site Marine Related Industry at Askeaton Business Park	Estuaries Potential Impacts: Habitat present but only on the verge of the site boundary (Lower Shannon Estuary). Site also borders estuarine habitat on the Askeaton side however the existing Pfizer Pharmaceuticals is situated here	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Introduction of non synthetic & synthetic compounds - Removal of target & non-target species - Scouring - Smothering - Temporary increases in the level of suspended sediments in the water column - Changes in hydrodynamics and geomorphology at dredge and disposal sites	- Careful site selection within strategic sites avoiding sensitive features for construction and installation of structures associated with the Marine Related Industry identified for this site. - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the strategic site - Avoid installation during sensitive seasons - Consider alternative beneficial use options to reduce amounts of material disposed at sea. - Use approved dump site only - The potential effects at the disposal site are minimised under the EPA licensing process which should include an appropriate assessment. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). - The permanent habitat area is stable or increasing, subject to natural processes. - Conserve the marine community type "Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex" surrounding this strategic site. - Early consultation or scoping with the Department of the Environment in advance of formal application is advisable for such proposals in order to determine the project level requirements under Article 6.3 & 6.4 of the Habitats Directive. Any future development within this Strategic Site will need to assess the impacts to water quality and how it will affect the WFD Status and objectives together with the requirements arising from the Marine Strategy Framework Directive.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed.
	Mudflats and sandflats not covered by seawater at low tide. Potential Impacts: Habitat present only on the boundary of the Strategic site outside of the main identified area (Lisillaun to southwest of Crumweela) as indicated through NPWS (1140) GIS data set but no indication of habitat being present within site location.	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Introduction of non synthetic & synthetic compounds - Removal of target & non-target species - Scouring - Smothering - Temporary increases in the level of suspended sediments in the water column - Changes in hydrodynamics and geomorphology at dredge and disposal sites	- Any future development within this Strategic Site will need to assess the impacts to water quality and how it will affect the WFD Status and objectives together with the requirements arising from the Marine Strategy Framework Directive. - Any future development within this Strategic Site will need to assess the indirect impacts to the structure and function of the recorded intertidal areas and any nett loss of habitat will need to be assessed against the integrity of the overall SAC and the use of the site in terms of biomass availability to the conservation interests of the adjacent SPAs. - Should any discharges or consents for discharge be required through the development of this site then direct impacts together with assimilative capacity should also be assessed. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). - The permanent habitat area is stable or increasing, subject to natural processes. - Conserve the marine community type "Intertidal sand to mixed sediment	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			with polychaetes, molluscs and crustaceans community complex" surrounding this strategic site. Early consultation or scoping with the Department of the Environment in advance of formal application is advisable for such proposals in order to determine the project level requirements under Article 6.3 & 6.4 of the Habitats Directive.	
	<u>Coastal Lagoons</u> No Potential Impacts: No Coastal Lagoons located within the vicinity of the opportunity			
	<u>Vegetated sea cliffs of the Atlantic and Baltic Coasts</u> No Potential Impacts: No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	<u>Salicornia and other annuals colonizing mud and sand</u> No Potential Impacts: No record exists for this habitat within the area of interest.			
	<u>Atlantic salt meadows (Glauco-Puccinellietalia maritime)</u> Potential Impacts: Small areas of ASM were documented through the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG on the verges of the site boundary.	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Water flow - Non synthetic & synthetic compounds - Removal of target & non-target species	- Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. - As Salt marsh is a priority habitat and future development will need to determine whether it will impact on the habitat either within or outside the SAC boundary. - Any future development within this Strategic Site will need to ensure it does not encroach on ASM habitat or an overall nett loss of the habitat within the SAC occurs. Future development within this site must also take in consideration the potential for the loss of habitat due to the spread of <i>Spartina anglica</i> and must not encourage the spread of <i>Spartina</i> or any alien or invasive species. - It is recommended that this site boundary is altered to exclude the extent of this habitat and therefore remove the potential for direct impact. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012).	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			• Area stable or increasing, subject to natural processes, including erosion and succession • Habitat distribution: No decline, subject to natural processes. • Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions • Maintain creek and pan structure, subject to natural processes, including erosion and succession • Maintain natural tidal regime • Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession • Maintain structural variation within sward • Maintain more than 90% of the saltmarsh area vegetated • Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009) • No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%	
	<u>Mediterranean salt meadows (<i>Juncetalia maritimi</i>)</u> No Potential Impacts: No record exists for this habitat within the area of interest.			
	<u>Watercourses of plain to montane levels with the <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i> vegetation</u> No Potential Impacts: Not present			
	<u>Sandbanks which are slightly covered by sea water all the time</u> No Potential Impacts: Not present			
	<u>Large shallow inlets and bays</u> No Potential Impacts: Not present			
	<u>Reefs</u> No Potential Impacts: Not present			
	<u>Perennial vegetation of stony banks</u> No Potential Impacts: Not present			

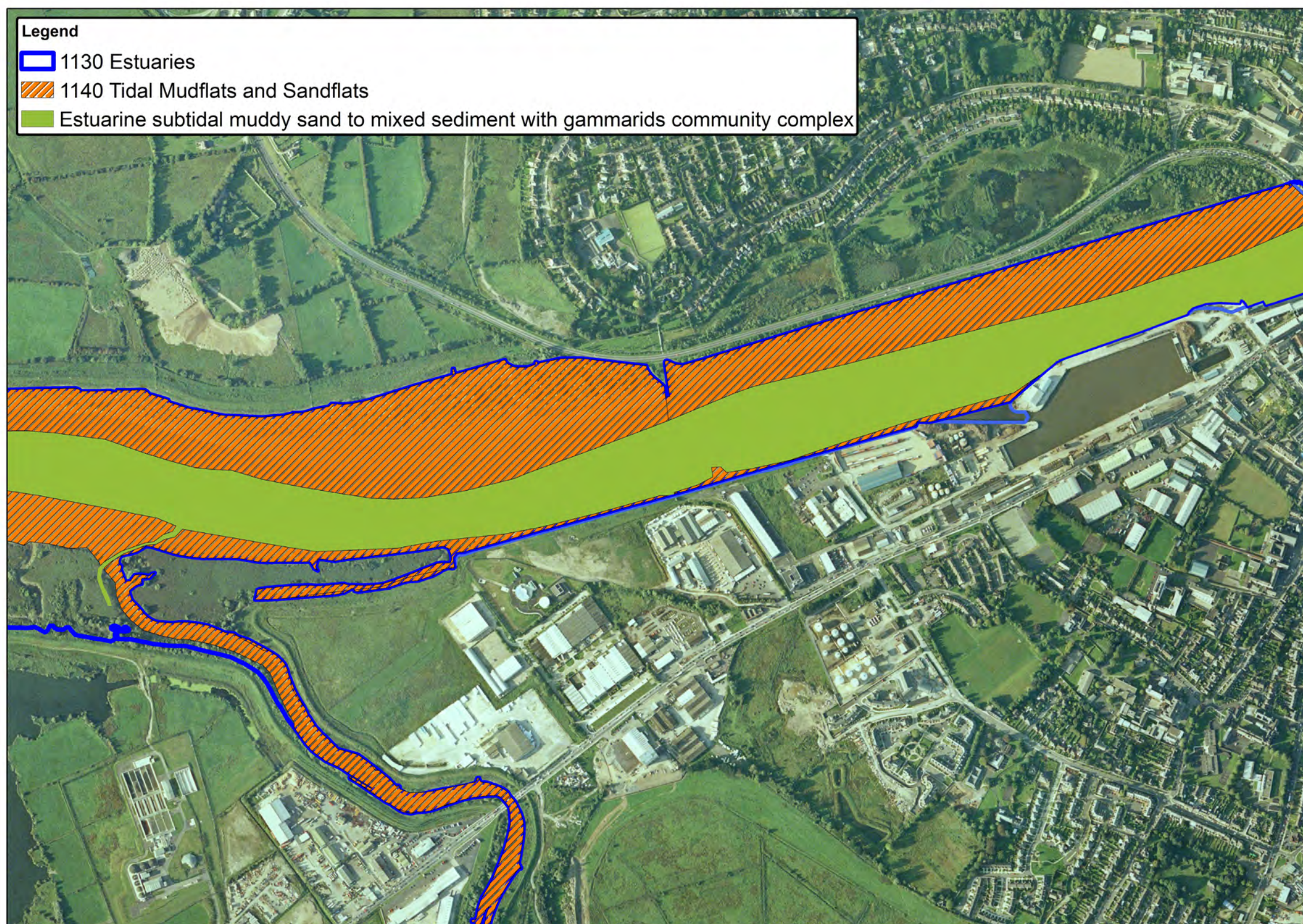
Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>Molinia meadows on calcareous, peaty or clay-silt-laden soils (Molinion caeruleae)</u>			
	No Potential Impacts: Not present			
	<u>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> also <i>Salix spp.</i> And sometimes <i>Quercus robur</i></u>			
	No Potential Impacts: Not present			
	<u>River Lamprey</u> Potential Impacts: No records for this site. However, it is likely that they occur in most rivers that allow access to spawning and nursery areas from the sea.	- Loss of migration route - Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas The main threats to this species include channel maintenance works, barriers to migration such as weirs, gross pollution and specific pollutants.	- In the absence of detailed baseline data on fish communities in the Strategic Site a freshwater fish community composition and abundance survey will be required in any freshwater rivers/streams for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by River Lamprey of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Where River Lamprey are found to utilise this site detailed project level mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. - This should ensure there is; - Access to all water courses down to first order streams - At least three age/size groups of river/brook lamprey present - Mean catchment juvenile density of river/brook lamprey at least 2/m² - No decline in extent and distribution of spawning beds - More than 50% of sample sites positive in terms of available juvenile habitat The Red List of Amphibians, Reptiles & Freshwater Fish, 2011 has classified the River Lamprey as "of least concern" as the juvenile stages are widely distributed in catchments where suitable habitat exists. While no records exist at this site it is likely that they occur in most rivers that allow access to spawning and nursery areas from the sea. As the Shanagolden River feeds in at the back of this site to the inter-tidal area in-direct effects should be considered at project level assessment.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.
	<u>Brook Lamprey</u> Potential Impacts: No records for this site. Unlikely that Brook Lamprey will be present. However, within the immediate site the Lismakeery Stream traverses the site which may contain potential habitat.	- Loss of migration route. - Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas The main threats to this species include channel maintenance works, barriers to migration such as weirs, gross pollution and specific pollutants.	- In the absence of detailed baseline data on fish communities in the Strategic Site a freshwater fish community composition and abundance survey will be required in any freshwater rivers/streams for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by Brook Lamprey of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Where Brook Lamprey are found to utilise this site detailed project level	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. - This should ensure there is; - Access to all water courses down to first order streams - At least three age/size groups of river/brook lamprey present - Mean catchment juvenile density of river/brook lamprey at least 2/m2 - No decline in extent and distribution of spawning beds - More than 50% of sample sites positive in terms of available juvenile habitat The brook lamprey does not migrate to the marine environment, and the adults do not feed. As the adjacent site is inter-tidal it is highly unlikely that Brook Lamprey will be present. Within the immediate site two streams traverse the site which may contain potential habitat.	there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.
	<u>Sea Lamprey</u> No Potential Impacts: No records for this site, no connection with marine environment			
	<u>Atlantic Salmon</u> Potential Impacts: Known records through out the Shannon Estuary	- Medium risk of impact to Atlantic Salmon during migration period when they may use the adjacent river channel for passage. - Should development of this site require dredging works, infilling, reclamation or any type of coastal protection works the risk could be raised to high.	- In-direct impacts will need to be assessed at project level. - In the absence of detailed baseline data on fish communities in the Strategic Site a marine fish community composition and abundance survey will be required in the overall marine aquatic footprint for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by Atlantic Salmon of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Suitable mitigation measures would be required specifically for Atlantic salmon should the risk of impact to this species be determined as high at project level once details of the type of development and the level of engineering works and morphological alteration are known. - The design of the project and required mitigation measures should be developed in consultation with IFI. Any development associated with the development of a Marine Related Industry at this site must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. 100% of river channels down to second order accessible from estuary - Conservation Limit for each system consistently exceeded - Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling - No significant decline in out-migrating smolt abundance - No decline in number distribution of spawning redds due to anthropogenic causes	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

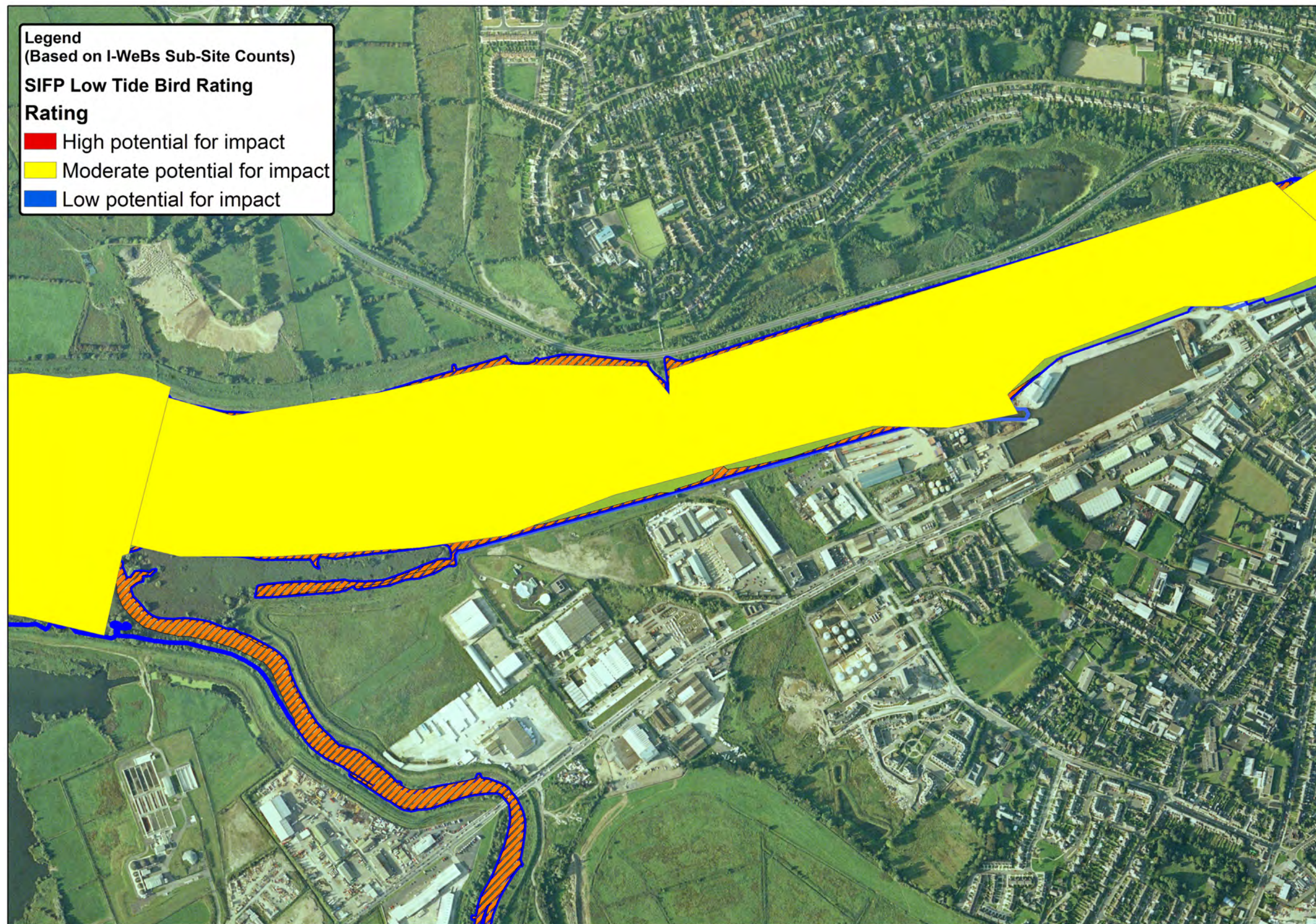
Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			- Access to all water courses down to first order streams - At least Q4 at all sites sampled by the EPA (Freshwater)	
	<u>Bottle-nosed Dolphin</u> Potential Impacts: Not present within site or in-direct risk of impact			
	<u>Freshwater Pearl Mussel</u> Potential Impacts: Not present			
	<u>Otter</u> Potential Impacts: No records within this site Outside of Otter commuting route as per NPWS Lower River Shannon SAC Conservation Objectives Map 16, NPWS 2012 Quercus are currently undertaking an National Otter Survey on behalf of NPWS. Following the publication of these results records may exist for this site. While no records exist for this site this is most likely as a result of lack of survey or reporting within this site rather than an absence of the species from the site. Therefore, at project level an Otter survey should be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.	- In-direct disturbance - Loss of habitat - Loss of access to feeding areas - Loss of breeding areas	- Avoid construction in sensitive areas such as feeding and breeding areas - Minimise the use of high noise emission activities such as impact pilling and blasting - Enforce speed limits for vessels used in construction and establish a code of conduct to avoid disturbance to otters both during construction activities and in transit to construction area if entering areas of high abundance - Avoid installation during sensitive periods - Use of sound installation on equipment - Soft starting pilling activities / passive acoustic deterrents – gradually increasing noise produce do allow otters to move away from activities - Use of bubble curtains (this may only be effective in shallow water) - The use of acoustic deterrents such as pingers or acoustic harassment devices. - Noise from operating turbines can be reduced by using isolators. However this has not been tested in the long term and to account for cumulative effects	None anticipated

Location	Qualifying Interests & Potential Impacts ⁴	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA Theme/ Strategic Site Marine Related Industry at Askeaton Business Park	Sub-site OI491: <u>Purple sandpiper</u> <u>Wigeon</u> <u>Teal</u> <u>Cormorant</u> <u>Golden Plover</u> <u>Grey Plover</u> <u>Lapwing</u> <u>Knot</u> <u>Dunlin</u> <u>Black-tailed</u> <u>Godwit</u> <u>Curlew</u> <u>Greenshank</u> <u>Redshank</u> <u>Black-headed</u> <u>Gull</u> Sub-site OI458: <u>Shelduck</u> <u>Wigeon</u> <u>Teal</u> <u>Grey Plover</u> <u>Knot</u> <u>Black-tailed</u> <u>Godwit</u> <u>Curlew</u> <u>Greenshank</u> <u>Redshank</u> (As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012) Potential Impacts: The sub-site OI491 which lies to the north of the strategic site nearest the estuary (See Figure 8.0) has	As this potential site (Askeaton Business Park) is located adjacent to but not within two sub-sites OI491 and OI458 disturbance is the key impact. There is a very low potential for direct impact to feeding areas of loss of habitat.	A full Project Level Appropriate Assessment, taking account of the whole SPA, will be required to ensure there are no significant effects to the Natura 2000 site in the context of the sites conservation objectives. Dedicated site counts throughout the summer and winter months will be required for any application at a project level to establish the use, if any, of birds within this Area of Opportunity. Direct physical damage to mobile species: - Avoid siting the structures within sensitive sites - Avoid installation during sensitive seasons (i.e. breeding and moulting) - Site specific surveys at project level to identify the presence of key foraging hotspots and / or resting areas and to aid site selection within the strategic site - Appropriate siting of developments e.g. away from breeding colonies, important feeding and roosting areas, near shore areas and migration corridors - No construction between resting and foraging areas - Avoiding large-scale continuous illuminations Indirect disturbance or loss of species: - Minimise the use of high noise emission activities such as impact piling or blasting - Avoid installation during sensitive periods - Review and consideration of noise reduction techniques (e.g. bubble curtains around the pile) - Use of sound insulation on plant equipment and device design. Any development associated with the testing of tidal energy devices must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Long term population trend stable or increasing • The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference should also be made to the relevant species specific targets for Shelduck, Wigeon, Teal, Lapwing, Knot, Dunlin, Bar-tailed Godwit, Black-tailed Godwit, Curlew, Greenshank, Black Headed Gull, Redshank, Cormorant as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives This rating may change at project level depending on the scale and detail of the project. Both sites are located adjacent to the sub-site and not within therefore depending on the scale of the project no potential impact may occur however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. It should be noted that the ranking system is to be used as a guide at a strategic level only and that a full Appropriate Assessment screening exercise, taking account of the whole SPA, will be required at the project level to ensure there are no significant effects to the Natura 2000 site in the context of the sites conservation objectives. NPWS Conservation Objectives (2012) provides the relative importance of each sub-site based on the broad habitat and the proportional use of sub-sites by each of Special Conservation Interest (SCI) species, relative to the site as a whole during surveys. Species within this sub-site have been given a High, Moderate and low ranking based on the site usage. As further details become available as to the exact type of proposals which will be brought forward for	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts ⁴	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 9 of the qualifying species being recorded at this site coupled with 287 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI439 is moderately sensitive to future development at a strategic level. Sub-site OI458 which lies to the west of the site nearest the Deel (See Figure 8.0). This site has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 12 of the qualifying species being recorded at this site coupled with 1966 waterbirds recorded based on the sum of the peak counts over 2010/2011. This site however is not part of the SPA designation.		this strategic site an assessment of the % loss of principal supporting habitat should be undertaken, its ability to utilise alternative habitats as outlined in conservation objectives together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents which outline the foraging and roosting distribution of each species within the River Shannon and River Fergus Estuaries. In looking at the individual species which have been identified for this site the assessment should consider whether principal supporting habitat from another sub-site will also be effected or is currently being development elsewhere with the SPA in order to make an assessment of the in-combination and cumulative impacts. As both sub-sites are located outside of the Strategic site boundary direct effects in terms of habitat loss or species loss are deemed to be low however in-direct impacts due to disturbance in particular during the construction stage need to be considered.	



Appendix 2 Figure 9 Qualifying features located within close proximity to Limerick Docks and Strategic Site I from the draft SIFP.



Appendix 2 Figure 10.0 Subsite rating based on SIFP assessment of low tide survey locations within close proximity to site

Table 4.0 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Limerick Dock, Co.Limerick from draft Plan

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
Site Natura 2000 Site Code 2165 - Lower River Shannon Theme/Strategic Site Marine Related Industry at Limerick Docks	Estuaries Potential Impacts: Habitat present (Lower Shannon Estuary)	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Introduction of non synthetic & synthetic compounds - Removal of target & non-target species - Scouring - Smothering - Temporary increases in the level of suspended sediments in the water column - Changes in hydrodynamics and geomorphology at dredge and disposal sites	- Careful site selection within strategic sites avoiding sensitive features for construction and installation of structures associated with the Marine Related Industry identified for this site. - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the strategic site - Avoid installation during sensitive seasons - Consider alternative beneficial use options to reduce amounts of material disposed at sea. - Use approved dump site only - The potential effects at the disposal site are minimised under the EPA licensing process which should include an appropriate assessment. - The extent of estuarine communities within the area of potential needs to be determined. The site is located upstream of Limerick City Council WWTP, any future development or discharges at this site should not impact on the assimilative capacity of the receiving water. The ambient river water quality results from the Limerick Main drainage scheme which discharges downstream of this site can be viewed and downloaded monthly from http://www.limerickcity.ie/Water/LimerickMainDrainage/ Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). - The permanent habitat area is stable or increasing, subject to natural processes. - Conserve the marine community type "Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex" surrounding this strategic site. - Early consultation or scoping with the Department of the Environment in advance of formal application is advisable for such proposals in order to determine the project level requirements under Article 6.3 & 6.4 of the Habitats Directive. Any future development within this Strategic Site will need to assess the impacts to water quality and how it will affect the WFD Status and objectives together with the requirements arising from the Marine Strategy Framework Directive.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed.
	Mudflats and sandflats not covered by seawater at low tide. Potential Impacts: Small portion of habitat present on western portion of site only (Deel River Estuary to Ballynacloough River Estuary) as indicated	- Habitat loss - to land - Habitat change - to another marine habitat - Physical disturbance - Siltation rate changes - Introduction of non synthetic & synthetic compounds - Removal of target & non-target species - Scouring - Smothering - Temporary increases in the level of suspended sediments in the water column - Changes in hydrodynamics and geomorphology at dredge and disposal sites	- Any future development within this Strategic Site will need to assess the impacts to water quality and how it will affect the WFD Status and objectives together with the requirements arising from the Marine Strategy Framework Directive. - Any future development within this area of opportunity will need to assess the in-direct impacts to the structure and function of the recorded intertidal areas and any nett loss of habitat will need to be assessed against the integrity of the overall SAC and the use of the site in terms of biomass availability to the conservation interests of the adjacent SPAs. - Should any discharges or consents for discharge be required through the development of this site then direct impacts together with assimilative capacity should also be assessed.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	through NPWS sediment shores GIS data set 1140.		- Much of this site is bounded on the coastal side by embankments which serve to protect both the agricultural land from inundation and the intertidal habitat from encroachment. Maintaining this embankment is critical to the qualifying interest feature. - As the detailed conservation objectives for this SAC has identified this site as having a marine community dominated by intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community and intertidal sand with <i>Scolecopsis squamata</i> and <i>Pontocrates spp</i> community the actual loss of foraging habitats (if any) will need to be determined in terms of potential impact on wader and waterfowl populations at or adjacent to the site. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). • The permanent habitat area is stable or increasing, subject to natural processes. • Conserve the following communities' types in a natural condition: Intertidal sand with <i>Scolecopsis squamata</i> and <i>Pontocrates spp</i> community and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex. • Early consultation or scoping with the Department of the Environment in advance of formal application is advisable for such proposals in order to determine the project level requirements under Article 6.3 & 6.4 of the Habitats Directive.	
	<u>Coastal Lagoons</u> Potential Impacts: No Coastal Lagoons located within the vicinity of the strategic site			
	<u>Vegetated sea cliffs of the Atlantic and Baltic Coasts</u> No Potential Impacts: No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	<u>Salicornia and other annuals colonizing mud and sand</u> Potential Impacts: No record exists for this habitat within the area of interest.			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) Potential Impacts: No record exists for this habitat within the area of interest. However, further un-surveyed areas may be present within the site in particular to the west of the site nearest Ballincurra creek	The potential impacts from the site potential are; - Habitat loss (to land) - Habitat change (to another marine habitat) - Physical disturbance - Siltation rate changes - Water flow - Non synthetic & synthetic compounds - Removal of target & non-target species	- Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. This site was not included in the Saltmarsh Monitoring Project carried out by NPWS/DEHLG Therefore; further un-surveyed areas may be present within the site in particular to the west of the site nearest Ballincurra creek. Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. - As Salt marsh is a priority habitat and future development will need to determine whether it will impact on the habitat either within or outside the SAC boundary. - Any future development within this Strategic Site will need to ensure it does not encroach on ASM habitat or an overall nett loss of the habitat within the SAC occurs. Future development within this site must also take in consideration the potential for the loss of habitat due to the spread of <i>Spartina anglica</i> and must not encourage the spread of <i>Spartina</i> or any alien or invasive species. Any development associated with the Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC (September 2012). - Area stable or increasing, subject to natural processes, including erosion and succession - Habitat distribution: No decline, subject to natural processes. - Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions - Maintain creek and pan structure, subject to natural processes, including erosion and succession - Maintain natural tidal regime - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession - Maintain structural variation within sward - Maintain more than 90% of the saltmarsh area vegetated - Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009) - No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%	None anticipated
	Mediterranean salt meadows (<i>Juncetalia maritimi</i>) Potential Impacts: No record exists for this habitat within the area of interest. However, further un-surveyed areas may be present within the site in particular to the west of the site nearest	The most common impact to this habitat is over-grazing by cattle or sheep. There has been some minor losses of habitat to infilling and reclamation.	This site was not included in the Saltmarsh Monitoring Project carried out by NPWS/DEHLG Therefore; further un-surveyed areas may be present within the site in particular to the west of the site nearest Ballincurra creek. Depending on the extent and location of development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	Ballincurra creek			
	<u>Watercourses of plain to montane levels with the Rannunculus fluitans and Callitriche-Batrachium vegetation</u> No Potential Impacts: Not present			
	<u>Sandbanks which are slightly covered by sea water all the time</u> No Potential Impacts: Not present			
	<u>Large shallow inlets and bays</u> No Potential Impacts: Not present			
	<u>Reefs</u> No Potential Impacts: Not present			
	<u>Perennial vegetation of stony banks</u> No Potential Impacts: Not present			
	<u>Molinia meadows on calcareous, peaty or clay-silt-laden soils (Molinia caerulea)</u>			
	<u>Alluvial forests with Alnus glutinosa and Fraxinus excelsior also Salix spp. And sometimes Quercus robur</u>			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	<u>River Lamprey</u> Potential Impacts: As per “ <i>The Status of EU Protected Habitats and Species in Ireland, 2008</i> ” the 10km national grid squares for this area indicate current distribution for this site.	- Loss of migration route - Artificial barriers can block lampreys’ upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas The main threats to this species include channel maintenance works, barriers to migration such as weirs, gross pollution and specific pollutants.	- In the absence of detailed baseline data on fish communities in the Strategic Site a freshwater fish community composition and abundance survey will be required in any freshwater rivers/streams for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by River Lamprey of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Where River Lmaprey are found to utilise this site detailed project level mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. This should ensure there is; - Access to all water courses down to first order streams - At least three age/size groups of river/brook lamprey present - Mean catchment juvenile density of river/brook lamprey at least 2/m2 - No decline in extent and distribution of spawning beds - More than 50% of sample sites positive in terms of available juvenile habitat The Red List of Amphibians, Reptiles & Freshwater Fish, 2011 has classified the River Lamprey as “of least concern” as the juvenile stages are widely distributed in catchments where suitable habitat exists. While no records exist at this site it is likely that they occur in most rivers that allow access to spawning and nursery areas from the sea. As the Shanagolden River feeds in at the back of this site to the inter-tidal area in-direct effects should be considered at project level assessment.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.
	<u>Brook Lamprey</u> Potential Impacts: As per “ <i>The Status of EU Protected Habitats and Species in Ireland, 2008</i> ” the 10km national grid squares for this area indicate current distribution for this site.	- Loss of migration route. - Artificial barriers can block lampreys’ upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas The main threats to this species include channel maintenance works, barriers to migration such as weirs, gross pollution and specific pollutants.	- In the absence of detailed baseline data on fish communities in the Strategic Site a freshwater fish community composition and abundance survey will be required in any freshwater rivers/streams for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by Brook Lamprey of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Where Brook Lmaprey are found to utilise this site detailed project level mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. This should ensure there is; - Access to all water courses down to first order streams - At least three age/size groups of river/brook lamprey present - Mean catchment juvenile density of river/brook lamprey at least 2/m2 - No decline in extent and distribution of spawning beds - More than 50% of sample sites positive in terms of available juvenile habitat	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			The brook lamprey does not migrate to the marine environment, and the adults do not feed. As the adjacent site is tidal/inter-tidal it is highly unlikely that Brook Lamprey will be present. The site does however bound the Ballinacurra Creek where Brook Lamprey are present.	
	<u>Sea Lamprey</u> Potential Impacts: Known records through out the Shannon Estuary and distribution mapped as present along this stretch in the <i>"The Status of EU Protected Habitats and Species in Ireland, 2008"</i>	- Loss of migration route - Artificial barriers can block lampreys' upstream migration or passage, thereby limiting species to lower stretches and restricting access to spawning areas Any future development associated with the alteration to the sea bed will need to take into consideration the Sea Lamprey and its passage within this area. The Sea Lamprey has been listed in The Red List of Amphibians, Reptiles & Freshwater Fish, 2011 as near threatened. Sea Lamprey may use the section of the Shannon Estuary adjacent to this site for migration from the Sea into Freshwater and therefore in-direct effects will need to be considered at project level.	- In the absence of detailed baseline data on fish communities in the Strategic Site a marine fish community composition and abundance survey will be required in the overall marine aquatic footprint for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by Sea Lamprey of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Where Sea Lamprey are found to utilise this site detailed project level mitigation measures will be required to ensure there are no significant impacts to this species or its habitat. - This should ensure there is; - No decline in extent and distribution of spawning beds (Surveys may be needed here to determine distribution of spawning areas, if any, within site) - At least three age/size groups present Juvenile density at least 1/m² - More than 50% of sample sites positive in terms of available juvenile habitat.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.
	<u>Atlantic Salmon</u> Potential Impacts: Known records through out the Shannon Estuary and distribution mapped as present along this stretch in the <i>"The Status of EU Protected Habitats and Species in Ireland, 2008"</i>	- Medium risk of impact to Atlantic Salmon during migration period when they may use the adjacent river channel for passage. - Should development of this site require dredging works, infilling, reclamation or any type of coastal protection works the risk could be raised to high.	- In-direct impacts will need to be assessed at project level. - In the absence of detailed baseline data on fish communities in the Strategic Site a marine fish community composition and abundance survey will be required in the overall marine aquatic footprint for which the development will take place prior to the commencement of any works. - These detailed fishery surveys will be required to determine the use (if any) by Atlantic Salmon of this Strategic Site across all seasons over a minimum 1-year period. - The sampling season, sampling methods and reporting of results should be agreed with Inland Fisheries Ireland (Shannon) - Suitable mitigation measures would be required specifically for Atlantic salmon should the risk of impact to this species be determined as high at project level once details of the type of development and the level of engineering works and morphological alteration are known. - The design of the project and required mitigation measures should be developed in consultation with IFI. Any development associated with the development of a Aquaculture at this site must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC.	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
			100% of river channels down to second order accessible from estuary - Conservation Limit for each system consistently exceeded - Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling - No significant decline in out-migrating smolt abundance - No decline in number distribution of spawning redds due to anthropogenic causes - Access to all water courses down to first order streams - At least Q4 at all sites sampled by the EPA (Freshwater)	
	<u>Bottle-nosed Dolphin</u> Potential Impacts: Bottle-nose dolphins are present in the greater Shannon Estuary. The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. However, there is very little survey effort upriver of Tarbert, Co Kerry apart from Berrow (2009) but this was restricted to winter months. The results of the static acoustic monitoring undertaken as part of the SIFP project focused on deep water berths within the estuary. The nearest deep water berth to this site where monitoring was undertaken was at Shannon Airport Jetty. Overall, their occurrence is progressively less the further upriver but is still significant even at Shannon Airport (21% days with detections). Bottlenose Dolphins are rarely found as far up-	As this area of opportunity is located within the Shannon Estuary the following potential impacts may arise in relation to Bottlenose Dolphins; - Disturbance through construction, operational and decommissioning works (Physical disturbance – noise) - Disturbance through dumping of dredge spoil at sea should it be required - Impacts to water quality in the water Shannon Estuary as a result of increased discharges - Collision with any infrastructure associated with development, increased shipping	- Background noise assessments would be required in any project level appropriate assessment or licencing for such an activity by the NPWS - Minimise the use of high noise emission activities such as impact piling and blasting associated with shipping/navigation activities - Avoid installation during sensitive periods for bottlenose dolphins - Soft starting piling activities / passive acoustic deterrents – gradually increasing noise produced do allow mammals to move away from activities - Use of mammal observers and passive acoustic monitoring to facilitate implementation of exclusion area during noisy activities - Adherence to the risk assessment and menu of management options outlined in the NPWS Draft Guidance to manage the risk to Marine Mammals from Man-Made Sound Sources in Irish Waters⁵ - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary which can be used across all sectors. - Given the international nature of reducing risk of collisions this issue is being considered further and progressed within the Marine Strategy Framework Directive implementation process. Any project level development should consider the findings of this work. Any development associated with the development of a Marine Related Industry at this site must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC. - Species range within the SAC should not be restricted by artificial barriers to SAC use - Critical areas, representing habitat used preferentially by Bottlenose Dolphins should be maintained in a natural condition - Human activities should occur at levels that do not adversely affect the bottlenose dolphin population within the SAC. - The DAHG Draft “Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters” should be adhered to at all times - Consultation should be undertaken with the Marine research Unit of NPWS, Irish Whale & Dolphin Group and the Shannon Dolphin & Wildlife Foundation prior to the commencement of any works.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	stream as Limerick Dock and therefore any direct impact is deemed to imperceptible. While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction may cause disturbance, should dredging and associated dumping at sea be required impacts to the resident group of bottlenose dolphins in the estuary will also need to be considered.			
	Freshwater Pearl Mussel No Potential Impacts: Not present (nearest populations are located on the north shore in the Cloon and Doonbeg catchments in County Clare)			
	Otter Potential Impacts: The closest record of Otters to this site is from 1980 (Source; Biodiversity Ireland) at Ballynacclough downstream of Ballinacurra Creek. Quercus are currently undertaking an National Otter Survey on behalf of NPWS. Following the publication of these results records may exist for this site. The shoreline of this strategic site has been indicated as part of the 250m commuting buffer in the NPWS, 2012	• In-direct disturbance • Loss of habitat • Loss of access to feeding areas • Loss of breeding areas	- Avoid construction in sensitive areas such as feeding and breeding areas - Minimise the use of high noise emission activities such as impact pilling and blasting - Enforce speed limits for vessels used in construction and establish a code of conduct to avoid disturbance to otters both during construction activities and in transit to construction area if entering areas of high abundance - Avoid installation during sensitive periods - Use of sound installation on equipment - Soft starting pilling activities / passive acoustic deterrents – gradually increasing noise produce do allow otters to move away from activities - Use of bubble curtains (this may only be effective in shallow water) - The use of acoustic deterrents such as pingers or acoustic harassment devices. - Noise from operating turbines can be reduced by using isolators. However this has not been tested in the long term and to account for cumulative effects	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
	Conservation Objectives Ref; Map 17. While no records exist for this site this is most likely as a result of lack of survey or reporting within this site rather than an absence of the species from the site. Therefore, at project level an Otter survey should be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.			
	<u>Bat species (All bat species are protected where they occur under Annex IV of the Habitats Directive either within or outside an SAC)</u> Potential Impacts: All three of these bat species have been recorded during the course of surveys carried out in 2005 within the 10km grid square to the south east of the site: Daubenton's Bat Soprano pipistrelle Leislars Bat Source; Biodiversity Ireland.	A diverse range of threats and impacts currently affect bats and their habitat in Ireland. Wetland drainage and serious water pollution are concerns for Daubenton's Bat. Accidental and deliberate exclusion of nursery roosts from buildings is the main threat to Leisler's bat. Use of pesticides, removal of hedgerows, copses and scrub; and illegal disturbance of roosts in domestic dwellings and other buildings are the main threats identified for the Soprano pipistrelle.	Any future development of this site would require site specific surveys to establish a) any roosting habitats located within the site boundary b) any feeding areas or habitat corridors utilised within the site. Previous records are from road EIS surveys are therefore further ground truthing would be required should development of the	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts ⁶	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
Natura 2000 Site Code 4077-River Shannon and River Fergus Estuaries SPA Theme/ Strategic Site Marine Related Industry at Limerick Docks	Wigeon Teal Cormorant Lapwing Dunlin Black tail Godwit Curlew Greenshank Redshank Black Headed Gull (As listed in the NPWS Detailed Conservation Objectives 17th September 2012) Potential Impacts: The sub-site OI447 which is within the River Shannon and runs along the front of the Limerick Dock site (See Figure 10.0) has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 7 of the qualifying species being recorded at this site coupled with 870 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI447 is moderately sensitive to future development at a strategic level.	As this potential site (Limerick Dock) is located adjacent to the sub-site OI447 there is moderate vulnerability from future development. This rating may change at project level depending on the scale and detail of the project. The Limerick Dock site is located adjacent to the sub-site and takes into account the inter-tidal area at the front of the site therefore depending on the scale of the project no potential impact may occur however indirect impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. It should be noted that the ranking system is to be used as a guide at a strategic level only and that a full Appropriate Assessment screening exercise, taking account of the whole SPA, will be required at the project level to ensure there are no significant effects to the Natura 200 site in the context of the sites conservation objectives. NPWS detailed Conservation Objectives 2012 provides the relative importance of each sub-site based on the broad habitat and the proportional use of sub-sites by each of Special Conservation Interest (SCI) species, relative to the site as a whole during surveys as per NPWS Conservation Objectives 2012. Species within this sub-site have been given a High, Moderate and low ranking based on the site usage. As further details become available as to the exact type of proposals which will be brought forward for this strategic site an assessment of the % loss of principal supporting habitat should be undertaken, its ability to utilise alternative habitats as outlined in the conservation objectives together with reference	A full Project Level Appropriate Assessment, taking account of the whole SPA, will be required to ensure there are no significant effects to the Natura 2000 site in the context of the sites conservation objectives. Dedicated site counts throughout the summer and winter months will be required for any application at a project level to establish the use, if any, of birds within this Area of Opportunity. Direct physical damage to mobile species: - Avoid siting the structures within sensitive sites - Avoid installation during sensitive seasons (i.e. breeding and moulting) - Site specific surveys at project level to identify the presence of key foraging hotspots and / or resting areas and to aid site selection within the strategic site - Appropriate siting of developments e.g. away from breeding colonies, important feeding and roosting areas, near shore areas and migration corridors - No construction between resting and foraging areas - Avoiding large-scale continuous illuminations Indirect disturbance or loss of species: - Minimise the use of high noise emission activities such as impact piling or blasting - Avoid installation during sensitive periods - Review and consideration of noise reduction techniques (e.g. bubble curtains around the pile) - Use of sound insulation on plant equipment and device design. Any development associated with the testing of tidal energy devices must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Long term population trend stable or increasing • The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference should also be made to the relevant species specific targets for Whooper Swan, Shelduck, Whimbrel, Teal, Cormorant, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Bar-tailed Godwit, Black-tailed Godwit, Curlew, Greenshank, Redshank, Black Headed Gull, as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives	Where appropriate mitigation measures cannot remove the potential for significant effects an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no options for avoiding likely significant effects the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project.

Location	Qualifying Interests & Potential Impacts ⁶	Likely Potential Impacts from the Strategic Site include	Mitigation (to ensure key targets are maintained)	Residual Impacts
		to the waterbird distribution discussion notes from the conservation objectives supporting documents which outline the foraging and roosting distribution of each species within the River Shannon and River Fergus Estuaries. In looking at the individual species which have been identified for this site the assessment should consider whether principal supporting habitat from another sub-site will also be effected or is currently being development elsewhere with the SPA in order to make an assessment of the in-combination and cumulative impacts.		

ACRONYMS

AWB	Artificial Water Body
BAP	Biodiversity Action Plan
CFRAM	Catchment Flood Risk Assessment Management
CMP	Conservation Management Plan
DAFM	Department of Agriculture, Food and the Marine
DCENR	Department of Communications, Energy and Natural Resources
DoEHLG	Department of Environment, Community and Local Government
EIA	Environment Impact Assessment
EPA	Environmental Protection Agency
EU	European Union
IRBD	International River Basin District
NHA	Natural Heritage Area
NPWS	National Parks and Wildlife Service
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
ShIRBD	Shannon International River Basin District
SPA	Special Protection Area
SIFP	Strategic Integrated Framework Plan
WFD	Water Framework Directive

GLOSSARY

Acidification	The rough canopies of mature evergreen forests are efficient scavengers of particulate and gaseous contaminants in polluted air. This results in a more acidic deposition under the forest canopies than in open land. Chemical processes at the roots of trees, evergreens in particular, further acidify the soil and soil water in forest catchments. When the forests are located on poorly buffered soils, these processes can lead to a significant acidification of the run-off water and consequent damage to associated streams and lakes.
Alien species	Invasive alien species are non-native plants or animals that successfully establish themselves in aquatic and fringing habitats and damage our natural flora and fauna.
Appropriate Assessment	An assessment of the effects of a plan or project on the Natura 2000 network. The Natura 2000 network comprises Special Protection Areas under the Birds Directive, Special Areas of Conservation under the Habitats Directive and Ramsar sites designated under the Ramsar Convention (collectively referred to as European sites).
Aquifers:	A water bearing rock which readily transmits water to wells and springs.
Artificial water body:	A body of surface water created by human activity. It is known as a heavily modified water body if, as a result of physical alterations by human activity, it is changed substantially in character as designated by an individual Member State and in accordance with the provisions of Annex II of the Water Framework Directive.
Baseline environment:	A description of the present state of the environment of the P/P area.
Biodiversity:	Word commonly used for biological diversity and defined as assemblage of living organisms from all habitats including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.
Birds Directive:	Council Directive of 2nd April 1979 on the conservation of wild birds (79/409/EEC).
Coastal Waters:	Is that area of surface water on the landward side of a line, every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured, extending where appropriate up to the outer limit of transitional waters.
Cumulative effects:	Effects on the environment that result from incremental changes caused by the strategic action together with other past, present, and reasonably foreseeable future actions. These effects can result from individually minor but collectively significant actions taking place over time or space.

Ecology:	The study of the relationship among organisms and between those organisms and their non-living environment.
Ecosystem:	A community of interdependent organisms together with the environment they inhabit and with which they interact, and which is distinct from adjacent communities and environments
Ecological status:	Is an expression of the structure and functioning of aquatic ecosystems associated with surface waters. Such waters are classified as being of good ecological status when they meet the requirements of the Directive.
Environmental assessment:	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 (in accordance with Articles 4 to 9 of the SEA Directive).
Environmental indicator:	An environmental indicator is a measure of an environmental variable over time, used to measure achievements of environmental objectives and targets.
Environmental objective:	Environmental objectives are broad, overarching principles which should specify a desired direction of environmental change.
Environmental receptors:	Include biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage (including architectural and archaeological) and landscape as listed in the SEA Directive. This list is not exhaustive, and can include other receptors which may arise for a particular P/P.
Environmental report (ER):	A document required by the SEA Directive as part of a strategic environmental assessment which identifies, describes and evaluates the likely significant effects on the environment of implementing a plan or programme.
Eutrophic:	A eutrophic lake is a lake with high primary productivity, the result of high nutrient content.
Eutrophication:	Enrichment of water by nutrients (phosphorus and nitrogen). The nutrients accelerate plant growth, which disturbs the balance of aquatic plants and animals and affects water quality.
Good status:	Is a general term meaning the status achieved by a surface water body when both the ecological status and its chemical status are at least good or, for groundwater, and when both its quantitative status and chemical status are at least good.
Groundwater:	All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil. This zone is commonly referred to as an aquifer which is a subsurface layer or layers of rock or other geological strata of sufficient porosity and

	permeability to allow a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Habitats Directive:	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna.
Hierarchy of plans:	Both higher and lower level P/P relevant to the P/P being assessed.
Hydromorphology:	A study of the quantity and dynamics of water flow within a river/channel that has variations in its width, depth, structure and substrate of bed and riparian zone
Inland Surface Waters:	All standing or flowing water on the surface of the land (such reservoirs, lakes, rivers and coastal waters) and all groundwater on the landward side of the baseline from which the breadth of territorial waters is measured.
Interrelationships:	Associations or linkages, related to environmental impact of the proposed P/P usually on environmental receptors.
Key environmental issues:	Those significant environmental issues, which are of particular relevance and significance within a P/P area and/or the zone of influence of that P/P. These issues should be identified during SEA Scoping process.
Mitigation measures:	Measures to avoid/prevent, minimise/reduce, or as fully as possible, offset/compensate for any significant adverse effects on the environment, as a result of implementing a P/P.
Monitoring:	A continuing assessment of environmental conditions at, and surrounding, the plan or programme. This determines if effects occur as predicted or if operations remain within acceptable limits, and if mitigation measures are as effective as predicted. The primary purpose of monitoring is to identify significant environmental effects which arise during the implementation stage against those predicted during the plan preparation stage.
Natural Heritage Area (NHA):	An area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection.
Plan or Programme:	Including those co-financed by the European Community as well as any modifications to them: - which are subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government, and - which are required by legislative, regulatory or administrative provisions.

	In accordance with the SEA Directive, P/P that require SEA are those that fulfill the conditions listed in Article 2(a) and Article 3 of the SEA Directive.
Ramsar sites:	Sites designated as internationally important wetland habitats under the International Convention on Wetlands of International Importance (1976) (Ramsar Convention).
River Basin:	Means the area of land from which all surface water run-off flows, through a sequence of streams, rivers and lakes into the sea at a single river mouth, estuary or delta.
River Basin Districts (RBD):	administrative areas for coordinated water management and are comprised of multiple river basins (or catchments), with cross-border basins (i.e. those covering the territory of more than one Member State) assigned to an international RBD.
Scoping:	the process of deciding the content and level of detail of an SEA, including the key environmental issues, likely significant environmental effects and alternatives which need to be considered, the assessment methods to be employed, and the structure and contents of the Environmental Report
Screening:	The determination of whether implementation of a P/P would be likely to have significant environmental effects on the environment. The process of deciding whether a P/P requires an SEA.
SEA Directive:	Directive 2001/42/EC 'on the assessment of the effects of certain plans and programmes on the environment'.
SEA Statement:	A statement summarising: - how environmental considerations have been integrated into the P/P - how the ER, the opinions of the public, and designated authorities, and the results of transboundary consultations have been taken into account - the reasons for choosing the P/P as adopted in the light of other reasonable alternatives.
Significant effects:	Effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors.
Special Area of Conservation (SAC):	Site designated according to the habitats directive.

Special Protection Area (SPA):	An area designated under the European Directive on the Conservation of Wild Birds.
Statutory authority:	The authority by which or on whose behalf the plan or programme is prepared.
Statutory Instrument:	Any order, regulation, rule, scheme or byelaw made in exercise of a power conferred by statute.
Surface water:	Means inland waters, except groundwater, which are on the land surface (such as reservoirs, lakes, rivers, transitional waters, coastal waters and, under some circumstances, territorial waters) which occur within a river basin.
Transitional waters:	Bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their vicinity to coastal waters, but which are substantially influenced by freshwater flows.
Water body:	A discrete and significant element of surface water such as a river, lake or reservoir, or a distinct volume of groundwater within an aquifer.
Water Framework Directive:	The Water Framework Directive is a new piece of European legislation that promotes a new approach to water management through river basin planning. The legislation addresses inland surface waters, estuarine waters, coastal waters and groundwater.

Ireland & Northern Ireland

- Dublin
- Belfast
- Cork
- Galway
- Limerick
- Letterkenny
- Sligo

Global

- Africa
- Australia Asia Pacific
- Brazil
- Canada
- Middle East
- Russia
- The Netherlands
- United Kingdom
- United States of America